

The assessment of indicator trends against SDG-related EU objectives and targets

Data coverage and sources

Data in the EU SDG monitoring reports are mainly presented for the aggregated EU level, referring to the current EU composition (27 Member States). In addition to the EU Member States, data for the EU [candidate countries](#) and the countries of the [European Free Trade Association \(EFTA\)](#) are included in the country-level comparisons throughout the report when available, complementing the EU-level analysis. When data availability allows, global comparisons of the EU with other large economies in the world (such as the United States, Japan and China) are also presented.

In order to reflect the 15-year scope of the 2030 Agenda, the analysis of trends is, as far as possible, based on data for the past 15 years. However, for a number of indicators, in particular those based on the EU Statistics on Income and Living Conditions (EU-SILC), data are only available from 2010 or 2015 onwards.

The data presented in the 2023 report were mainly extracted in early April 2023. Additionally, the release of EU Labour Force Survey (LFS) data for 2022 was taken into account as far as data were available by the end of April 2023. Most of the data used to compile the indicators stem from the standard Eurostat collection of statistics through the European Statistical System (ESS), but a number of other data sources have also been used, including other European Commission services, the European Environment Agency (EEA), the European Institute for Gender Equality (EIGE) and the [OECD](#).

Eurostat's website contains a section dedicated to the EU SDG indicator set. Eurostat online data codes, such as [sdg_01_10](#), allow easy access to the most recent data ⁽¹⁾. The website also includes a section called '[Statistics Explained](#)', presenting the full range of statistical subjects covered by Eurostat in an easy-to-understand way. It works in a similar way to Wikipedia, offering an encyclopaedia of European statistics for everyone, complemented by a statistical glossary clarifying all terms used and numerous links to further information and the latest data and metadata.

Treatment of breaks in time series

Breaks in time series occur when the data collected in a specific year are not comparable with the data from previous years. This could be caused by a change in the classification used, the definition of the variable, the data coverage or other reasons. Breaks in time series could affect the continuity

and consistency of data over time. However, it should be noted that such breaks may not necessarily undermine the reliability of the time series.

In the course of preparing the annual monitoring reports, a case-by-case assessment of breaks in times series is conducted to determine the extent to which a break would affect the assessment of an indicator. In cases where a break is considered significant enough to affect the assessment of an indicator trend or the comparability between countries, the analysis of the indicator is adjusted accordingly. Breaks in times series are indicated throughout the report in footnotes below the graphs.






Assessment of indicator trends

The SDG monitoring reports provide an assessment of indicator trends against SDG-related EU objectives and targets. The assessment method considers whether an indicator has moved towards or away from the sustainable development objective, as well as the speed of this movement. The method focuses on developments over time and not on the 'sustainability' of the status ⁽²⁾.

Ideally, the trends observed for each indicator would be compared against theoretical trends necessary to reach either a quantitative target set within the political process or a scientifically established threshold. However, this approach is only possible for a limited number of indicators, where an explicit quantified and measurable target exists for the EU. In the remaining cases, a transparent and simple approach across the indicators is applied to avoid ad hoc value judgments. The two approaches are explained in more detail below.

The assessment of indicator trends is visualised in the form of arrows (see Table 1). The direction of the arrows shows whether the indicators are moving in a sustainable direction or not. This direction does not necessarily correspond to the direction in which an indicator is moving. For example, a reduction of the long-term unemployment rate, or of greenhouse gas emissions, would be represented with an upward arrow, as reductions in these areas mean progress towards the sustainable development objectives.

Table 1: Assessment categories and associated symbols

Symbol	With quantitative target	Without quantitative target
	Significant progress towards the EU target	Significant progress towards SD objectives
	Moderate progress towards the EU target	Moderate progress towards SD objectives
	Category not applicable	No progress towards SD objectives
	Insufficient progress towards the EU target	Moderate movement away from SD objectives
	Movement away from the EU target	Significant movement away from SD objectives
:	Calculation of trend not possible (e.g. time series too short)	

Depending on whether or not there is a quantitative EU policy target, two cases are distinguished, as shown in Table 1. For indicators with a quantitative target, the arrows show if, based on past

progress, the EU is on track to reaching the target. For indicators without a quantitative target, the arrows show whether the indicator has moved towards or away from the sustainable development objective, and the speed of this movement. The assessment method therefore differs slightly for these two types of indicators, as explained further below.

As far as possible, indicator trends are assessed over two periods:

- The **long-term trend**, which is based on the evolution of the indicator over the past 15-year period (usually 2006 to 2021 or 2007 to 2022). The long-term trend is also calculated for shorter time series if data are available for at least 10 consecutive years.
- The **short-term trend**, which is based on the evolution of the indicator during the past five-year period (usually 2016 to 2021 or 2017 to 2022). In a few exceptional cases, the short-term trend is calculated for shorter time periods, as long as data are available for at least three consecutive years.

Two arrows — for the assessment of the long-term and short-term trends — are therefore usually shown for each indicator, providing an indication of whether a trend has been persistent or has shown a turnaround at a certain point in time.

Method 1: Indicators without quantitative targets






In the absence of a quantified target, it is only possible to compare the indicator trend with the desired direction. An indicator is making progress towards the SD objectives if it moves in the desired direction, and is moving away from the SD objectives if it develops in the wrong direction. The assessment is generally based on the '[compound annual growth rate](#)' (CAGR) formula, which assesses the pace and direction of an indicator trend. The CAGR formula uses the data from the first and the last years of the analysed time span and is used to calculate the average annual rate of change of the indicator (in %) between these two data points:

$$(1) \text{ CAGR} = \left(\frac{y_t}{y_{t_0}} \right)^{\frac{1}{t-t_0}} - 1$$

where: t_0 = base year, t = most recent year, y_{t_0} = indicator value in base year, y_t = indicator value in most recent year

To ensure a consistent approach throughout the report, the CAGR formula is applied to all indicators irrespective of their unit, meaning that it is also used for indicators already given as percentages (such as employment or poverty rates). The trend assessment is based on comparing the calculated growth rate of an indicator with a certain threshold, which is set at 1 % growth per year. The 1 % threshold is easy to communicate, and Eurostat has used it in its monitoring reports for more than 10 years. It is discerning enough to ensure there is a significant movement in the desired direction. Furthermore, it allows a nuanced picture to be presented, with a sufficient number of indicators falling into all four categories ⁽³⁾. The threshold should not be confused with the level of EU ambition on a given topic. It should also be noted that for some indicators, such as loss of biodiversity, any movement away from the SD objectives might be irreversible and lead to environmental, economic and social changes, thus affecting many SDGs simultaneously. The table below shows the applied thresholds and the resulting symbols.

Table 2: Thresholds for assessing trends of indicators without quantitative targets

Growth rate (CAGR) in relation to desired direction	Symbol
$\geq 1\%$	
$< 1\%$ and $> 0\%$	
$= 0\%$	
$< 0\%$ and $> -1\%$	
$\leq -1\%$	

Method 2: Indicators with quantitative targets

The assessment of trends for indicators with targets is based on the CAGR described above and also takes into account concrete targets set in relevant EU policies and strategies (see Table 4). In this case, the actual (observed) growth rate is compared with the (theoretical) growth rate that would have been required up to the most recent year for which data are available in order to meet the target in the target year. This comparison is done for both the long-term (past 15 years) and short-term (past 5 years) periods and does not take into account projections of possible future developments of an indicator. The calculation of actual and required indicator trends is based on the CAGR formula and includes the following three steps:

Actual (observed) growth rate:

$$(2a) \quad CAGR_a = \left(\frac{y_t}{y_{t_0}} \right)^{\frac{1}{t-t_0}} - 1$$

where: t_0 = base year, t = most recent year, y_{t_0} = indicator value in base year, y_t = indicator value in most recent year

Required (theoretical) growth rate to meet the target:

$$(2b) \quad CAGR_r = \left(\frac{x_{t_1}}{y_{t_0}} \right)^{\frac{1}{t_1-t_0}} - 1$$





where: t_0 = base year, t_1 = target year, y_{t_0} = indicator value in base year, x_{t_1} = target value in target year

Ratio of actual and required growth rate:

$$(2c) \quad R_{a/r} = \frac{CAGR_a}{CAGR_r}$$

The table below shows the thresholds applied for the $R_{a/r}$ ratio and the resulting symbols. As the assessment is based on the comparison of the actual to the required growth rate, a neutral category (as included in Table 2 above) is not applicable in this case.

Table 3: Thresholds for assessing trends of indicators with quantitative targets

Ratio of actual and required growth rate	Symbol
≥ 95 %	
< 95 % and ≥ 60 %	
< 60 % and ≥ 0 %	
< 0 %	

The growth rates (CAGR) upon which the arrow symbols are based are provided in the overview tables in the beginning of a chapter. For indicators with quantitative targets, the note gives the average annual growth rates observed for the two assessment periods as well as the growth rates that would be required to meet the target in the target year. For indicators without quantitative targets, only the observed growth rates are given.

The table below shows the EU policy targets that have been considered for assessing indicator trends over the long- and short-term periods, to give an indication of whether the developments observed mean indicators are on track to meet their respective target in the target year.

Table 4: EU policy targets considered for assessing indicator trends

Indicator	Target	Policy reference
People at risk of poverty or social exclusion (SDG 1)	Reduce the number of people at risk of poverty or social exclusion by 15 million by 2030, including at least 5 million children	European Pillar of Social Rights Action Plan
Area under organic farming (SDG 2)	At least 25 % of the EU's agricultural land should be under organic farming by 2030	Farm to Fork strategy
Premature deaths due to exposure to fine particulate matter (PM _{2.5}) (SDG 3, SDG 11)	Reduce the health impacts of air pollution by at least 55 % by 2030	Zero Pollution Action Plan
People killed in road crashes (SDG 3, SDG 11)	Halving the overall number of road deaths in the EU by 2030 starting from 2019	EU road safety policy framework 2021–2030

Indicator	Target	Policy reference
Low achievers in reading, maths and science (SDG 4)	The share of low-achieving 15-year-olds in reading, mathematics and science should be less than 15 % by 2030	European Education Area
Participation in early childhood education (SDG 4)	At least 96 % of children between 3 years old and the starting age for compulsory primary education should participate in early childhood education and care by 2030	European Education Area
Early leavers from education and training (SDG 4)	The share of early leavers from education and training should be less than 9 % by 2030	European Education Area
Tertiary educational attainment (SDG 4, SDG 9)	The share of 25 to 34 year-olds with tertiary educational attainment should be at least 45 % by 2030	European Education Area
Gender employment gap (SDG 5)	Halve the gender employment gap by 2030 compared with 2019	European Pillar of Social Rights Action Plan
Primary and final energy consumption (SDG 7)	Reduction of final energy consumption of at least 11.7 % in 2030, compared with the energy consumption forecasts for 2030 made in 2020; for monitoring purposes this has been translated into absolute levels of primary and final energy consumption	Agreement between EU Council and Parliament on 29 March
Share of renewable energy in gross final energy consumption (SDG 7, SDG 13)	Raise the share of renewable energy in the EU's overall energy consumption to 42.5 % by 2030 (with an additional 2.5 % indicative top up that would allow to reach 45 %)	Agreement between EU Council and Parliament on 30 March
Young people neither in employment nor in education and training (NEET) (SDG 8)	Decrease the rate of young people neither in employment, nor in education or training (NEETs) aged 15 to 29 to 9 % by 2030	European Pillar of Social Rights Action Plan
Employment rate (SDG 8)	At least 78 % of the population aged 20 to 64 should be in employment by 2030	European Pillar of Social Rights Action Plan
Gross domestic expenditure on R&D (SDG 9)	Increasing combined public and private investment in R&D to 3 % of GDP	Council Recommendation on a Pact for Research and Innovation in Europe
Share of households with high-speed internet connection (SDG 9, SDG 17)	By 2030, all European households should be covered by a gigabit network	2030 Digital Compass
Recycling rate of municipal waste (SDG 11)	Increase the preparing for re-use and the recycling of municipal waste to a minimum of 60 % by weight by 2030	Directive (EU) 2018/851
Circular material use rate (SDG 12)	Double the EU's circular material use rate until 2030	Circular Economy Action Plan
Net greenhouse gas emissions (SDG 13)	Reduce net greenhouse gas emissions by 55 % until 2030 compared to 1990	European Climate Law
Net greenhouse gas emissions from land use, land use change and	Net greenhouse gas removals in the LULUCF sector should reach 310 million tonnes of CO ₂ equivalent by 2030	Fit for 55 package

Indicator	Target	Policy reference
forestry (LULUFC) (SDG 13)		
Marine protected areas (SDG 14)	Protect a minimum of 30 % of the EU's sea area by 2030	EU Biodiversity Strategy for 2030
Terrestrial protected areas (SDG 15)	Protect a minimum of 30 % of the EU's land area by 2030	EU Biodiversity Strategy for 2030
Official development assistance (SDG 17)	Provide 0.7 % of gross national income (GNI) as ODA within the timeframe of the 2030 Agenda	The new European Consensus on Development

Method for calculating average scores at the goal level

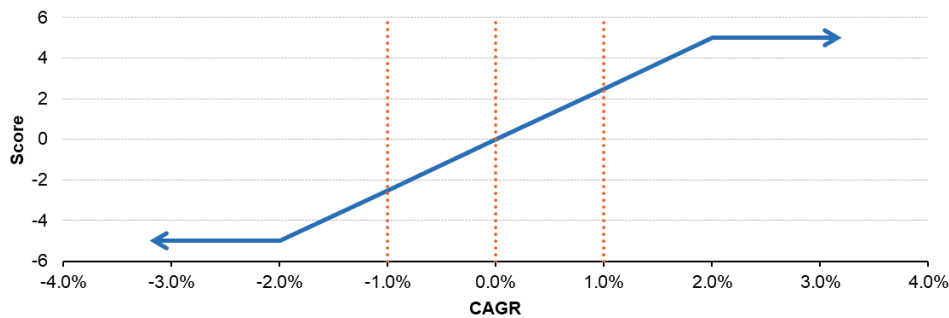
In the synopsis and the country profiles chapters of the SDG monitoring reports, average scores of the indicators are used to rank the 17 SDGs according to their level of progress over the short-term (past 5 years) period. The calculation of average scores on the goal level is based on the calculations described above for the indicators that have been chosen to monitor the respective SDG. For indicators without quantitative targets, the CAGR (see formula (1) above) is used. For indicators with quantitative targets, the ratio of actual to required growth (see formula (2c) above) is used. These values are inserted into a scoring function (which is different for indicators with and without quantitative target) in order to calculate a score ranging from + 5 (best score) to – 5 (worst score) for each indicator. The average scores on the goal level are then calculated as the arithmetic mean of the individual scores of the indicators chosen for monitoring the respective goal (including both main and multipurpose indicators) ⁽⁴⁾. Consequently, these goal-level scores can also range from + 5 (best score) to – 5 (worst score).

Note that the scoring functions use broader cut-off points than the thresholds shown in Tables 2 and 3 in order to allow for larger variability in the scores (an indicator with a CAGR of, for example, 1.1 % per year receives a different score than an indicator with a CAGR of, for example, 5.0 % per year, although they both fall into the same assessment category of Table 2). However, the scores at the threshold points in Tables 2 and 3 are harmonised (the threshold values shown in both Tables result in scores of + 2.5, 0 and – 2.5, respectively) to ensure that indicators with and without quantitative targets have the same 'weight' when calculating the average score at the goal level. Indicators for which trends cannot be assessed (for example due to insufficient time series) are not taken into account for the average score on the goal level.

Scoring function for indicators without quantitative targets

Figure 1 below shows the scoring function for indicators without quantitative targets. In this case, the scoring function is a linear transformation, with cut-off points set at growth rates (CAGR) of 2.0 % and – 2.0 %. Indicators with a growth rate of exactly 0.0 % receive a score of 0. Indicators with growth rates of 2.0 % or above in the desired direction receive a score of + 5, indicators with growth rates of 2.0 % or above in the wrong direction receive a score of – 5.

Figure 1: Scoring function for indicators without quantitative target

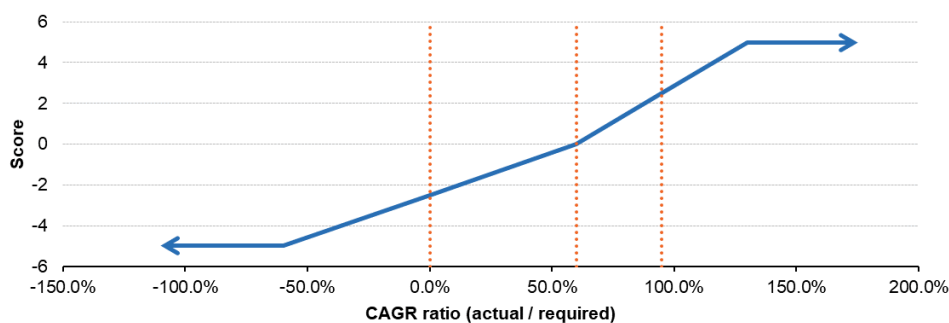


Note: The orange dotted lines represent the thresholds used for defining the assessment category of the indicator, as shown in Table 2 above.

Scoring function for indicators with quantitative targets

Figure 2 below shows the scoring function for indicators with quantitative targets. The scoring function is not linear in this case, with cut-off points set at CAGR ratios (actual to required growth) of 130 % and – 60 % (ratios below zero indicate a movement away from the target). Indicators with a CAGR ratio of 60 % receive a score of 0. Indicators with CAGR ratios of 130 % or above receive a score of + 5, indicators with CAGR ratios of – 60 % or below receive a score of – 5.

Figure 2: Scoring function for indicators with quantitative target



Note: The orange dotted lines represent the thresholds used for defining the assessment category of the indicator, as shown in Table 3 above.

Method for calculating countries' status scores

The country profiles chapter in the SDG monitoring report applies an additional calculation of Member States' SDG status, referring to the relative position of countries towards each other based on the most recent year of data availability for each indicator. Using the formulas below, a country's status score of an indicator is calculated relative to the range of values from the worst to the best performing country, whereby outliers are excluded ⁽⁵⁾. The calculation is based on normalisation of indicator values with a min-max-method:

$$(3a) X_{ic} = \frac{x_{ic} - \min_i\{x_{ic}\}}{\max_i\{x_{ic}\} - \min_i\{x_{ic}\}} \quad (3b) X_{ic} = \frac{\max_i\{x_{ic}\} - x_{ic}}{\max_i\{x_{ic}\} - \min_i\{x_{ic}\}}$$

X_{ic} is the normalized value of indicator x_{ic} , with i being the indicator, c the country and \max_i and \min_i being the maximum and minimum values of the indicator across all Member States for the most recent year of available data. Equation (3a) is used when higher indicator values are better (e.g. employment rate), while equation (3b) is used when lower values are better (e.g. greenhouse gas emissions per capita). Status scores for the aggregate EU level are calculated in the same way, using the EU aggregates available in the Eurostat database. The aggregation of a country's indicator scores at the SDG level is explained in the country profiles chapter.

Notes

(¹) In the EU SDG monitoring report, online data codes are given as part of the source below each table and figure. When clicking on the online data code, the reader is directly led to the indicator table showing the most recent data. Alternatively, the data can be accessed by entering the data code in the search field on the Eurostat website. The indicator table also contains a link to the source dataset, which generally presents more dimensions and longer time series than the indicator table.

(²) The following study discusses and analyses the differences in assessment methods of status (in a given year) and progress (change over time) for the EU Member States: Hametner, M., Kostetckaia, M. (2020), *Frontrunners and laggards: How fast are the EU member states progressing towards the sustainable development goals?*, Ecological Economics 177.

(³) Higher thresholds (for example, 2 %) have been tested and finally rejected, since they make the overall picture less interesting, as a vast majority of indicators would fall in the two 'moderate' categories.

(⁴) In this 2021 edition of the monitoring report, the following exceptions apply: for SDG 15, the aggregation at the goal-level takes into account the trends in the soil sealing index (sdg_15_41) for the period 2009 to 2015.

(⁵) Outliers are identified by means of the interquartile range (IQR) method (see Hoaglin, D. C., Iglewicz, B., & Tukey, J. W. (1986). *Performance of Some Resistant Rules for Outlier Labeling*. *Journal of the American Statistical Association*, 81(396), 991-999 and Hoaglin, D. C., & Iglewicz, B. (1987). *Fine-Tuning Some Resistant Rules for Outlier Labeling*. *Journal of the American Statistical Association*, 82(400), 1147-1149). This method involves calculating the first and third quartiles of the country distribution, with the IQR representing the difference between these two values. The boundaries for identifying outliers are then determined by multiplying the IQR by the factor two and by subtracting/adding these values from/to the first/third quartile, respectively. Values below/above these thresholds are considered outliers and are excluded during indexing, meaning that countries identified as outliers with this method are assigned the value of the next best/worst country for the indexing.