



Monitoring progress towards the 8th Environment Action Programme

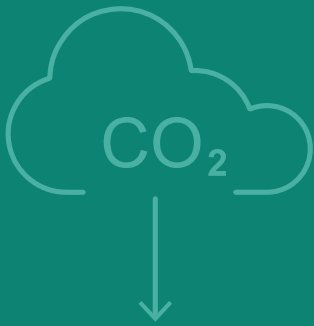
Compilation of the 8th EAP headline indicators





8th Environment Action Programme

Total net greenhouse gas emission trends
and projections in Europe



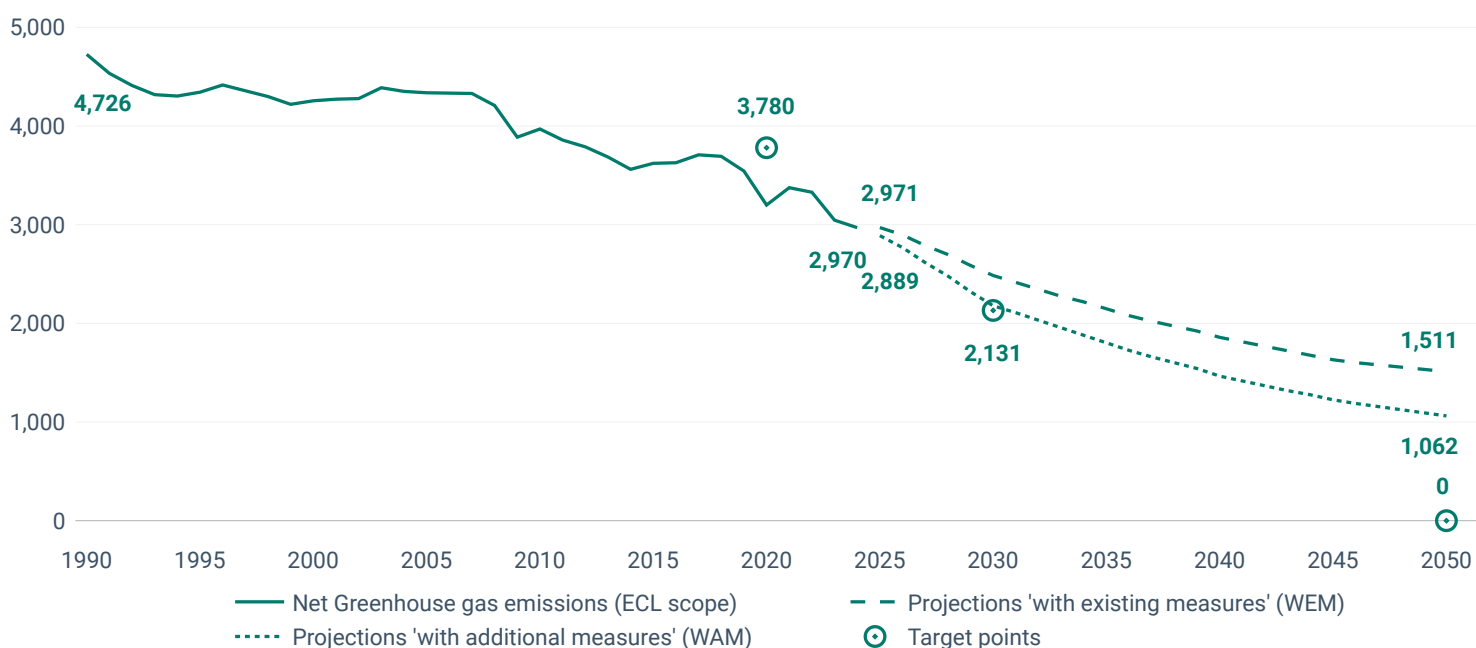
Total net greenhouse gas emission trends and projections in Europe

Published 06 Nov 2025

Net greenhouse gas (GHG) emissions in the European Union fell by 36% between 1990 and 2023, including international transport as regulated by EU Climate law. Preliminary estimates indicate a year-on-year drop of 2.5% between 2023 and 2024. Projections based on current policies and measures reported by Member States suggest that a 47% reduction in net emissions will be reached by 2030 compared to 1990 levels. Integrating countries' additionally planned policies and measures closes most of the ambition gap - putting the EU at a projected 54% reduction by 2030 compared to 1990 levels.

Figure 1. Progress towards achieving climate targets in the EU-27

Million tonnes of CO₂ equivalent (MtCO₂e)



The [European Climate Law](#) sets a binding **target** to achieve climate neutrality by 2050 and reduce net GHG emissions by at least 55% in 2030, compared to 1990.

Between 1990 and 2023, EU net GHG emissions fell by 36%, while GDP grew by nearly 70% over the same period. This achievement takes the carbon sink from the land use, land use change and forestry sector ([LULUCF](#)) into account and includes emissions of international aviation and maritime, as regulated by EU law (EU target scope)^[1].

Preliminary estimates indicate that net EU GHG emissions **fell a further 2.5%** below 2023 levels in 2024. This marks a deceleration from the record year-on-year emission reduction of 8% in 2023, bringing estimated 2024 emissions to 37% below 1990 levels.

The observed reduction in GHG emissions has followed a gradual strengthening of climate mitigation policies over the past two decades. The decrease can be largely attributed to **shifts in energy production** methods, notably a significant decline in coal usage and growth in the adoption of renewable energy sources. There has also been a modest reduction in total energy

consumption, and substantial decreases in GHG emissions linked to specific industrial production processes^[2].

In 2024 the energy supply sector recorded an estimated 9% **reduction** in GHG emissions versus 2023, while GHG emissions from both the industrial and buildings sector remained at the **same level** as the previous year. The transport sector experienced a **limited increase** in emissions of 0.7% compared to 2023, while agricultural sector emissions **decreased** by 1.2%. For the second year, estimates indicate a modest increase in the GHG sink from LULUCF, suggesting the potential reversal of a negative trend that saw LULUCF removals declining since 2013.

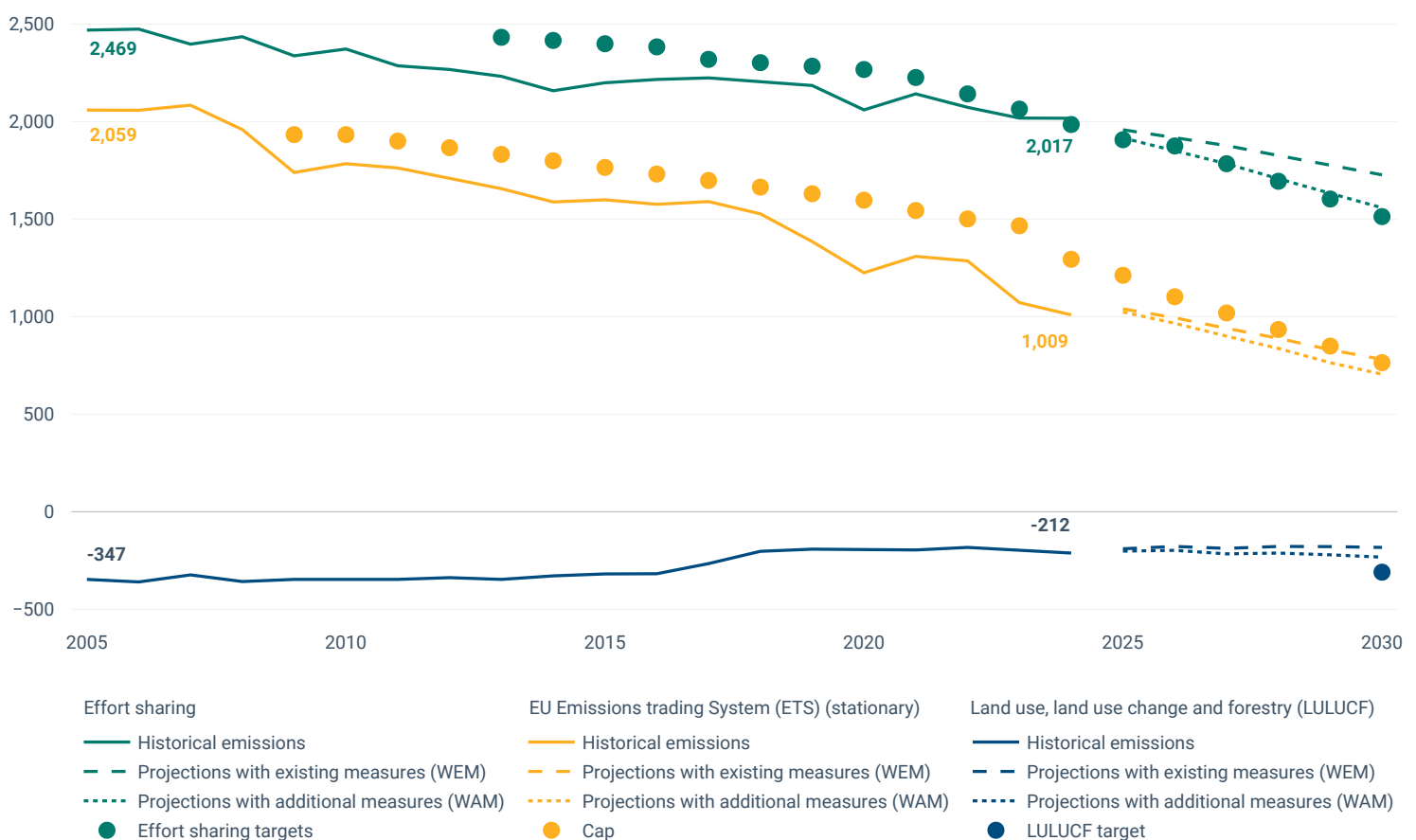
Current and planned policy measures across the EU are expected to contribute to **sustaining** emission reductions. Member States' latest projections show the policies and measures currently in place would achieve a reduction of 47% in net emission levels by 2030 compared to 1990.

The projected reduction would reach 54% when planned **additional measures** are taken into account, leaving a one-percentage point gap towards the 55% target. New EU-wide policy tools such as the emission trading system for buildings, road transport and additional sectors will strengthen the economic case to reduce emissions.

The gap between the targets and projected impact of current and planned measures widens beyond 2030: accounting for currently adopted and planned measures, net emissions are **projected** to reach a level of 69% below 1990 levels in 2040 and 78% in 2050. These projections fall behind the recommended 90% reduction target for 2040 and the legally binding climate neutrality target for 2050. This indicates a need to continue developing ambitious policies to reduce emissions in all sectors in the coming years and decades.

Figure 2. Effort Sharing, ETS, LULUCF trends and projections in the EU-27

Million tonnes of CO₂ equivalent (MtCO₂e)



Three **pivotal EU policies** target GHG emissions and removals. Each is accompanied by clear binding goals for 2030:

- The **EU Emission Trading System (EU ETS)** covers GHG emissions from stationary installations in the power sector and large industrial plants. It also includes CO₂ emissions from aviation since 2012. Emissions from stationary installations have decreased by 51% between 2005 and 2024, largely driven by the decarbonisation of the power sector. Stationary emissions

showed a 6% decrease in 2024 compared to 2023, linked to emission reduction in the energy supply sector. At the same time, aviation ETS emissions increased by more than 15%. Projections taking into account current and planned measures indicate an expected 66% reduction by 2030, compared to 2005 levels for stationary installations.

- The [Effort Sharing Regulation \(ESR\)](#) governs **national GHG reduction targets**, covering sectors such as transport, buildings and agriculture. The reduction in these emissions has been less pronounced compared to those governed by the EU ETS, showing a 20% decrease between 2005 and 2023, with estimates indicating almost no progress between 2023 and 2024. Yet, projections including additional measures suggest that most of the gap towards the target for 2030 will be filled in future years, with Effort Sharing emissions expected to reach a reduction of 38% compared with the target of 40%.
- The [Land Use, Land Use Change and Forestry \(LULUCF\)](#) sector represented a net carbon sink of about 198MtCO_{2e} in 2023, corresponding to the absorption of 6% of the EU's total GHG emissions. Although the initial estimates for 2024 show a two-year reversal of this trend, the carbon sink has been shrinking continuously over the last decade. GHG projections as submitted by Member States foresee a rather stable carbon sink, which would not permit achieving a target sink of 310MtCO_{2e} by 2030.

▼ Supporting information

Definition

This indicator presents past and projected GHG emission trends in Europe and assesses the progress of the EU towards its GHG targets, within the scope defined by the European Climate Law. The EU's total GHG emissions include GHG emissions from land use, land use change and forestry (LULUCF) and portions of emissions from international aviation and maritime transport, as regulated by EU law.

In addition to the overall GHG emissions, this indicator presents disaggregated trends to illustrate the development of emissions covered by the EU Emission Trading Scheme (ETS) and the Effort Sharing Legislation as well as from land use, land use change and forestry (LULUCF) along an assessment of the EU's progress towards its 2030 and 2050 climate ambitions.

The indicator covers all 27 Member States of the European Union.

Methodology

Methodology for indicator calculation

This indicator is based on the official GHG inventories submitted by the EEA countries to the EEA, as well as on the projected GHG emissions submitted by the Member States under the Regulation (EU) 2018/1999 on the governance of the energy union and climate action. The EU GHG inventory submitted by the EU to the UNFCCC is based on the same data and is also used. The estimation of historical emissions from international aviation and maritime sectors for the total greenhouse gas emissions (target scope) relies on data derived from the JRC Ideas methodology ^[3] as documented in the JRC methodological paper ^[4].

The EU ETS emissions, as reported to the European Commission by operators of industrial installations and aircrafts, are also used. When available, approximate estimates of the GHG emissions for the year (T-1) are also presented.

Greenhouse gases

In line with the UNFCCC reporting guidelines on annual inventories, the national inventories cover emissions and removals of the following GHGs:

- carbon dioxide (CO₂), including indirect CO₂;
- methane (CH₄);
- nitrous oxide (N₂O);

- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs);
- sulphur hexafluoride (SF₆); and
- nitrogen trifluoride (NF₃)

from six sectors (Energy, Industrial processes and product use, Agriculture, LULUCF, Waste and Other).

The gases do not include the GHG emissions that are also ozone-depleting substances, which are controlled by the Montreal Protocol.

In order to be aggregated, non-CO₂ gases are weighted by their respective global warming potential (GWP) and presented in CO₂-equivalent units. Global warming potential (GWP) is a measure of how much a given mass of a GHG is estimated to contribute to global warming on a 100-year horizon.

Consistent with the latest Decision on the UNFCCC Reporting Guidelines adopted at COP27 in Sharm-El-Sheik, the GWP values used in this indicator are the ones from IPCC AR5:

Gas	Global warming potential values from IPCC AR5
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	28
Nitrous oxide (N ₂ O)	265
Sulphur hexafluoride (SF ₆)	23,500
Nitrogen trifluoride (NF ₃)	16,100

HFCs and PFCs comprise a large number of different gases that have different GWPs. The full list of GWPs can be found in [Chapter 8 of the 5th Assessment Report](#).

Greenhouse gas inventories

For the preparation of their national inventories, countries use the methodologies of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Projected greenhouse gas emissions

For projected GHG emissions, information submitted by the EEA countries under the Governance Regulation is used, with the latest submission in March 2025. The projected GHG emissions referred to in the indicator are those reported under the 'with existing measures' scenario (WEM) and the 'with additional measures' scenario (WAM).

Emission trading system emissions

Emissions from the EU ETS are also presented in the indicator. The EU ETS runs over four trading periods: Phase I (2005-2007), Phase II (2008-2012), Phase III (2013-2020), and Phase IV (2021-2030).

In 2013, the scope of the EU ETS was expanded to include additional references to (a) the capture, transport and geological storage of GHG emissions; (b) CO₂ emissions from petrochemical, ammonia and aluminium production; (c) N₂O emissions from the production of nitric, adipic and glyoxylic acids; and (d) PFC emissions from aluminium production. Since 1 January 2012, aviation has also been part of the EU ETS.

Since 2013, these emissions have been calculated by the plant operators that fall under the ETS

obligations in line with Regulation No 601/2012 ^[5], whereas in Phase II of the EU ETS (2008-2012), the monitoring and reporting of the operators was based on [Commission Decision 2004/156/EU](#). Croatia entered the EU ETS on 1 January 2013.

The ETS Directive for the fourth trading phase was first revised in 2018, in line with the EU's 2030 climate and energy framework, established in 2014. With the launch of the European Green Deal and more ambitious climate targets under the European Climate Law, the Directive was revised further in 2023.

Key technical changes agreed in the 2023 revision of the ETS Directive:

- The cap has been tightened to bring emissions down by 62% by 2030, compared to 2005 levels. This covers emissions from [maritime transport](#), which have been included in the EU ETS from 2024.
- Free allocation of allowances to companies has been scaled down, in line with the tighter cap, and made conditional on the companies' decarbonisation efforts. For the [aviation](#) sector, free allocation will be removed as of 2026.
- The [Market Stability Reserve](#) has been revised to foster balance in the reformed EU carbon market.

Approximated greenhouse gas inventory

This indicator uses data and estimates from the 'Approximated GHG inventory' for the year (T-1). These 'proxy' inventories are reported by Member States to the EEA and to the Commission under the Governance Regulation by 31 July of each year, T, and are calculated at an aggregated level on the basis of the national and international information available for the year (T-1).

Methodology for gap filling

Greenhouse gas inventories (years 1990-(T-2)):

The historic emission data presented in the indicator are based on the information reported by Member States under the Governance Regulation. However, should a Member State not submit the inventory data required to compile the EU inventory, the Commission shall prepare estimates to complete the GHG inventories submitted by Member States in consultation and close cooperation with the Member States concerned. In this case, the Member State shall use the gap-filled inventory in its official submission to the UNFCCC. The basis for these gap-filling processes is described in the Commission Delegated Regulation of 12.03.2014 (http://ec.europa.eu/clima/policies/g-gas/monitoring/docs/c_2014_1539_en.pdf)

Projected greenhouse gas emissions (year T-2050):

In order to ensure the timeliness, completeness, consistency, comparability, accuracy and transparency of the reporting of projections by the EU and its Member States, the quality of the reported projections is assessed by the ETC CM on behalf of the EEA. As the Member States' reporting of projections is carried out every two years by countries, in certain cases, projections are adjusted to ensure full consistency with historic GHG emission data from the latest GHG inventories. Where a country has not made a submission, data are gap-filled by the ETC CM.

Approximated greenhouse gas inventory (year T-1):

Under the Governance Regulation, the Commission shall also estimate a Member State's approximated GHG inventory if the Member State does not provide it. These estimates are provided by the EEA and are country-specific. More information on the methodology used for gap-filling is provided in the 'Approximated GHG inventory report' of each year.

Methodology references

- [Annual European Union greenhouse gas inventory and inventory report](#). All the data used to prepare the indicator are consistent with the latest EU GHG national inventory report (NIR). The main institutions involved in the compilation of the EU GHG inventory are the Member States, the European Commission's Directorates-General Climate Action (DG CLIMA), Eurostat, the Joint Research Centre and the European Environment Agency (EEA) and its European Topic Centre on Air Pollution and Climate Change Mitigation (ETC CM). This report is compiled on the basis of the inventories of the EU Member States for the EU-27. The EU GHG inventory is the direct sum of the national inventories.

- [2006 IPCC Guidelines for National Greenhouse Gas Inventories](#) The 2006 IPCC Guidelines for National Greenhouse Gas Inventories are the latest step in the IPCC development of inventory guidelines for national estimates of GHGs. These 2006 Guidelines build on the previous Revised 1996 IPCC Guidelines and the subsequent Good Practice reports. They include new sources and gases as well as updates to the previously published methods whenever scientific and technical knowledge have improved since the previous guidelines were issued. Since 2015, UNFCCC Parties are using the 2006 IPCC Guidelines' methodologies and reporting formats when preparing their inventories, in line with the UNFCCC reporting guidelines (Decision 24/CP.19).
- [UNFCCC reporting guidelines on annual inventories](#) This document contains the complete updated UNFCCC reporting guidelines on annual inventories for all inventory sectors.
- [Commission Regulation \(EU\) No 601/2012](#) of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council. The regulation sets out the rules for the monitoring and reporting of ETS emissions by plant operators, covering the scope of Phase III of the ETS.
- [Commission Regulation \(EU\) No 2023/757](#) of 10 May 2023 on the inclusion of maritime transport activities in the EU Emissions Trading System and for the monitoring, reporting and verification of emissions of additional greenhouse gases and emissions from additional ship types
- [IPCC Fifth Assessment Report \(AR5\)](#) At regular intervals, the (IPCC) prepares comprehensive Assessment Reports of scientific, technical and socio-economic information relevant for the understanding of human induced climate change, the potential impacts of climate change and options for mitigation and adaptation. Currently used GWP are based on the AR5.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring aspects of the 8th EAP priority objective Article 2a. that shall be met by 2030: 'swift and predictable reduction of greenhouse gas emissions and, at the same time, enhancement of removals by natural sinks in the Union to attain the 2030 greenhouse gas emission reduction target as laid down in [Regulation \(EU\) 2021/1119](#)^[6], in line with the Union's climate and environment objectives, whilst ensuring a just transition that leaves no one behind;^[7]. For the purposes of the 8th EAP monitoring framework, this indicator assesses specifically whether the EU will 'reduce net GHG emissions by at least 55% by 2030 from 1990 levels' ^[7]. This year's projections may not fully reflect the current efforts by Member States to meet some of the measures under the Fit for 55 package that were adopted in the course of 2023 ^[8]. The modelling results presented by the European Commission in its impact assessments for the [Fit for 55 package of legislative proposals](#) indicate an expected full achievement of the 2030 target if strengthened policies are implemented across the sectors.

The [UNFCCC](#) sets an ultimate objective of stabilising GHG concentrations 'at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.' The 2015 Paris agreement clarifies that the overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." The European Union, as a party to the UNFCCC and the Paris Agreement, reports annually on the GHG emissions within the area covered by its Member States. The Annual European Union greenhouse gas inventory and inventory report, officially submitted to the UNFCCC Secretariat, is prepared on behalf of the European Commission (DG CLIMA) by the EEA and its European Topic Centre for Climate Change Mitigation (ETC CM), supported by the Joint Research Centre and Eurostat.

The EU is committed to reduce its GHG emissions and has taken several steps over the past decades:

In 2007, EU leaders set the target of a 20% reduction of EU GHG emissions by 2020 compared with the emissions in 1990. To attain this goal, a comprehensive legislative package known as the **EU 2020 Climate and Energy Package** was introduced. This package encompassed not only climate objectives but also a commitment to substantially expand renewable energy sources and enhance energy efficiency. To fulfill the climate objectives, a twofold legal framework was put in place:

- The implementation of a cap-and-trade system with the EU Emissions Trading Scheme (EU ETS) for regulating emissions from energy-intensive industries and the power sector. In this framework, the emission cap for 2020 was set at a 21% reduction compared to 2005 levels.

- An effort to reduce emissions not covered by the EU ETS by about 10% compared with 2005 levels, shared between the EU Member States through differentiated annual national GHG targets under the [ESD](#).

The **European Climate Law**, published in 2021, sets the trajectory towards 2050 and beyond, with the target to reduce GHG emissions in the EU by at least 55% by 2030, and to achieve climate neutrality at the latest by 2050, with the aim of to achieve negative emissions thereafter. Contrary to the 2020 target, both targets also account for emissions and removals of the land use, land use change and forestry sector and are therefore net targets. In line with the European Climate Law, the European Commission will make a legislative proposal, as appropriate, for a Union-wide 2040 climate target within 6 months of the global stocktake under the Paris Agreement in November 2023.

Towards **2030, the 'Fit for 55' legislative" package**, a key element of the European Green Deal, sets the EU on a path to reach its climate targets in a fair, cost-effective, and competitive way. It builds on the previous 2020 energy and climate framework, but also includes many new policy instruments and targets that incentivize climate action across all sectors of society. In the area of climate mitigation, the key targets of the package are:

- The revised EU ETS Directive increases the ambition of the existing ETS to 62% emissions reductions by 2030, compared to 2005 levels, and will also apply to international maritime transport.
- For the sectors not covered by this ETS system, namely road and domestic maritime transport, buildings, agriculture, waste and small industries, a global reduction target of 40% compared with 2005 levels is set through the amended Effort Sharing Regulation (ESR). This target is shared between the EU Member States through differentiated annual national GHG targets, ranging from -10% to – 50%.
- The LULUCF regulation sets an overall EU-level objective of 310 Mt CO₂ equivalent of net removals, with national targets for each Member State

In addition to these key policies, a new emissions trading system (ETS2) will be introduced from 2027 onwards. ETS2 will cover emissions from fuel combustion in road transport, buildings, and other sectors, contributing to a 42% reduction in emissions compared to 2005 levels within these sectors. These emissions will also be subject to the Effort Sharing Regulation.

Related policy documents

State of the Energy union Report 2024

Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee and the Committee of the Regions. State of the Energy Union Report 2024 (pursuant to Regulation (EU)2018/1999 on the Governance of the Energy Union and Climate Action)

EU Climate Action Progress Report 2024

Report from the Commission to the European Parliament and the Council

- [Regulation \(EU\) 2021/1119\('European Climate Law'\)](#)

Regulation of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality

- [Consolidated text of the Regulation \(EU\) 2018/1999 \(Governance Regulation\)](#)

Regulation of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action

- [Consolidated text of Regulation 2018/842, as amended by Regulation \(EU\) 2023/857 \(Effort Sharing Regulation\)](#)

Regulation on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement

- [Consolidated text of Directive 2003/87/EC as last amended by Directive 2023/959 \(ETS Directive\)](#)

Directive of the European Parliament and of the Council establishing a system for greenhouse gas emission allowance trading within the Union,

- [Consolidated text of Regulation \(EU\) 2018/841, as last amended by Regulation 2023/839 \(LULUCF Regulation\)](#)

Regulation of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework

- [Consolidated text of Commission Implementing Decision \(EU\) 2020/2126, as last amended by Commission Implementing Decision \(EU\) 2023/1319](#)

Decision on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council

- [Kyoto Protocol to the UN Framework Convention on Climate Change](#)

Kyoto Protocol to the United Nations Framework Convention on Climate Change; adopted at COP3 in Kyoto, Japan, on 11 December 1997

- [Paris Agreement](#)

The Paris Agreement. Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 11 December 2015.

- [European Green Deal](#)
- [UNFCCC](#)

UNFCCC reporting guidelines on annual inventories

Accuracy and uncertainties

Methodology uncertainty

Greenhouse gas inventories

(a) Difference in methodologies between countries

Since Member States use different national methodologies, national activity data or country-specific emission factors in accordance with IPCC and UNFCCC guidelines, these different methodologies are reflected in the EU GHG inventory data. The EU believes that it is consistent with the UNFCCC reporting guidelines and the 2006 IPCC guidelines to use different methodologies for one source category across the EU territory, especially if this helps to reduce the uncertainty and improve the consistency of the emission data, provided that each methodology is consistent with the 2006 IPCC guidelines. At the same time, the EU is making an effort to promote and support the use of higher tier methodologies across Member States. At the EU level, and for most of the key categories of the EU inventory, more than 75% of the EU emissions are calculated using higher tier methodologies, resulting in lower uncertainty rates.

(b) Global warming potential

According to the IPCC, the GWP values used in the IPCC AR4 have an uncertainty of $\pm 35\%$ for the 5-95% (90%) confidence range.

Projected greenhouse gas emissions

The methodology proposed consists of simple additions of data reported by Member States. However, uncertainty arises from the following:

- projections can be subject to updates that might not be reflected in the assessment if these updates were recently developed;
- the projections taken into account are fully consistent with Member State submissions under the Governance Regulation. However, other sets of projections with different data might have been published by countries (e.g. national allocation plans, national communications to the UNFCCC).

Several countries carry out sensitivity analyses on their projections.

Approximated greenhouse gas inventory

The uncertainty ranges estimated in the approximated GHG inventories are derived by comparing the official national data submitted to the UNFCCC in year X with the proxy estimates of the same year. The uncertainty for the approximated emissions at the EU level is estimated as the weighted mean of the differences described: weighted again by the relative contribution that each Member State makes to total EU-27 emissions. More details about these methodologies are provided each year in the 'Approximated GHG inventory report'.

Data sets uncertainty

The 2006 IPCC Guidelines provide approaches on how Parties should estimate uncertainties, suggesting different values for the uncertainty of activity data and emission factors for most of the emission source categories. On the basis of this guidance, EU Member States and other EEA countries perform their own assessment of the uncertainty of reported data and provide an uncertainty analysis in the National Inventory Report to account for uncertainty per source category, as well as the total uncertainty of their national inventory.

Section (1.6) of the annual EU GHG inventory report considers the uncertainty evaluation, describing the methodology used to estimate it. The results suggest that the uncertainty level in the EU is about 5% for total GHG emissions (including LULUCF).

Total EU-27 GHG emission trends are likely to be more accurate than individual absolute annual emission estimates, because the annual values are not independent of each other. The IPCC suggests that the uncertainty in total GHG emission trends is approximately 4-5%. For the EU, the trend uncertainty is estimated to be close to 1%. Total GHG emission estimates are quite reliable and the limited number of interpolations used to build the indicator do not introduce much uncertainty at the EU level.

Uncertainties in the projections of GHG emissions can be significant but have not been assessed.

Data sources and providers

- [Approximated estimates for greenhouse gas emissions](#), European Environment Agency (EEA)
- [National emissions reported to the UNFCCC and under the EU Governance Regulation](#), European Environment Agency (EEA)
- [Member States' greenhouse gas \(GHG\) emission projections](#), European Environment Agency (EEA)
- [Greenhouse gas emissions under the Effort Sharing Legislation](#), European Environment Agency (EEA)
- [European Union Emissions Trading System \(EU ETS\) data from EUTL](#), European Environment Agency (EEA)

▼ Metadata

DPSIR

Pressure

Topics

[# Climate change mitigation](#)

Tags

[# CLIM050](#) [# Climate](#) [# Progress to target](#) [# Energy](#) [# Greenhouse gases](#) [# climate change mitigation](#) [# Trends](#)
[# Projections](#) [# Energy efficiency](#) [# Renewable energy](#) [# 8th EAP](#)

Temporal coverage

1990-2050

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Performance indicator (Type B - Does it matter?)

UN SDGs

SDG13: Climate action

Unit of measure

This indicator expresses GHG emissions in 'million tonnes of CO₂ equivalent' (MtCO₂e).

Frequency of dissemination

Every 2 years

▼ References and footnotes

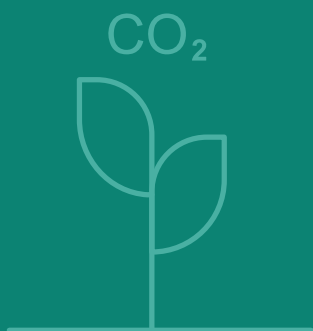
1. In the previously published indicator, all net GHG emissions (including Land Use, Land Use Change, and Forestry) and emissions from international aviation based on bunker fuels were accounted for. This year, the scope (EU target scope) more closely aligns with that of the European Climate Law. In addition to net GHG emissions from within the EU, it now includes portions of emissions from international aviation and maritime transport, as regulated by EU law.
[↗](#)
2. EEA, 2020, *Trends and drivers of EU greenhouse gas emissions*, EEA Report, 3/2020, European Environment Agency.
[↗](#)
3. JRC: Rózsai, M., Jaxa-Rozen, M., Salvucci, R., Sikora, P., Tattini, J. and Neuwahl, F., 2024, *JRC-IDEES-2021: the Integrated Database of the European Energy System – Data update and technical documentation*, Joint Research Centre, Luxembourg.
[↗](#)
4. JRC, 2024, *Aligning historical international aviation and maritime transport data to the scope of EU climate policies*, Joint Research Centre, Luxembourg.
[↗](#)
5. EU, 2018, Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012
[↗](#)

6. EU, 2021, Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality (OJ L 243, 9.7.2021, p. 1–17).
[↱](#)
7. EC, 2022, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives
[a](#) [b](#)
8. EEA, 2023, *Trends and Projections in Europe 2023*, Publication, 07/2023,
[↱](#)



8th Environment Action Programme

Greenhouse gas emissions from land use, land use change and forestry in Europe

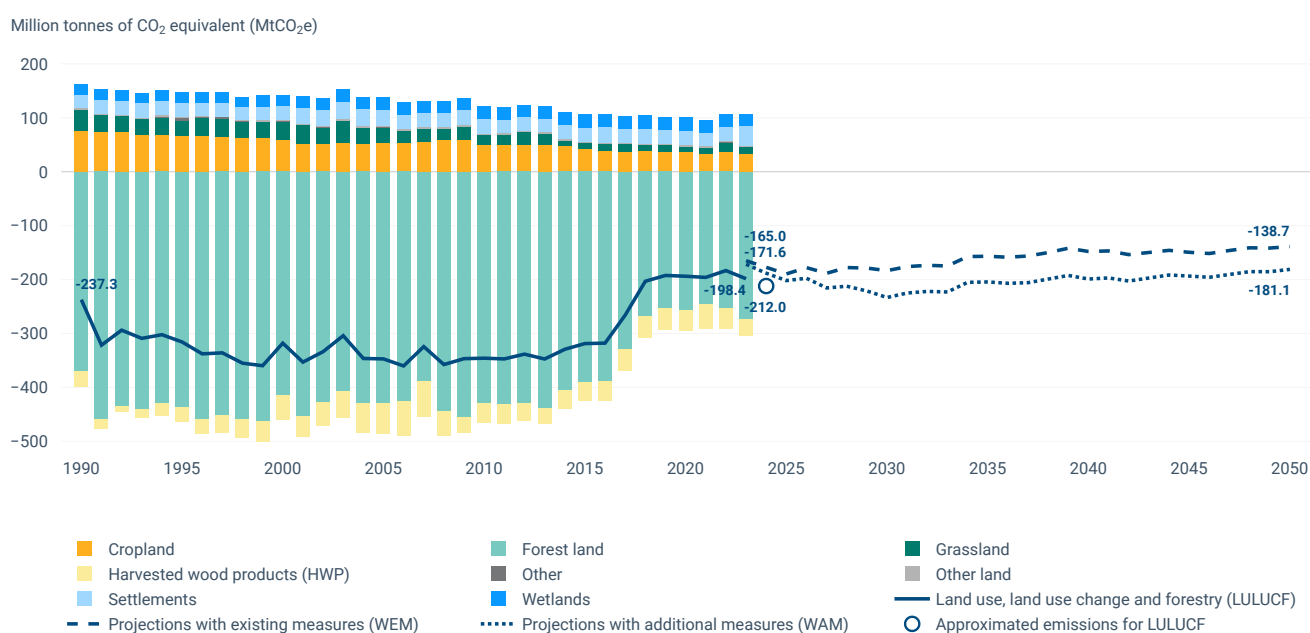


Greenhouse gas emissions from land use, land use change and forestry in Europe

Published 06 Nov 2025

The land use, land use change and forestry (LULUCF) sector plays a key role in achieving the EU's goal of net zero emissions by 2050. LULUCF activities removed net 198 million tonnes of CO₂ equivalent (MtCO₂e) from the atmosphere in 2023, equal to 6% of the EU's annual greenhouse gas emissions. Removals are estimated to have increased to 212MtCO₂e in 2024. The LULUCF Regulation set an EU-level net removal target of 310MtCO₂e by 2030. Based on Member States' projections, the current implemented and planned measures will not suffice to meet the target, requiring renewed efforts and further policies to enhance Europe's carbon sink.

Figure 1. EU emissions and removals of the LULUCF sector by main land use category



The European Union aims to be **climate neutral** by 2050, as set out in the [European Climate Law](#). Achieving this depends both on reducing greenhouse gas emissions and increasing CO₂ removals from the atmosphere. The land use, land use change and forestry (LULUCF) sector has the potential to contribute by removing CO₂ from the atmosphere.

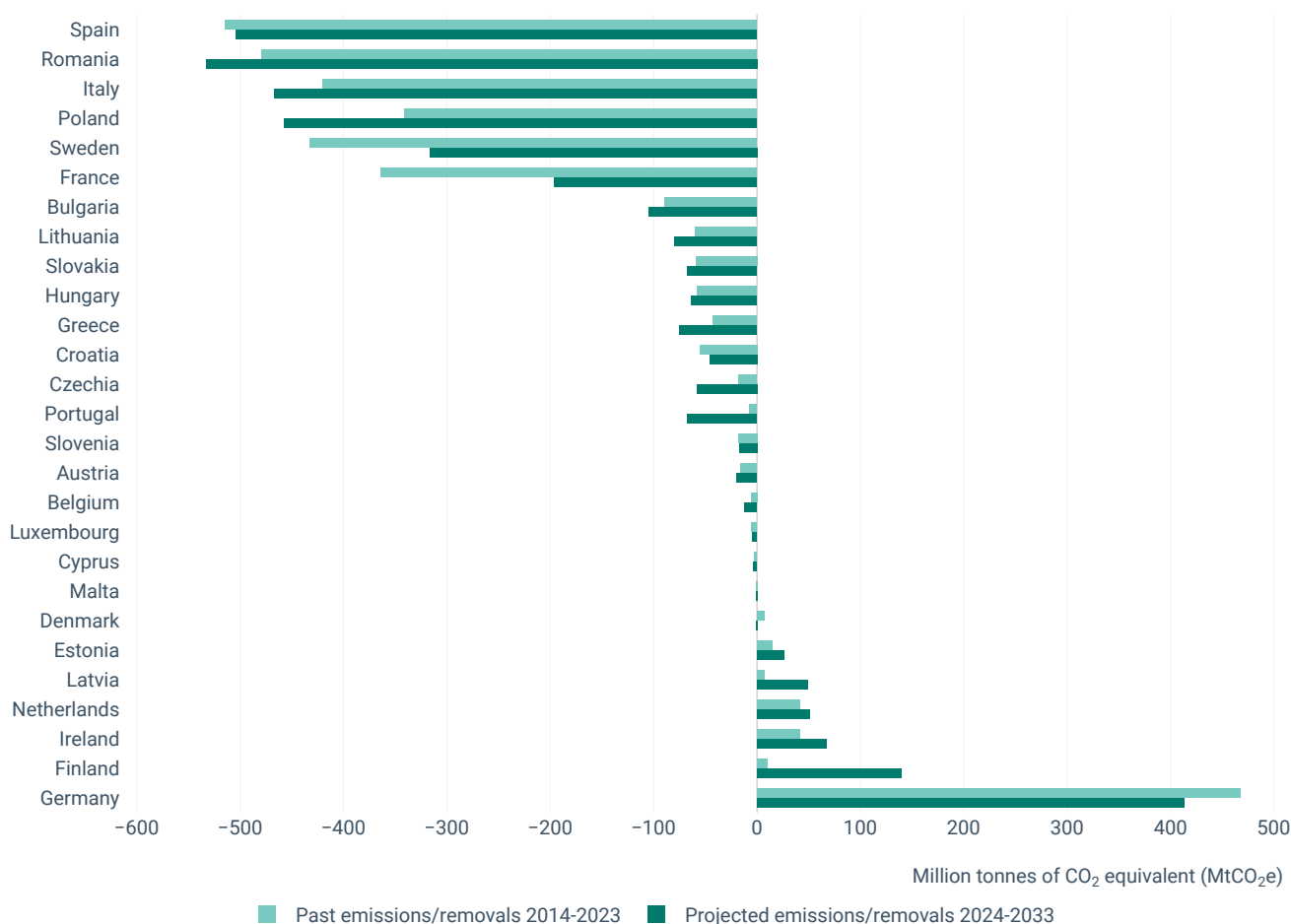
The [LULUCF Regulation](#) ^[1] sets an EU-level **net removal target** of 310MtCO₂e by 2030, calculated as a reduction of 42MtCO₂e compared to the 2016-2018 EU average, with national targets for each Member State. In 2023, the EU's LULUCF sector accounted for the net removal of 198MtCO₂e, equal to 6% of the [EU's total greenhouse gas emissions](#) and is **estimated to have accounted for -212MtCO₂e in 2024**. Overall, removals have decreased in the past 10 years, mainly as a result of climate change and natural disturbances impacts on forests, increased harvest of wood as well as lower sequestration of carbon by ageing forests.

Natural disturbances (e.g. wind throws, forest fires, droughts) cause inter-annual variations, and their increasing frequency negatively affects long-term trends. A slower rate of net forest area gain has also contributed to the **reduction** in removals. Cropland, grassland, wetland and settlements are sources of LULUCF emissions at EU level. Soils containing large proportions of organic matter (mainly peat) account for a significant share of these emissions, although such "organic soils" are only found in wetter and colder parts of Europe.

The most recent Member State projections suggest that net removals will decline at EU level from an average of 307MtCO₂e per year in 1990-2022 to a level between 160 and 201MtCO₂e in 2023-2050, depending on the scenario. The projections show that for 2030, current policies and measures would deliver net removals of 183MtCO₂e. A removal level of 233MtCO₂e by 2030

appears within reach if all Member States' planned additional measures are swiftly implemented. This means at present, the EU 2030 target of 310MtCO₂e is not on track. The target will be difficult to achieve without significantly more ambitious removals measures in the coming years, the effects of which will become more evident in the long term.

Figure 2. Comparison of cumulative historical and projected LULUCF emissions and removals per Member State



Among the EU Member States, Austria, Estonia, Finland, Germany, Ireland, Latvia, Malta and Netherlands experienced positive emissions from LULUCF in 2023. This accounts for 25% of all the EU LULUCF emissions in that year. The remaining Member States contributed with net removals, contributing to approximately 75% of the **EU's LULUCF sink**.

Looking towards 2050, seven Member States (Estonia, Finland, Germany, Ireland, Latvia, Malta and Netherlands) expect to have **positive LULUCF emissions** (20% of EU LULUCF). The remaining Member States all foresee contributing to the carbon sink (80% of EU LULUCF).

Across Europe, Member States are currently applying the LULUCF regulation's requirements to progressively increase the accuracy of LULUCF inventories. Such efforts, while beneficial, may introduce variability in historical data for the Member States.

▼ Supporting information

Definition

Land use categories:

- Forest land: land areas covered by forests and woody vegetation as defined by the national forest definition. Forest land areas can be temporarily without trees if harvest or storms occurred and if trees will re-grow on this land area.

- Cropland: cropped land including orchards, vineyards or agro-forestry systems if the woody vegetation falls below the thresholds of the national forest definition.
- Grassland: rangelands, pastures or grassland. Woody vegetation on grassland is included if the woody vegetation falls below the thresholds of the national forest definition.
- Wetlands: areas covered or saturated by water for all or part of the year such as peatlands or water reservoirs.
- Settlements: areas with human settlements or infrastructure.
- Other lands: bare soil, rock, ice and land that does not fall in the other categories above.

CO₂ equivalent:

There are three greenhouse gases relevant for the LULUCF sector: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). CO₂ equivalent is a common unit that allows these different gases to be added up based on their warming potential. Following the [IPCC 5th Assessment report](#) and as agreed for the [Paris Agreement](#), 1 tonne CH₄ = 28 tonne CO₂ equivalent, 1 tonne N₂O = 265 tonne CO₂ equivalent and 1 tonne CO₂ = 1 tonne CO₂ equivalent.

Organic soils and mineral soils:

Organic soils are soils with a high carbon content while the rest is mineral soils. In the EU only 8% of the soils are organic soils according to the GHG inventories. Due to the higher carbon content, organic soils have generally higher emissions than mineral soils.

Methodology

Methodology for indicator calculation

Historical and projected emissions estimates from all 27 EU Member States and aggregated for the EU-27 were obtained from the publicly available databases published by the EEA based on official submissions by the Member States.

For individual Member State emissions and removals, the cumulative 10-year LULUCF total for 2013-2022 and the projected 10-year LULUCF total for 2023-2032 for the 'with existing measures' scenario are shown.

The latest available version of the historical inventory and projected emissions were used to compile the indicator, but it should be noted that this may introduce slight inconsistencies between the historical and projected emissions, if projections for some Member States are not based on the latest inventory data submitted and recalculations have been made.

Methodology for gap filling

No methodology for gap filling has been specified.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring aspects of the 8th EAP priority objective Article 2a. that shall be met by 2030: 'swift and predictable reduction of greenhouse gas emissions and, at the same time, enhancement of removals by natural sinks in the Union to attain the 2030 greenhouse gas emission reduction target as laid down in [Regulation \(EU\) 2021/1119^{\[2\]}](#), in line with the Union's climate and environment objectives, whilst ensuring a just transition that leaves no one behind;' (EU, 2022). For the purposes of the 8th EAP monitoring framework, this indicator assesses specifically whether the EU will 'increase net GHG removals by carbon sinks from the LULUCF sector to -310 million tonnes CO₂ equivalent by 2030' (EC, 2022).

Accuracy and uncertainties

No uncertainties have been specified.

Data sources and providers

- [Total GHG emissions and removals in the EU](#), European Environment Agency (EEA)
- [Greenhouse gas inventory and GHG projections](#), European Environment Agency (EEA)

Metadata

DPSIR

State

Topics

[# Climate change mitigation](#) [# Land use](#) [# Forests and forestry](#)

Tags

[# CLIM057](#) [# 8th EAP](#) [# Land use](#) [# LULUCF](#) [# Land use change](#) [# Trends and projections](#)

Temporal coverage

1990-2050

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Policy-effectiveness indicator (Type D)

UN SDGs

SDG13: Climate action

Unit of measure

Million tonnes of CO₂ equivalent (MtCO₂e)

Frequency of dissemination

Once a year

▼ References and footnotes

1. EU, 2023, Regulation (EU) 2023/839 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/841 as regards the scope, simplifying the reporting and compliance rules, and setting out the targets of the Member States for 2030, and Regulation (EU) 2018/1999 as regards improvement in monitoring, reporting, tracking of progress and review
[↗](#)
2. EU, 2021, Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1-17., Regulation (EU) 2021/1119
[↗](#)



8th Environment Action Programme

Economic losses from weather- and climate-related extremes in Europe

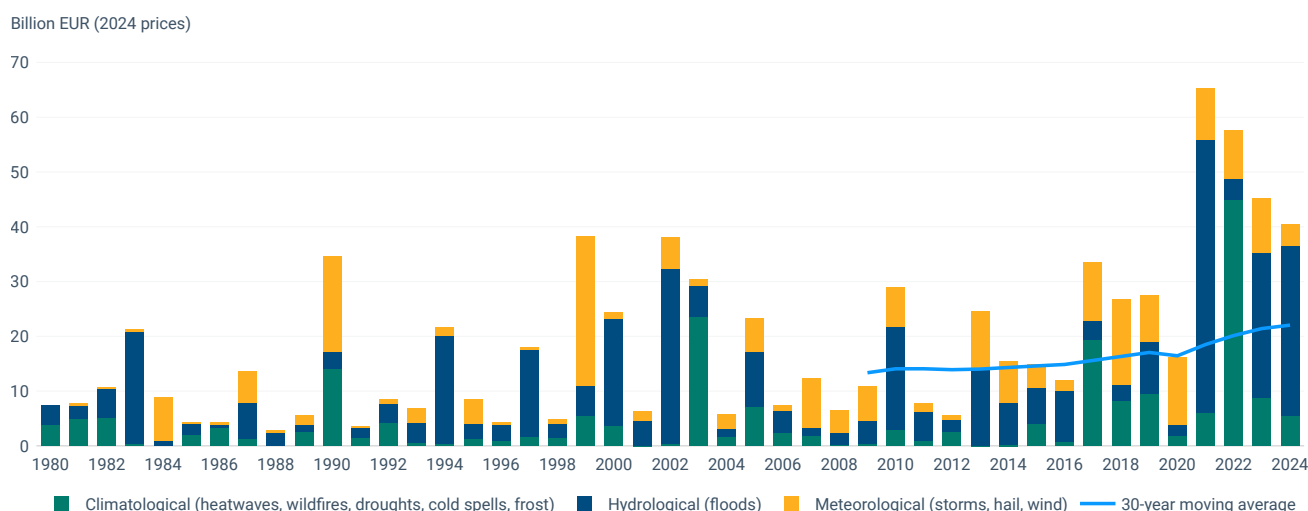


Economic losses from weather- and climate-related extremes in Europe

Published 14 Oct 2025

Weather- and climate-related extremes caused economic losses of assets estimated at EUR 822 billion during 1980 - 2024 in the European Union, with over EUR 208 billion (25%) between 2021 and 2024. Analysing trends in economic losses is challenging, primarily due to large annual variability. Statistical analyses revealed that economic losses increase over time and the last four years are all in the top five years of the highest annual economic losses since 1980. As severe weather- and climate-related extreme events are expected to intensify further, associated economic losses will likely continue to increase.

Figure 1. Annual economic losses caused by weather- and climate-related extreme events in the EU Member States



Climate-related **hazards**, such as temperature extremes, heavy precipitation and droughts, pose risks to human health^[1] and ecosystems and can lead to **substantial economic losses**^[2]. These losses equally create pressures on public finances^[3].

The 2021 **EU Adaptation Strategy**^[4] aims to build **resilience** and ensure that the EU is well prepared to manage climate risks. The EU intends to ultimately reduce the overall monetary losses from weather- and climate-related events^[5].

The first **European Climate Risk Assessment** (EUCRA) concluded that climate risks are accelerating and that cascading climate risks can lead to system-wide challenges affecting whole societies. Climate-related extreme events are expected to intensify further and the adaptation pace is not following the same speed. However, It seems unlikely, although uncertain, that the EU will be able to sufficiently mitigate the impact of these events by building resilience. Associated economic losses will likely continue to increase.

The future cost of climate-related hazards depends on the frequency and severity of events and several other factors, such as the value of the assets exposed^[6] and the effectiveness of the implemented climate adaptation measures. Studies show the **benefits of adaptation** measures, including nature-based solutions, to mitigate the impacts of weather- and climate-related extremes in Europe^{[7][8]}. A comprehensive, integrated approach is required to adapt to and manage the risks, and develop strategies that deal with the remaining and residual risks not mitigated by adaptation measures.

Between 1980 and 2024, economic losses due to weather- and climate-related **extremes** amounted to an estimated EUR 822 billion (2024 prices) in the EU. Hydrological hazards (floods) account for 47% and meteorological hazards (storms, including lightning and hail) for around 27% of the total. For the climatological hazards, heat waves caused almost 18% of the total losses. The remaining 8% were caused by droughts, wildfires, cold spells and frost.

Relatively few events were **responsible** for most of the economic losses: 5% of climate-related events with the biggest losses were responsible for 59% of losses, and 1% of the events caused 37% of losses. On the other hand, 66% of events, that reflect events with the smallest losses, recorded a total of only 5% of the losses ^{[9][10][11][12]}.

The average **annual** (constant 2024 EUR prices) economic losses were around EUR 8.6 billion in 1980-1989, 14.9 billion in 1990-1999, 16.5 billion in 2000-2009, 19.7 billion in 2010-2019 and 44.9 billion for the period 2020-2024. A statistical analysis of a 30-year moving average reveals that economic losses increased over time. A linear trendline through these 30-year averages represent a 54% increase from 2009 to 2024, or 3.4% per year ^[13].

The five years with highest annual values are:

- 1999 (EUR 38.2 billion);
- 2021 (EUR 65.2 billion);
- 2022 (EUR 57.7 billion);
- 2023 (EUR 45.1 billion);
- 2024 (EUR 40.4 billion).

Figure 2. Economic losses and fatalities caused by weather - and climate - related extreme events (1980-2024) - per country

Country	Total losses million EUR	Loss per km ² EUR	Loss per capita EUR	Insured losses million EUR	Insured losses %	Fatalities
Austria	19,757	235,538	2,417	3,669	19	2,426
Belgium	18,404	600,130	1,742	7,610	41	14,827
Bulgaria	6,292	56,684	801	99	2	3,190
Croatia	4,742	83,796	1,083	110	2	2,146
Cyprus	459	49,607	635	8	2	253
Czechia	21,711	275,270	2,086	2,885	13	1,382
Denmark	9,347	217,750	1,724	5,690	61	1,036
Estonia	352	7,766	250	54	15	547
Finland	2,422	7,159	465	74	3	1,873
France	138,104	216,302	2,218	48,009	35	69,059
Germany	186,908	522,718	2,304	57,663	31	107,508
Greece	18,311	139,046	1,734	912	5	14,096
Hungary	12,813	137,755	1,261	617	5	8,453
Ireland	4,833	69,095	1,169	813	17	295
Italy	145,226	480,766	2,503	6,373	4	56,855
Latvia	1,302	20,153	570	90	7	251
Lithuania	2,968	45,467	899	70	2	731
Luxembourg	1,409	543,089	2,980	685	49	218
Malta	83	261,285	204	2	2	170
Netherlands	13,241	354,112	828	6,255	47	5,450
Poland	27,885	89,395	738	1,611	6	6,773
Portugal	17,653	191,412	1,721	617	3	20,339
Romania	23,964	100,521	1,121	334	1	6,495
Slovakia	2,549	51,989	478	106	4	1,281
Slovenia	18,480	911,559	9,176	642	3	861
Spain	119,577	236,326	2,804	14,415	12	113,627
Sweden	3,831	8,563	419	990	26	927
Total EU-27	822,624			160,403		441,069
Iceland	27	267	93	0	0	3
Liechtenstein	22	139,338	674	11	48	1
Norway	4,462	11,604	956	3,079	69	77
Switzerland	22,749	550,999	3,056	7,978	35	19,408
Türkiye	7,978	10,225	120	535	7	3,222

The economic impact of climate-related extremes varies across the EU. In absolute terms, the **highest** economic losses during the period 1980-2024 were recorded in Germany, Italy, France and Spain. Highest losses per capita were calculated in Slovenia, Switzerland, Luxembourg and Spain. The highest losses per area (in km²) were found in Slovenia, Belgium, Switzerland, Luxembourg and Germany.

According to estimates for 1980-2024, less than 20% of total losses were privately insured. This varied among countries, from less than 3% in Bulgaria, Croatia, Cyprus, Lithuania, Malta, Romania and Iceland to over 35% in Belgium, Denmark, France, Luxembourg, Netherlands, Liechtenstein, Norway and Switzerland. There were significant **differences** between event types. For meteorological events, over 35% of the economic losses were insured. It was around 15% for hydrological events and slightly over 10% for all climatological events, including heatwaves, wildfires, droughts, cold spells and frost.

The [EU adaptation strategy](#)^[4] aims to promote action at **national level**. All countries have a national adaptation policy^[14]^[15] adopted using different instruments such as strategies and national, regional and sectoral plans, also laws with adaptation relevance reflecting differences in governance in between countries^[15]. The [Climate-ADAPT platform](#) — developed by the European Commission and the EEA — supports action by sharing knowledge on climate change and its impacts, adaptation strategies and plans, and case studies.

▼ Supporting information

Definition

This indicator considers estimated values for the number of fatalities, the overall and insured economic losses from weather- and climate-related events in the European Environment Agency (EEA) member countries, i.e., in the 27 EU Member States, Iceland, Liechtenstein, Norway, Switzerland and Türkiye. Focus of the indicator is on total economic losses for the EU-27. Further details are provided on the [Climate-ADAPT dashboard](#) presenting information on total economic losses, insured economic losses and fatalities for the EU-27 and EEA member countries; per country, per year and per hazard type. Hazards considered are those classified as meteorological hazards, hydrological hazards and climatological hazards, based on the classification by the International Council for Science (ICSU)^[16].

Methodology

Data have been adjusted to account for inflation. They are presented in 2024 prices (Euro). The implicit GDP deflator is used as an economic metric that measures the price level changes of all new, final goods and services produced in an economy over a specific period, relative to the base year, including those that are not included in the consumer price index (CPI), such as investment goods and exports. As the CPI only reflects the price changes of a specific basket of goods and services that consumers purchase, the implicit GDP deflator is a more comprehensive measure of price changes than the CPI.

Definition of a loss event: the event can occur in several countries; events are counted by country and by year and type of natural hazard^[17]. The 30-year moving averages are based on the value of the year and the 29 preceding years. The estimated annual increase over the period from 2009 to 2024 is based on a linear trendline determined with the least squares method^[18].

Loss per capita is defined as the cumulative losses over the period 1980-2024 divided by the average population over the 1980-2024 time period.

There are more than 190,000 more fatalities reported in the 1980-2024 dataset compared to the previous 1980-2023 dataset for the same period. This is due to a large addition of heatwave events. They adhere to the methodology used by the data provider RiskLayer. These additional events are included when peer-reviewed and trusted datasets publish them. Total and insured economic losses also changed between the 1980-2024 dataset and the 1980-2023 dataset for the 1980-2023 period. This is due to Eurostat changes in price index and exchange rates that change every year and retroactively, as well as the changes in values of the losses for the events already registered in the dataset, on top of the addition of new events.

The European Commission is working with Member States, the [ISDR](#) and other international organisations to improve data on disaster losses. The JRC, with the [disaster risk management knowledge centre](#) and the [risk data hub](#), has prepared guidance for recording and sharing disaster damage and loss data, status and best practices for disaster loss data

recording in EU Member States and recommendations for a European approach for recording disaster losses^[19]. Once comparable national databases on disaster losses are available for all EU Member States and EEA member countries and these data are reported, this EEA indicator can build on such data.

Data sources & providers

This assessment is based on the estimates provided by the [RiskLayer CATDAT dataset](#) (dataset url is not available) and the [Eurostat collection of economic indicators](#), whereas data from earlier years not covered by Eurostat have been completed using data from the Annual Macro-Economic Database of the European Commission (AMECO), the International Monetary Fund's (IMF) World Economic Outlook (WEO), the Total Economy Database (TED) and the World Bank database. More information on the data quality and aggregation process is provided in the [2025 report on economic losses and fatalities](#)^[20].

Data are received from the RiskLayer CATDAT under institutional agreement.

Methodology for gap filling

Data gap filling is not necessary.

Policy/environmental relevance

In February 2021, the European Commission presented the new [EU Strategy on adaptation to climate change](#). One of the objectives is 'smarter adaptation', within which a key action is 'more and better climate-related risk and losses data', as currently, no coherent mechanism is in place for countries to report losses to the European Commission or the EEA. This is further developed in the Staff Working Document, Closing the climate protection gap^{[21] [22]}- scoping policy and data gaps and in the activities of the Climate Resilience Dialogue, that published [its final report](#) in July 2024^[23]. In 2024, the European Commission presented the [Communication on Managing Climate Risks-Protecting People and Prosperity](#) which sets out how the EU can effectively get ahead of the growing climate-related risks and build greater resilience to the impacts of climate change including to address economic losses. It responded to the first ever [European Climate Risk Assessment Report](#).

Article 6 of the [European Union Civil Protection Mechanism](#) (2013) (EUCPM) obliges the EU Member States to develop risk assessments at national or appropriate sub-national levels and to make a summary of the relevant elements thereof^[24]. The [amendment of the EUCPM of March 2019](#) introduced joint reporting on national risk assessments, risk management capability assessments and information on the priority prevention and preparedness measures. This with a focus on key risks with cross-border impacts, and, where appropriate, low probability risks with a high impact.

The [Sendai Framework for Disaster Risk Reduction](#) (2015-2030), including 'Understanding disaster risk', requires that the signatory countries systematically evaluate, record, share and publicly account for disaster losses and understand the economic impacts at national and sub-national levels.

This is an EEA indicator for EUROSTAT monitoring of the [UN Sustainable Development Goals](#) (SDGs, for SDG13 Climate) and a headline indicator for monitoring progress towards the 8th Environment Action Programme^{[25][5]}. It contributes to monitoring aspects of the 8th EAP priority objective Article 2.2. b that shall be met by 2030: 'continuous progress in enhancing and mainstreaming adaptive capacity, including on the basis of ecosystem approaches, strengthening resilience and adaptation and reducing the vulnerability of the environment, society and all sectors of the economy to climate change, while improving prevention of, and preparedness for, weather- and climate-related disasters' ^[25]. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor whether the EU is reducing the overall monetary losses from weather- and climate-related events^[5].

Targets

No targets have been identified for this indicator.

Accuracy and uncertainties

No uncertainties have been specified.

Data sources and providers

- [CATDAT \(link not available\)](#), RiskLayer GmbH

▼ Metadata

DPSIR

Impact

Topics

Climate change adaptation

Tags

CLIM039 # 8th EAP # Climate losses insurance # Economic losses # Disasters # Natural hazards

Temporal coverage

1980-2024

Geographic coverage

- Austria

Bulgaria

Cyprus

Denmark

Finland

Germany

Hungary

Ireland

Latvia

Lithuania

Malta

Norway

Portugal

Slovakia

Spain

Switzerland
- Belgium

Croatia

Czechia

Estonia

France

Greece

Iceland

Italy

Liechtenstein

Luxembourg

Netherlands

Poland

Romania

Slovenia

Sweden

Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG13: Climate action, SDG1: No poverty

Unit of measure

Losses in Euros, million and billion Euros, 2024 prices, fatalities as absolute numbers.

Frequency of dissemination

Once a year

▼ References and footnotes

1. For details, see also the European Climate and Health Observatory: <https://climate-adapt.eea.europa.eu/en/observatory>.
2. Direct losses to infrastructure and physical assets are reported. Indirect losses, e.g. due to reduced productivity, loss of life, hazard-induced injuries, healthcare costs are not included. The costs of building back better or building back elsewhere are also not included. Geophysical hazards, like earthquakes and volcanoes are also natural hazards. As they are not seen as directly impacted by climate change, they are not included in this indicator.
3. EC, 2022, *The fiscal impact of extreme weather and climate events: Evidence for EU countries*, Discussion Paper 168, European Commission, Brussels.
4. EC, 2021, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Forging a climate-resilient Europe – the new EU strategy on adaptation to climate change', COM(2021) 82 final.
a b
5. EC, 2022, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives*,
a b c
6. Ranasinghe, R., Ruane, A. C., Vautard, R., Arnell, N., Coppola, E., Cruz, F. A., Dessai, S., Islam, A. S., Rahimi, M., Ruiz Carrascal, D., Sillmann, J., Sylla, M. B., Tebaldi, C., Wang, W. and Zaaboul, R., 2021, 'Climate change information for regional impact and for risk assessment', in: Masson-Delmotte, V., Zhai, P., Pirani, A., et al. (eds), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press.
7. Dottori, F., Mentaschi, L., Bianchi, A., Alfieri, L. and Feyen, L., 2023, 'Cost-effective adaptation strategies to rising river flood risk in Europe', *Nature Climate Change* 13(2), pp. 196–202 (<https://www.nature.com/articles/s41558-022-01540-0>) accessed April 4, 2023.
8. Vousdoukas, M. I., Mentaschi, L., Hinkel, J., Ward, P. J., Mongelli, I., Ciscar, J.-C. and Feyen, L., 2020, 'Economic motivation for raising coastal flood defenses in Europe', *Nature Communications* 11(1), pp. 2119 (<https://www.nature.com/articles/s41467-020-15665-3>) accessed April 4, 2023.
9. The total losses vary significantly from year to year. This interannual variability is due to the development of assets in vulnerable areas and potential reporting bias over time and because most types of weather- and climate-related extremes across the world have become more severe and frequent as a result of human-caused climate change.
10. There is an increase of records per decade in the CATDAT data source from 646 for the period 1980-1989 to 1419 for the decade 2010-2019 and already with 2222 records for the period 2020-2024 for the EU-27 countries.
11. CarbonBrief, 2022, 'Mapped: How climate change affects extreme weather around the world', Carbon Brief (<https://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world/>) accessed September 1, 2023.
12. XAIDA, 2024 Many devastating extremes in 2023 were amplified by Global Warming, XAIDA H2020 project Media briefing (<https://drive.google.com/file/d/12mj4JDBHzzwKxVPtQKQtNV3qMEVoTDje/view?pli=1>) accessed August 25, 2024.
13. When expressing the impacts relative to the size of the economy exposed to these hazards, the increase in 30 year average GDP for the EU between 2009 and 2024 is half of the increase rate of the losses (based on an estimate using Worldbank data). Hence half of the increase in losses over this period can be linked to increased wealth and exposure and the losses have increased twice as fast as GDP
14. EEA, 2022, *Advancing towards climate resilience in Europe –Status of reported national adaptation actions in 2021*, EEA Report, 11/2022, European Environment Agency.

15. EEA, 2023, 'Is Europe on track towards climate resilience? Status of reported national adaptation actions in 2023', (<https://www.eea.europa.eu/publications/national-adaptation-actions-of-2023>) accessed 10 September 2025.
a b
16. IRDR, 2014, IRDR Peril Classification and Hazard Glossary, Integrated Research on Disaster Risk (<https://council.science/wp-content/uploads/2019/12/Peril-Classification-and-Hazard-Glossary-1.pdf>) access 5 October 2025.
17. Chappain, S., 2024, 'Natural disaster or natural hazard? Even experts interchangeably use these terms', (<https://english.onlinekhabar.com/natural-disaster-or-natural-hazard.html>) accessed August 25, 2024.
18. For the dataset 1980-2024, the trendline through 30-year moving average (2009-2024): $y=0.5451(x-1979)+11.651$.
19. Bountzouklis, C., Roeslin, S., Corbane, C., Battistutta, A. and Karagiorgos, K., 2025, 'Disaster loss data management: current Practices, challenges, and opportunities in Europe', Publications Office of the European Union, Luxembourg (<https://data.europa.eu/doi/10.2760/8144782>) accessed 5 October 2025.
20. EEA, 2025, Economic losses and fatalities from weather- and climate-related extremes (<https://www.eea.europa.eu/en/analysis/publications/economic-losses-from-climate-extremes>) accessed 5 October 2025.
21. The term 'climate protection gap' is used in reference to the share of non-insured economic losses in total losses after a weather- and climate-related extreme event. In recent years, it has also been used to refer to the notional gap between likely climate-related impacts and existing resilience measures (EC, 2021, p. 3)
22. EC, 2021, Commission Staff Working Document — Closing the climate protection gap - Scoping policy and data gaps, SWD(2021) 123 final.
23. EC and Climate Resilience Dialogue, 2024, *Climate Resilience Dialogue Final Report*, European Commission, Brussels.
24. EC, 2024, Report from the Commission to the European Parliament and the Council on progress on implementation of article 6 of the Union Civil protection Mechanism (Decision No1313/2013/EU) – Preventing and managing disaster risk in Europe, COM(2024) 130 final.
25. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22–36.
a b



8th Environment Action Programme

Drought impact on ecosystems in Europe

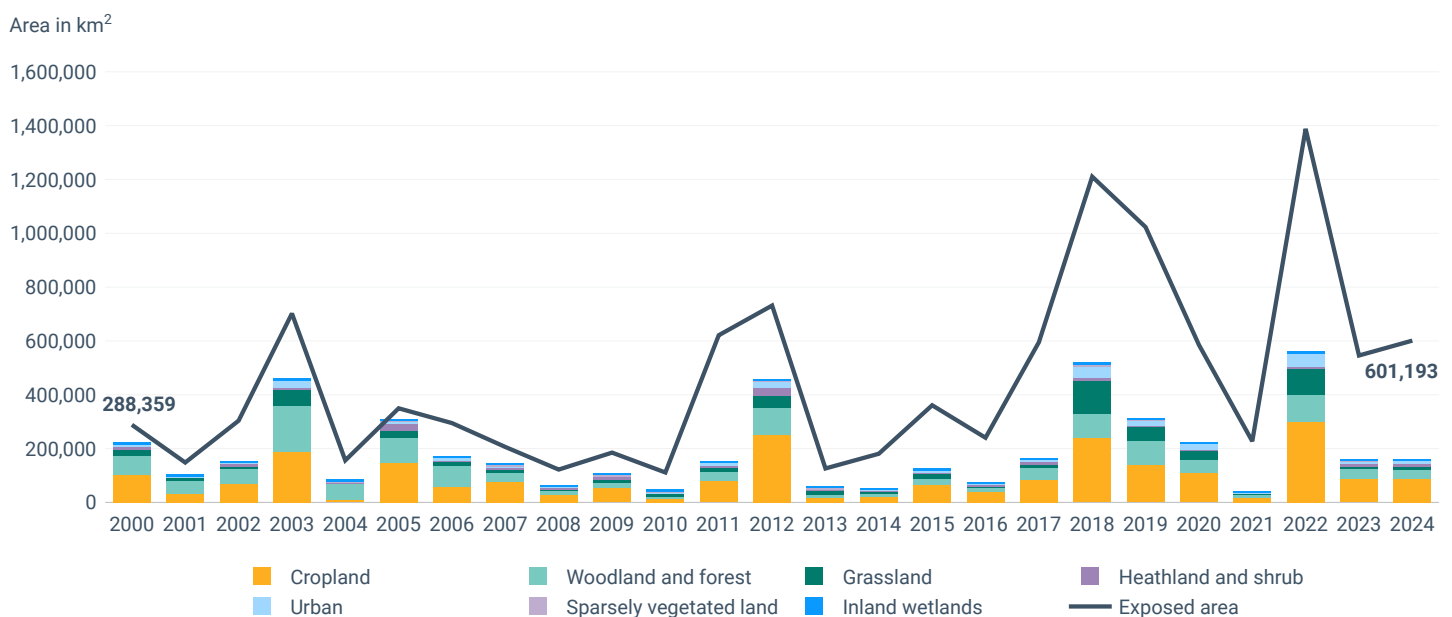


Drought impact on ecosystems in Europe

Published 01 Dec 2025

Europe is facing more and stronger climate hazards, including heatwaves and prolonged droughts. Drought conditions were drier-than-average in eastern/south-eastern Europe during 2024. Around 600,000 km² of the European Union was exposed to below 2000-2020 average soil moisture levels. In response, vegetation productivity did not recover to the 2000-2020 baseline condition in almost 160,000km² of south-eastern Europe and Mediterranean regions. Without effective implementation of global climate mitigation as well as EU and national climate adaptation strategies and plans, the impacts of prolonged drought are likely to further increase.

Figure 1. Area of drought impact on vegetation productivity in the EU-27



Droughts **hinder carbon sequestration** by natural ecosystems, which leads to undermining the EU's climate mitigation goals ([Climate Impact and Preparedness Portal](#)). It compromises ecosystems' ability to reduce the impact of heat waves and increases the risk of wildfires. They also impact food production, resource management, and territorial development—core aims of the [EU Common Agriculture Policy](#).

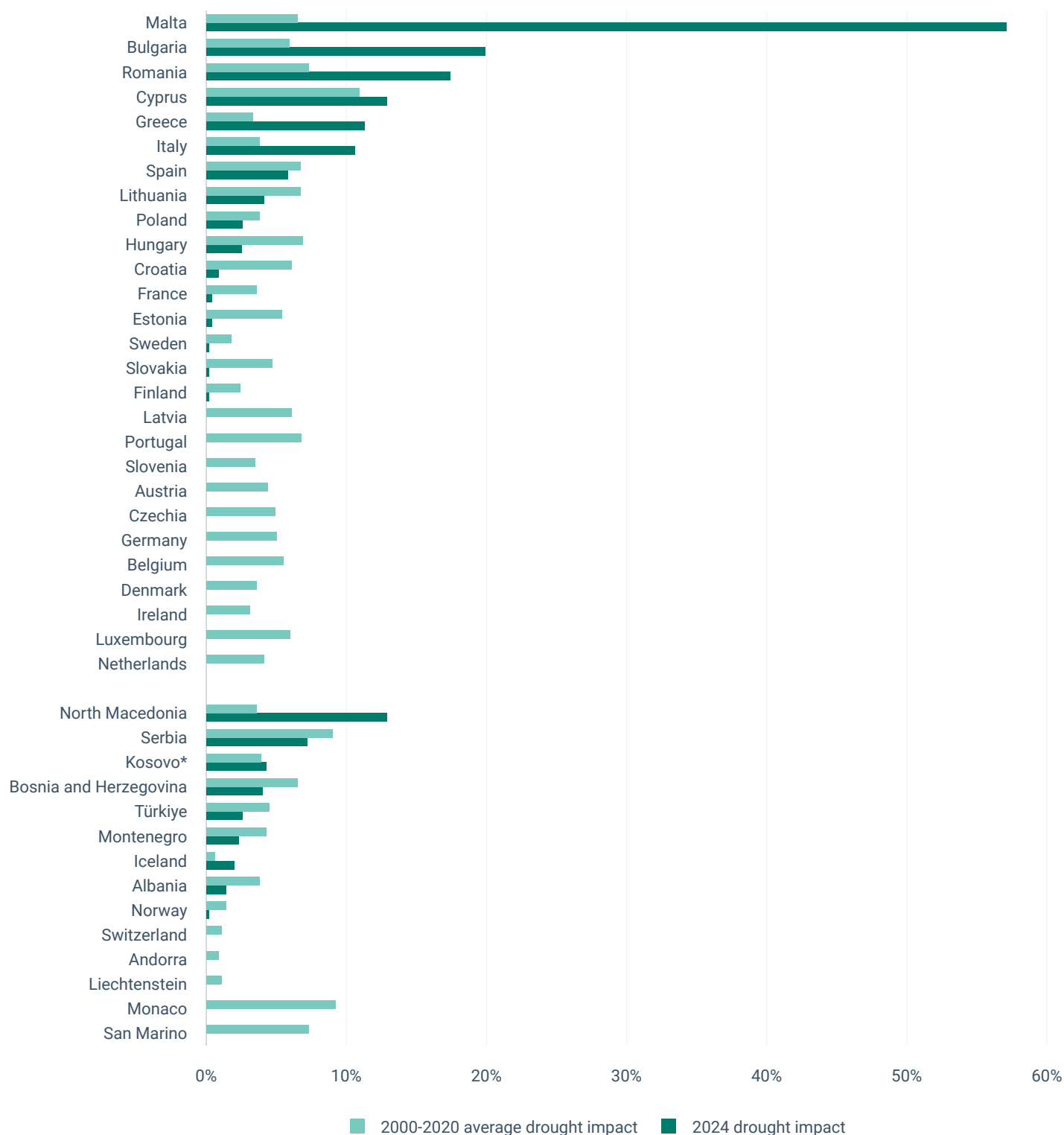
As set out in the [European Water Resilience Strategy](#), droughts and water scarcity are increasingly challenging the EU, for both environment and society. Strengthening ecosystem resilience and reducing drought impacts require **urgent climate adaptation action** by the EU and Member States, alongside stronger global climate mitigation, to meet Paris Agreement targets ([IPCC AR6, 2023](#)).

In 2024, severe droughts exposed 601,193 km² across Europe, with vegetation productivity failing to recover to the baseline level of 156,703 km² — indicating **adaptation stress** (Figure 1). Since 2017, vegetation impact has consistently exceeded the 2000-2020 baseline level (approx. 152,000km²), except in 2021.

During 2024, 87,567 km² of EU-27 **cropland productivity** was below the 2000–2020 baseline. Heathlands and shrubs were affected across 9,866 km², while **forest productivity** was impacted over 33,518 km². This is below the 2000-2020 baseline, yet still a concern for carbon sequestration and the [EU's 2050 climate goals](#). Grasslands and heathlands, among the EU's most biodiverse and carbon-rich ecosystems, were impacted on 24,056 km² in 2024—larger than the size of Slovenia. Only 222 km² of wetlands were affected in 2024, reflecting drought concentration in Southeast Europe where wetlands are rare.

By mid-century, heatwaves and droughts are expected to increase in frequency and in intensity across most of Europe, outpacing the global average (IPCC AR6). Between 2000 and 2024, 12 years saw **drought-affected areas** above the median, with eight occurring after 2010. Given the rising frequency and severity of droughts, impacted areas are unlikely to decline by 2030. Land and water management must become more sustainable which includes drought-tolerant crops, cover crops, and crop residues and the effective implementation of EU and national climate adaptation strategies are essential (Climate-ADAPT).

Figure 2. Drought impact area during 2024 in comparison to the 2000-2020 average for the EEA-38 regions



Strong regional differences can be seen in the **2024 drought impact** on Figure 2. The impacted area was much higher than the 2000-2020 average area for six EU Member States (eight in EEA member countries). In Malta, over 57% of the country's vegetation productivity could not recover to the 2000-2020 level. The same drought caused lower than baseline vegetation productivity in 20% of Bulgaria's and 17% of Romania's territory. Vegetation in Cyprus, Greece and Italy failed to recover in more than 10% of each country. In absolute terms, Romania suffered largest vegetation productivity impact from the drought (41,370km²), followed by Italy (31,856km²) and Spain (29,304km²).

For the non-EU region, drought impact in Macedonia was most concerning, where vegetation failed to recover across 13% of the country, 9.4 percentage points above the 2000-2020 baseline. The **largest area affected** by drought was seen in Türkiye (20,549km²).

▼ Supporting information

Definition

The indicator only addresses droughts, hence the annual deficit in soil moisture due precipitation shortages. The indicator does not address hydrological droughts which occur when low water levels become evident in hydrological systems, especially in streams, reservoirs, and groundwater, usually after many months of meteorological drought. The indicator monitors anomalies and long-term trends in vegetation productivity based on remote sensing observed time series data of vegetation indices in areas that are under pressure from soil moisture deficit.

Drought pressure is computed as soil moisture deficit within the growing season, using the Soil Moisture Index (SMI)¹⁰ time series of the Copernicus EMS [European Drought Observatory of the European Commission Joint Research Centre \(EDO, 2019\)](#).

Drought impact during the growing season is indicated as a severe negative annual productivity anomaly in drought-pressured areas, i.e. areas with negative annual soil moisture anomalies. Detailed indicator specifications are described under 'Methodology'.

Methodology

Soil moisture deficit is calculated at the pixel level by deriving z-score anomalies from the Soil Moisture Index, such as:

$$SMA = \frac{SMI - SMIMN(2001-2020)}{SMISD(2001-2020)}, \text{ (Equation 1)}$$

Where SMA is Soil Moisture Anomaly, MN is the 2001-2020 average SMA and SD is the 2001-2020 standard deviation of the SMI. The calculated SMA values are then averaged within the growing season to derive the SMA(gs) time series.

The aggregation is performed by averaging the monthly SMA values extracted from the EDO within the vegetation growing season. The vegetation growing season was defined by using the start and the end date of the growing period (SOS or Start of Season and EOS or End Of Season, respectively) extracted from the Medium Resolution Vegetation Phenology and Productivity product of the Copernicus Land Monitoring Service. The SOS and EOS datasets can be explored and downloaded from EEA's data repository under sdi.eea.europa.eu. Direct links to the datasets:

SOS:

<https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/a7b2369b-dd62-4d02-99e2-e5d74a8ec83a>

EOS:

<https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/a3cfb2c4-156a-413c-a73b-15ebbb016557>

Annual drought pressure is derived at the pixel level and is simply defined as:

$$SMA(gs) < -1, \text{ (Equation 2) .}$$

Negative soil moisture anomalies indicate that the annual average availability of soil moisture for plants is lower than the long-term normal condition and drops to such a level that it might impact vegetation productivity.

To indicate **drought pressure area**, strong negative soil moisture anomalies are selected by setting a maximum value at -1 standard deviation (std). The drought pressure area is the sum of those grid cells within each analytical unit (see later), where the growing season aggregated SMA values are < -1 . This threshold was selected to allow the monitoring of vegetation responses to only considerable soil moisture deficits. Choosing the threshold of -1 std follows the recommendations of the European Drought Observatory (EDO11) of the European Commission's Joint Research Centre. This approach is also followed in the EEA indicator addressing [soil moisture deficit](#). By applying this threshold, drought impacts can better be distinguished from response in vegetation anomalies due to other environmental pressures such as e.g. wildfires, storms or insects infestations. As vegetation productivity decline may be also caused by anthropogenic impacts, pixels with land use change were excluded from the statistical population based on the [Copernicus Corine Land Cover 2000-2018 accounting layers datasets](#).

The **drought pressure intensity** is defined as the annual, growing season aggregated SMA values where $SMA < -1$, where aggregation is performed by temporal and spatial averaging within analytical units (see later).

Annual drought impact is quantified as:

$SMA(gs) < 0$ and $LINTa < -0.5$, (Equation 2),

where $LINTa$ (Large Integral anomaly) refers to the 2000-2022 annual anomalies in growing season productivity derived from remote-sensing data and approximated using vegetation indices (see more explanation below).

The $LINT$ anomalies were calculated as standard deviations from the long-term mean:

$LINTa(year\ xi-n) = (LINT(xi) - LINT(LTA)) / LINT(std)$, (Equation 3).

Where $xi-n$ indexes the time series (from $i=2000$ till $n=2021$), $LINT(LTA)$ is the long term (using the background of 2000-2020) average of the $LINT$ values and $LINT(std)$ is the long term (using the background) standard deviation of the $LINT$ values for the same period.

The threshold of a -0.5 standard deviation for the vegetation anomalies was selected to indicate small deviations from the long-term mean and to allow for moderate productivity levels under drought impact to be accounted for. In a Europe-wide study, this is a pragmatic solution that provides a wide overview of drought impact situations in Europe. However, local studies might consider setting a lower or higher threshold to reflect local conditions.

The drought impact area is the sum of those grid cells within each analytical unit (see below) where the growing season aggregated SMA values are < -1 and the $LINT$ anomalies are < -0.5 . The drought impact intensity is defined as the annual aggregated $LINT$ anomalies where $SMA < -1$ and $LINTa < -0.5$. Aggregation is performed by temporal and spatial averaging within analytical units.

For the analytical units of this indicator the following datasets were combined:

- Administrative boundaries, aligned with the Corine Land Cover: <https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/08c0e074-4a98-4545-bd85-f58fe3f74d82>;
- Environmental Zones: <https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/6ef007ab-1fcd-4c4f-bc96-14e8afbcb688>;
- Corine Land Cover accounting layers 2000 and 2018: <https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/fa9bd2f5-8006-42e7-8090-7b9f9b09bf29> and <https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/5a5f43ca-1447-4ed0-b0a6-4bd2e17e4f4d>.
- MAES ecosystem types derived from the Corine Land Cover as Look Up Tables (can be distributed upon request).
- Land cover flows: <https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/835d25e0-b9dc-4fb9-a8b6-f9e5336fa357>.

The combination of the above datasets resulted in analytical units with 2,700,000 records in the database, which is easy to handle with desktop computers.

Vegetation productivity: LINT, or Large Integral

In summary, vegetation productivity is derived from remote-sensing observed time series data of vegetation indices. The vegetation index used for the LINT index is the Plant Phenology Index (PPI) ([Jin and Eklundh, 2014](#)). The PPI is based on the MODIS Nadir BRDF-adjusted reflectance product (MODIS MCD43 NBAR). The product provides reflectance data for the MODIS 'land' bands (1-7), adjusted using a bidirectional reflectance distribution function. This function models values as if they were collected from a Nadir view to remove so-called cross-track illumination effects. The PPI is a new vegetation index optimised for the efficient monitoring of vegetation phenology. It is derived from radiative transfer solution using reflectance in the visible-red (RED) and near-infrared (NIR) spectral domains. The PPI is defined as having a linear relationship with the canopy green Leaf Area Index (LAI) and its temporal pattern is very similar to the temporal pattern of gross primary productivity (GPP) estimated by flux towers at ground reference stations. The PPI is less affected by the presence of snow than other commonly used vegetation indices such as the Normalized Difference Vegetation Index (NDVI) or the Enhanced Vegetation Index (EVI).

The product is distributed with a 500m pixel size (MODIS Sinusoidal Grid) with an 8-day compositing period. The large integral, or LINT, used in this indicator is the mathematical integral calculation of the smoothed and gap-filled PPI time series data between the start and end of the growing season points, being the SOS and EOS datasets described above.

All input data sets are derived with wall-to-wall coverage of the land surface of the EEA-38 region.

No gap filling was needed.

Policy/environmental relevance

The indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme](#). It contributes mainly to monitoring aspects of the 8th EAP priority objective Article 2.2.b that shall be met by 2030: 'continuous progress in enhancing and mainstreaming adaptive capacity, including on the basis of ecosystem approaches, strengthening resilience and adaptation and reducing the vulnerability of the environment, society and all sectors of the economy to climate change, while improving prevention of, and preparedness for, weather- and climate-related disasters' ^[1]. More specifically, and in accordance with the European Commission Communication on the 8th EAP monitoring framework, the indicator assesses whether the EU will 'decrease the area impacted by drought and loss of vegetation productivity' by 2030 ^[2].

Justification for indicator selection

Droughts are extreme climate events that are induced by temporary water deficits and may be related to a lack of precipitation, soil moisture, streamflow or any combination of the three taking place at the same time. Droughts can occur in most parts of the world, even in wet and humid regions, and can have profound impacts on agriculture, industry, tourism and ecosystems and the services they provide. In arid and semi-arid ecosystems (including the Mediterranean regions), limited water availability is a recurrent phenomenon and governs plant growth and phenology. On the other hand, in temperate and boreal regions, sporadic prolonged dry periods can lead to water-limited conditions and have far-reaching impacts on ecosystems' carbon balance and structure. The immediate impacts of droughts within the growing season (i.e. a few weeks in duration) are, for example, lead to decline in crop production, pasture growth and fodder supplies from crop residues. Prolonged water shortages (e.g. of several months) may, among other things, potentially increase wildfire occurrences.

The monitoring and assessment of drought impacts are complex because they vary in their severity and often depend on the different phases of the given drought event. Differences in the physiological response of vegetation to water deficits cause differences in the sensitivity and resilience of terrestrial ecosystems to drought, and ultimately influence the types of impacts that droughts have, i.e. slow growth or reduced greenness, that lead to loss of biomass or may even result in plant mortality. Consequently, significant changes in vegetation productivity provide an indication/early warning of imminent impacts on ecosystems' equilibrium states.

Context description

In June 2024, the EU adopted the [Nature Restoration Law](#) requiring member states to restore at least 30% of habitats covered by legislation from a poor to a good condition by 2030, increasing to 60% by 2040, and 90% by 2050.

Droughts have an impact on the condition of ecosystems covered by the Nature Restoration law such as forests and grasslands and wetlands and might hamper reaching the restoration targets.

The EU Strategy on Adaptation to Climate Change ([COM\(2021\) 82 final](#)) sets out important objectives around mainstreaming adaptation across different policy areas. It shows the importance of healthy soils in minimising impacts of floods and droughts. Droughts negatively affect the adaptive capacity of agricultural ecosystems, the resilience of forest ecosystems and in urban ecosystems droughts indirectly affect the ability of green urban spaces to protect people against heatwaves.

The EU legislation for [LULUCF](#) as part of the 2030 climate target sets clear targets for the LULUCF sector for each Member States. The capacity of forests and other land uses to store and remove carbon from the atmosphere will depend on management as well as a number of natural circumstances. The latter include variations in growing conditions and droughts, which can have an important effect on reaching the national carbon removal targets of Member States by impacting the amount of carbon storage in ecosystems.

Targets:

No specific targets.

Accuracy and uncertainties

Methodology uncertainty:

The approach cannot account for all land use or land cover changes that have occurred within a pixel in the whole period of analysis. For example, clear cuts within forest ecosystems or the use of irrigation systems as part of management processes in agricultural areas might increase or decrease vegetation productivity independently of drought occurrences. This can introduce noise to the data sets that might further bias the assumed pixel-based relationships between drought pressure and vegetation productivity.

Another source of uncertainty is related to the simplification of the drought impact model for its implementation in the operational setting. On one hand, the same thresholds for deviations in soil moisture and vegetation production imply similar impacts/impact severity in different sectors (agriculture, forestry, etc), which gives an acceptable approximation on the continental scale but might need to be adjusted to local conditions. Still, in some cases, the start, end, severity and spatial extent of a drought, as well as the propagation of its impacts through the whole land systems, might change as a result of additional climate and/or surrounding biophysical conditions, such as temperature, snowpack, albedo and soil's water-holding capacity.

Lastly, insect infestations, wildfires and land use change, in most extreme case soil sealing will also reduce vegetation productivity. For the latter the analytics has excluded those grid cells with known land use change processes. Data on insect infestation are not available on the EU scale and wildfires will be included in the next version of the indicator. However, the analytics of anomalies for every 500m grid cells only retained those events where soil moisture deficit and negative vegetation anomalies occurred the same time and place. As vegetation productivity and soil moisture deficit have been shown to show a strong correlation, we think that the method is appropriate to indicate drought impact to an acceptable certainty.

Data set uncertainty:

The datasets represent the average impact on the productivity of all terrestrial ecosystems within an area covered by a pixel of 500m×500m. Therefore, the indicator can be used at coarse resolution only, indicating drought impacts on main terrestrial ecosystems. As opposed to field measurements, remote-sensing products measure vegetation's light

absorption from a satellite at a height of several hundred kilometres, which might introduce bias due to atmospheric disturbances.

In some land use types like e.g. in forestry, land management practices like e.g. clearing and thinning are practices that affect the measurements of vegetation productivity derived from satellite data. These measures are not captured by CORINE land cover and could therefore affect the results. Furthermore, the short vegetation period in the Nordic countries and high degree of cloudiness may potentially affect the results regionally.

Rationale uncertainty:

No uncertainty has been identified.

Data sources and providers

- [Vegetation productivity 2000-2024](#), European Environment Agency (EEA)
- [EDO Soil Moisture Index \(SMI\) \(version 3.0.1\)](#), European Drought Observatory, Joint Research Centre

▼ Metadata

DPSIR

Impact

Topics

[# Agriculture and food](#) [# Biodiversity](#) [# Climate change adaptation](#)

Tags

[# Biodiversity](#) [# Productivity](#) [# Land cover](#) [# 8th EAP](#) [# LSI011](#) [# Drought impact](#) [# Ecosystems](#)

Temporal coverage

2000-2024

Geographic coverage

Albania	Austria
Belgium	Bosnia and Herzegovina
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Kosovo (UNSCR 1244/99)	Latvia
Liechtenstein	Lithuania
Luxembourg	Malta
Montenegro	Netherlands
North Macedonia	Norway
Poland	Portugal
Romania	Serbia
Slovakia	Slovenia
Spain	Sweden

Switzerland

Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG13: Climate action

Unit of measure

FIG1: Area of drought impact (km²)

FIG2: Percentage

Frequency of dissemination

Once a year

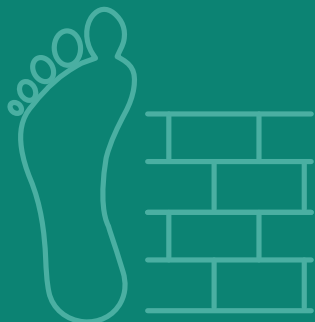
 References and footnotes

1. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36.
[↗](#)
2. EC, 2022, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives - COM/2022/357 final
[↗](#)



8th Environment Action Programme

Raw material consumption: Europe's material footprint



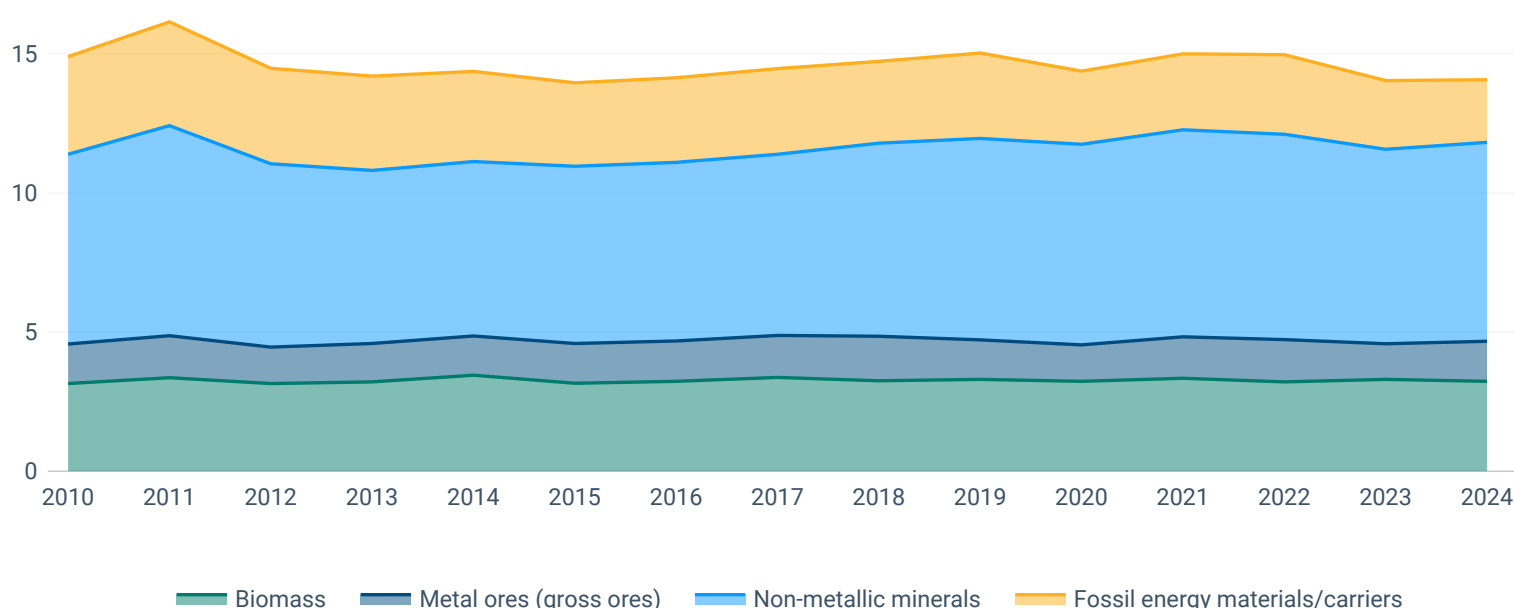
Europe's material footprint

Published 03 Nov 2025

The 8th Environment Action Programme aims to significantly cut the EU's material footprint - the amount of raw material extracted to produce goods and services consumed in the EU. The per capita material footprint has dropped by 5.5% during 2010-2024, including a dip of 6.2% from 2022 to 2023. Raw material extraction was 14.1 tonnes per capita in 2024, considered unsustainable and above the global average. Based on historical trends and projections for future material use, it appears unlikely that the EU will significantly reduce the per capita material footprint in the next decade. Major effort is needed to reduce material consumption, for example by switching to goods and services that require less material or circular business models.

Figure 1. EU Material Footprint, expressed in tonnes of raw material equivalent per capita

Tonnes per capita



The European Union's material footprint refers to the amount of material extracted from nature, both inside and outside the EU, to manufacture or provide the goods and services **consumed by EU citizens**. The [8th Environment Action Programme](#) aims to significantly decrease the EU's material footprint to safeguard precious natural resources and mitigate environmental impacts, such as climate change and biodiversity loss^[1]. This reflects the [Treaty commitment](#) (Art. 191 TFEU) to ensure 'the prudent and rational utilisation of natural resources'.

From 2010 to 2024, the EU per capita material footprint decreased by 5.5%. The material footprint fell markedly in 2020 – influenced by the economic slowdown due to the COVID-19 pandemic – yet increased again by 2021. Another sharp 6.2% drop between 2022 and 2023 was mainly caused by a decrease of metal and fossil fuel consumption. Consumption of metals decreased by 16% in 2023, which may be attributed to the EU [decreasing its imports of metals from Russia](#) and [increasing its exports to Ukraine](#), overall resulting in a lower metals footprint.

Consumption of **non-metallic minerals** is the highest of the various material groups, accounting for 51% of the footprint in 2024. Consumption changes in this group were largely responsible for the overall trend during the entire time period. Biomass was the next largest group (23%), followed by fossil fuels (16%) and metals (10%). Fossil fuels are the only material group to **show a decrease** (of 36%) between 2010 and 2024, driving the overall drop in material footprint. This could be attributed to EU climate policies, and other recent energy consumption-related developments, like high energy prices due to Russia's aggression in Ukraine. Non-metallic minerals account for a large part of the total material footprint, yet they have **less environmental and climate impact than metals and fossil fuels** because they are mostly composed of inert materials such as gravel or limestone.

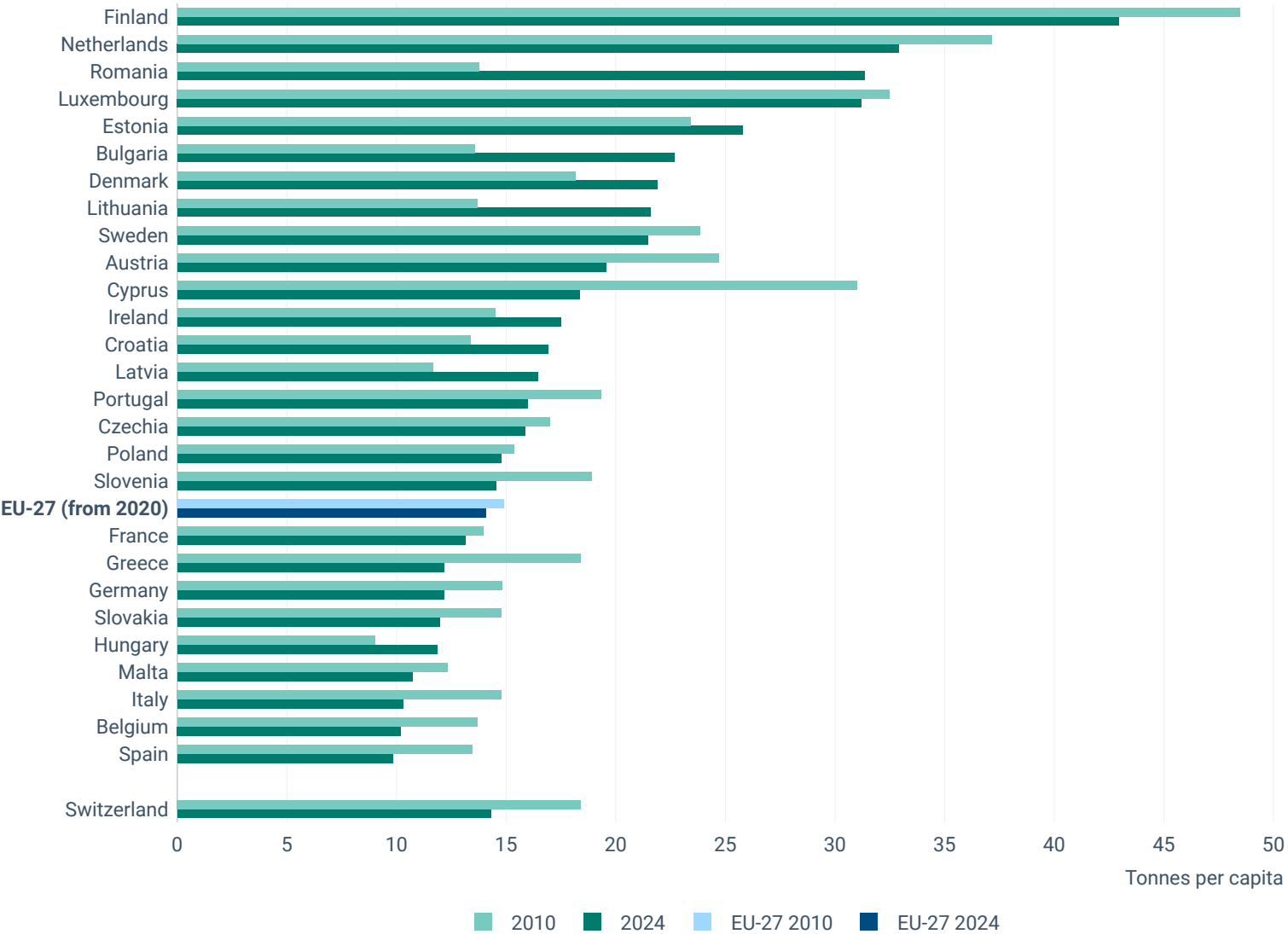
The material footprint provides a comprehensive measure of **all materials extracted**, including outside the EU and imported, to satisfy consumption demand. The reliance on external suppliers differs by material. Demand for metals and fossil fuels is mainly met by imports, while demand for biomass and non-metallic minerals is largely met by domestic extraction, due to their weight, lower value, availability and in the case of biomass degradability.

The EU's total material footprint is **above the global average** and greater than those of low- and middle-income non-EU countries. The level of resource consumption exceeds the planet's 'safe operating space' for resource extraction^[2]. This indicates, if the world were to consume resources at this level, the capacity of the planet to provide these resources would be exceeded.

Material footprints can be reduced by decreasing consumption (including for example by optimising use of products and assets, for example through sharing or product-as-a-service models) or choosing goods or services whose production or provision needs less material. Various **circular economy policies** (as part of the [EU circular economy action plan](#)) aim to reduce the need for primary material extraction, by keeping materials in the economy for as long as possible, optimising product and asset use, keeping their value as high as possible, and boosting high-quality recycling.

Discounting the temporary dips in 2020 and 2023, the level of the material footprint has been relatively stable from 2015 until 2024, albeit lower than its 2010 levels. Available projections for material use, such as the [OECD Global Material Resources Outlook](#), predict an increased future demand for materials in the EU^[3]. This suggests it is **unlikely** that the EU will significantly reduce its material footprint in the coming decade.

Figure 2. EU Member States' material footprint in t/cap for the years 2010 and 2024, ranked according to the 2024 footprint



Material footprints **vary substantially** across EU countries, from 9.8 tonnes/capita in Spain to 42.9 tonnes/capita in Finland. Since 2010, 19 of the 27 EU Member States and Switzerland, have reduced their material footprint. Cyprus, Greece and Italy reduced their footprints by more than 30%. However, Romania, Bulgaria and Lithuania increased theirs by more than 50%.

Differences in material footprints among countries are difficult to explain, as they are based on the **structure and efficiency of the economy** and citizens' consumption patterns. Yet, elements such as high levels of **circularity** in the national economy are also important. High levels of circularity may partly explain, beside econometric considerations, the low material footprint value in Belgium, Malta and Italy, countries with high circular material use rates. On the other hand, Finland and Romania with the highest and third-highest material footprints display very low circular material use rates (2.4% and 1.3% respectively in 2023).

Supporting information

Definition

The material footprint indicator is based on two components:

- domestic extraction of materials, by material group, as reported to Eurostat;

- estimates of raw material equivalents (RMEs) for imports and exports.

The term 'RME' indicates the full accounting for resources extracted to produce final products. While, for domestic extraction, RMEs equal domestic material extraction, RMEs need to be estimated for imports to the EU of raw materials, and semi-finished and finished products.

The difference in the calculations, compared with the more well-known domestic material consumption (DMC) is that the material footprint includes all materials needed to produce the products imported into the EU, while the DMC only includes the weight of imports when these cross the EU border. The material footprint, therefore, is more comprehensive in revealing the actual materials used by EU citizens. For example, in 2019, imports made up 27% of DMC, while they made up 53% of the material footprint.

Methodology

The Eurostat-derived data are described in [Eurostat \(2021\)](#)^[4]. Eurostat nowcasts material footprint values for 2022.

For country data, gap filling was performed for (1) missing values at the start or end of time series, where the value was assumed equal to the first available value; and (2) missing values between reported values, calculated by extrapolation.

Policy/environmental relevance

The [European Green Deal](#)^[5] explicitly calls for a decoupling of economic growth from resource extraction, which translates into continuously decreasing resource consumption in a growing economy. The material footprint accounts for a life cycle approach to material extraction, accounting not only for the weight of materials imported/exported to the EU, but also for the materials needed to produce these imports/exports. The footprint provides a fuller picture of the resources needed to satisfy EU demand.

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It contributes to monitoring aspects of the 8th EAP Article 3.s that requires 'significantly decreasing the Union's material and consumption footprints to bring them into planetary boundaries as soon as possible, including through the introduction of Union 2030 reduction targets, as appropriate'. It also helps monitor progress towards achieving, by 2030, aspects of the 8th EAP priority objective set out in Article 2.2.a: 'advancing towards a well-being economy that gives back to the planet more than it takes and accelerating the transition to a non-toxic circular economy, where growth is regenerative, resources are used efficiently and sustainably, and the waste hierarchy is applied'. The [European Commission Communication on the 8th EAP](#) monitoring framework specifies that this indicator should be used to monitor that the EU 'significantly decrease the EU's material footprint, by reducing the amount of raw material needed to produce the products consumed in the Union.'

Accuracy and uncertainties

No uncertainties have been specified.

Data sources and providers

- [Material flow accounts in raw material equivalents - modelling estimates](#), Eurostat - European statistics

▼ Metadata

DPSIR

State

Topics

Waste and recycling # Resource use and materials # Sustainability challenges

Tags

Material extraction # WST007 # Material footprint # Consumption # 8th EAP

Temporal coverage

2010-2024

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	Switzerland

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG12: Responsible consumption and production

Unit of measure

Tonnes per capita

Frequency of dissemination

Once a year

▼ References and footnotes

1. IRP, 2019, *Global Resources Outlook 2019: Natural Resources for the Future We Want*, International Resource Panel, Nairobi, Kenya.
[↗](#)
2. EC, 2022, 'Consumption Footprint Platform', *European Platform on Life Cycle Assessment*, European Commission (<https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>) accessed June 26, 2022.
[↗](#)

3. The OECD projections refer to the same material categories as the ones used in this indicator. However, the OECD refers to material use, not to material footprint. Material use is defined as domestic material consumption (DMC) which is calculated by the extraction of materials domestically plus imports minus exports. The difference with the material footprint approach is that DMC accounts only for the physical weight of goods imported at the point of entrance into a territory (in our case, the EU). The material footprint, on the other hand, accounts for the full weight of materials extracted in the value chain abroad in order to construct the goods imported. Therefore, the material footprint of a territory (e.g. the EU) is always higher than the DMC. However, the expected increase in the EU's material footprint based on the OECD projections is still valid, because these projections predict increases in material use in all world regions.
↱
4. Eurostat, 2021, 'Population on 1 January', *Data Browser* (<https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en>) accessed March 4, 2022.
↱
5. EC, 2022, 'A European Green Deal: striving to be the first climate-neutral continent', *European Commission* (https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en) accessed June 27, 2022.
↱



8th Environment Action Programme

Waste generation in Europe

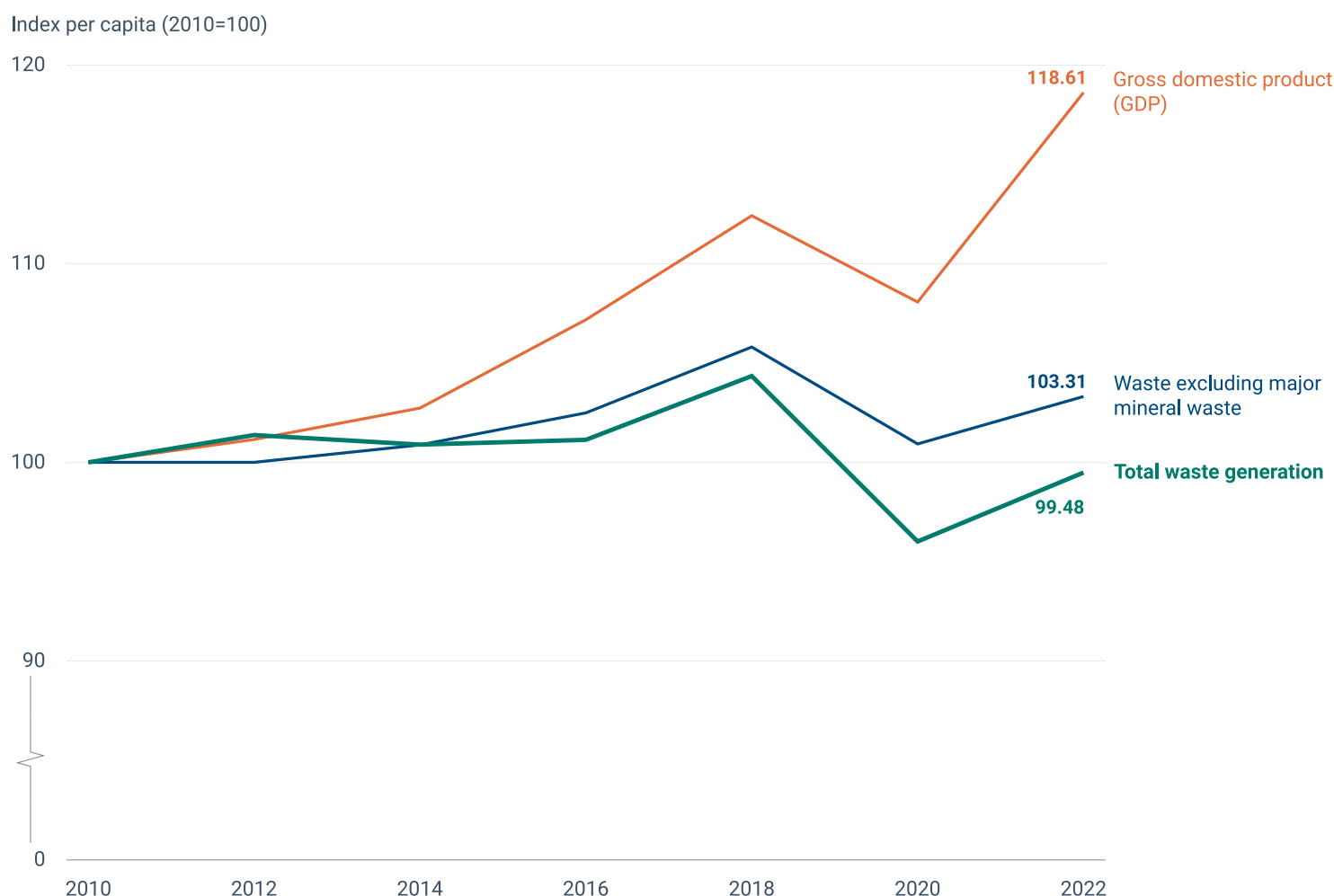


Waste generation in Europe

Published 02 Dec 2024

Total per capita waste generation remained near stable in the European Union between 2010 and 2022. Waste generation historically follows trends in economic growth, e.g. during the 2020 economic slowdown and recovery thereafter. The EU aims to significantly decrease its total waste generation by 2030. Although the observed stability and decoupling of waste generation from economic growth is encouraging, the latest data indicates that the link between economic growth and waste generation remains. Therefore, it is unlikely that waste generation will substantially decrease by 2030.

Figure 1. Waste generation per capita in the EU-27



For a long time, the EU has set a policy objective to reduce waste through prevention, which is the first step of the waste hierarchy laid down in the [Waste Framework Directive^{\[1\]}](#). The circular economy and zero pollution **ambition** of the EU is to significantly reduce total waste by 2030^[2].

Total **waste generation** per capita decreased very slightly by 0.5% (decrease of 26 kg/capita) in the EU-27 between 2010 and 2022 and reach 5 tonnes per capita in 2022. A sharp decrease occurred in 2018-2020, following an increase in 2016-2018, due to the COVID-19 pandemic and economic slowdown. Waste generation has bounced back since, with an increase of 4% (174 kg/capita) between 2020 and 2022.

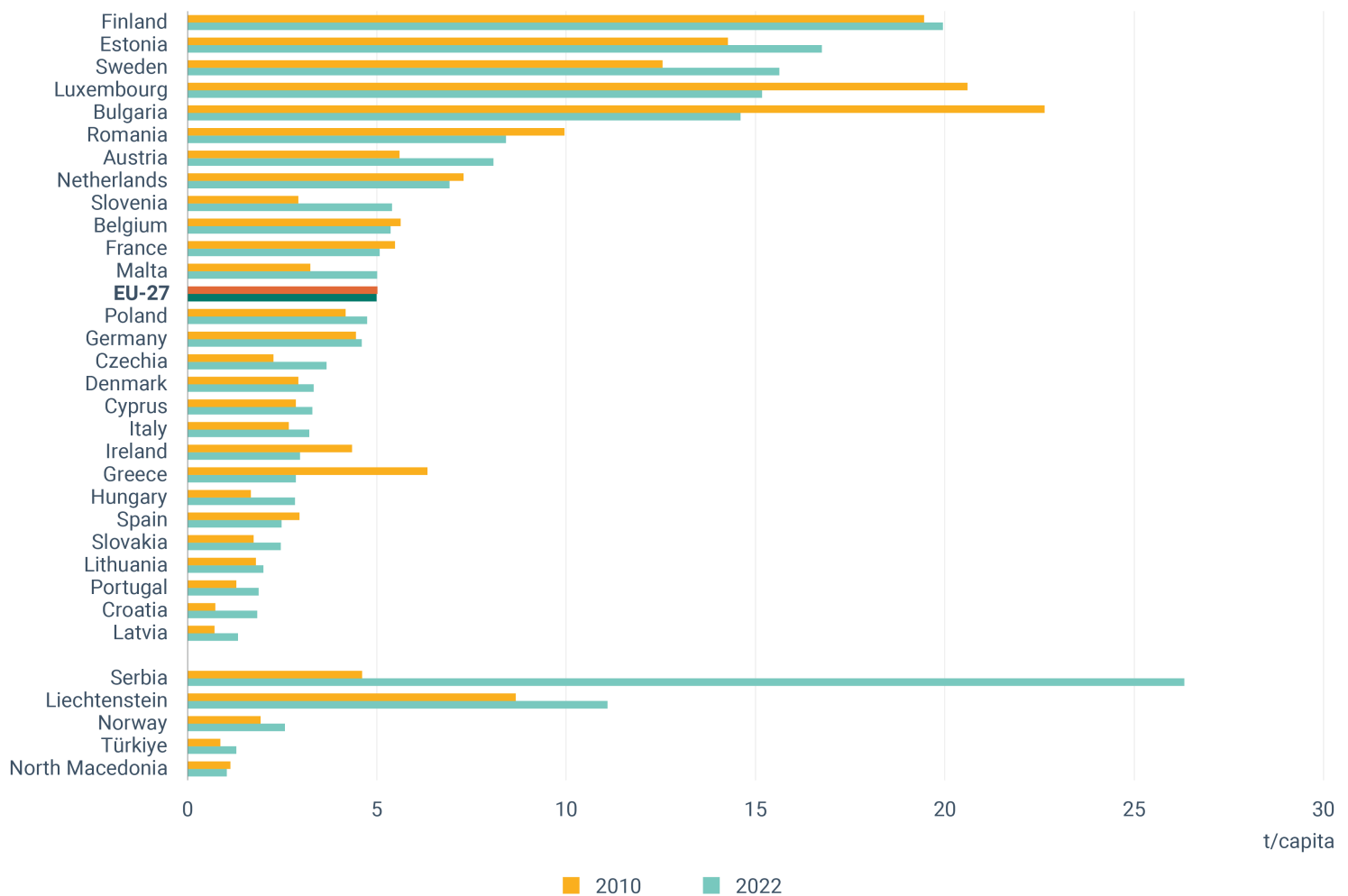
Total waste generation remained stable, yet underlying waste streams show variations, modifying the composition. Sorting residues^[3] almost doubled from 2010 to 2022 (indicating increases in collection of recyclables), while excavated soils and mineral waste from construction and demolition increased by more than 100kg/capita. The **stability** of the total waste is mainly due to a high decrease in generation of other mineral waste by around 400kg/capita in the reporting time period, due to a [slowdown](#) of mining activities in Europe.

Major **mineral wastes** (hard rocks, concrete, soil and others) mainly produced in mining and construction sectors, feature in large quantities in relation to other waste types. They usually represent less of an environmental concern because of their inert nature. If excluded from the totals, the remaining and more environmentally significant waste streams increased by 3.3% between 2010 and 2022, a rise of 57 kg/capita.

The main driver for trends in total waste volumes is considered to be **economic growth**, with gross domestic product (GDP) the most common parameter used to track the economy's size. During 2010-2022, the EU's per capita GDP increased in real (deflated) terms by almost 19%. While waste generation remained stable in the same period, it followed overall trends in GDP development (the drop in 2020), indicating a relative decoupling of waste generation from economic growth.

Latest data indicates that a **link** remains between waste generation and economic growth, albeit weaker. Therefore, it seems unlikely that the per capita total waste generation will significantly decrease by 2030. The only significant decrease observed (around 8%) in waste generation is very recent (2018-2020) and coincided with negative GDP growth rates. Waste generation has historically followed GDP growth closely and GDP growth rates have been positive since 2020. The [European Central Bank projects](#) this to remain as such in the coming years. Additional effort on implementing waste prevention is needed to significantly waste generation by 2030.

Figure 2. Generation of waste per capita and by European country (2010 and 2022)



On average, **5 tonnes** of total waste was generated per EU citizen in 2022, almost identical to the per capita generation in 2010. This average masks large country differences both in total waste volumes per capita and in waste generation trends.

Amounts generated for EU Member States in 2022 range from less than 1.35 tonnes per capita in Latvia to 20 tonnes per capita in Finland. Other European countries range from 1 tonne in North Macedonia to 26 tonnes in Serbia. Extreme numbers and differences can be affected by specific country situations and partly reflect variant structures of countries' economies. In 2022, 12 EU Member States (14 of 32 countries with available data) were **above the EU average** for 2022.

Trends over time also show a mixed picture between countries. The total waste generated per capita increased in 18 Member States (22 of the 32 countries with available data). The largest relative decrease within the EU was observed in Greece and the largest relative increase in Bulgaria. The highest increase overall was reported in Serbia.

Definition

This indicator consists of two figures about waste generation. Figure 1 shows indexed values of waste generation, waste generation excluding major mineral waste and GDP with 2010 taken as a reference year (2010=100%). GDP was chosen as a basic indicator of economic growth. Figure 2 shows total waste generation per capita by European country. Data presented in the form of a bar chart are displayed as a comparison of the reference year (2010) and the last available year.

Methodology

Figure 1: Raw data for waste generation (total and excluding major mineral wastes) and GDP were retrieved from Eurostat. Eurostat aggregates for the EU-27 were used. Data on waste generation contain all NACE activities and households. Frequency of data publishing varies from every 2 years (for waste generation) to every year (for GDP). The aggregated figures are indexed to 2010, which means that the figure for each year is divided by the figure for 2010 and then multiplied by 100. Information on data sets uncertainties can be found directly in the metadata and explanatory notes provided by Eurostat. Only official datasets by Eurostat have been used.

Figure 2: Data for waste generation were retrieved from Eurostat. Data are displayed for country level, contain all NACE activities and households, and are expressed in kg per capita. To provide the broadest possible picture of European countries, geographical coverage was extended to the EEA-32 member countries and West Balkan cooperating countries. Frequency of data publishing is every 2 years. Gap filling was applied for three countries where 2018 data were used to fill the 2020 data gap. Information on data sets uncertainties can be found directly in the metadata and explanatory notes provided by Eurostat. Only official datasets by Eurostat have been used.

Policy/environmental relevance

One of the symbols of the linear economy system, which predominated in recent decades, is the high consumption of resources followed by high waste generation ('take-make-dispose'). This economic model is based on increasing profits generated by the consumption of primary resources and increasing demand for short-cycle products. In 2015, 2018 and 2020, the European Commission adopted Circular Economy packages to make the transition to a circular economic model where resources are used in a more sustainable way. The waste hierarchy serves to set priorities for EU and national waste policies and gives the highest priority to waste prevention, followed by preparing for reuse, recycling, and other methods of recovery and disposal. These priorities are highlighted by recent waste and resource efficiency policies and strategies at EU and national levels.

This indicator is a headline indicator for monitoring progress towards the 8th Environment Action Programme (8th EAP)^{[4][5]}. It contributes mainly to monitoring aspects of the 8th EAP priority objective Article 2.2.c that shall be met by 2030: 'advancing towards a well-being economy that gives back to the planet more than it takes and accelerating the transition to a non-toxic circular

economy, where growth is regenerative, resources are used efficiently and sustainably, and the waste hierarchy is applied'. For the purposes of 8th EAP monitoring, this indicator assesses specifically whether the EU will significantly reduce the per capita total amount of generated waste by 2030^[6].

The zero pollution ambition of the EU calls for a significant reduction in EU waste generation by 2030 and this indicator also monitors progress towards this EU policy objective.

Accuracy and uncertainties

Methodology uncertainty

No uncertainty has been specified.

Data sets uncertainty

Rationale uncertainty

No uncertainty has been specified.

Data sources and providers

- [Generation of waste by waste category, hazardousness and NACE Rev. 2 activity](#), Statistical office of the European Union (EUROSTAT)

▼ Metadata

DPSIR

Pressure

Topics

[# Waste and recycling](#) [# Resource use and materials](#) [# Circular economy](#)

Tags

[# WST004](#) [# Waste generation](#) [# Industrial waste generation](#) [# 8th EAP](#)

Temporal coverage

2010-2022

Geographic coverage

Austria

Bulgaria

Cyprus

Denmark

Belgium

Croatia

Czechia

Estonia

Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Liechtenstein	Lithuania
Luxembourg	Malta
Netherlands	North Macedonia
Norway	Poland
Portugal	Romania
Serbia	Slovakia
Slovenia	Spain
Sweden	Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG12: Responsible consumption and production

Unit of measure

- Figure 1: Index (2010=100)
- Figure 2: t/capita

Frequency of dissemination

Every 2 years

▼ References and footnotes

1. EU, 2018, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, OJ L 150, 14.6.2018, p. 109-140.
[↩](#)
2. EC, 2021, 'Zero pollution action plan', (https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en) accessed November 10, 2022.
[↩](#)
3. Waste generated by the sorting of separately collected recyclables
[↩](#)

4. EC, 2022, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives
[↩](#)
5. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22–36.
[↩](#)
6. EC, 2021, COMMISSION STAFF WORKING DOCUMENT Digital Solutions for Zero Pollution Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Pathway to a Healthy Planet for All EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'
[↩](#)



8th Environment Action Programme

Premature deaths due to exposure to fine particulate matter in Europe

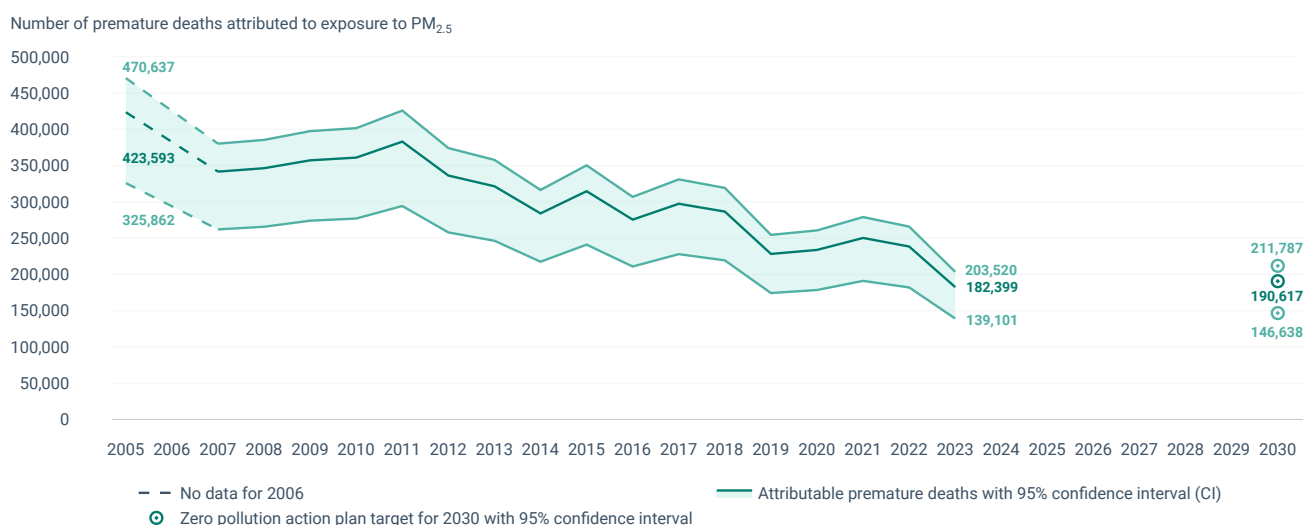


Premature deaths due to exposure to fine particulate matter in Europe

Published 30 Nov 2025

The European Commission's zero pollution action plan (ZPAP) sets a target to reduce the health impacts of air pollution by at least 55% by 2030, compared to 2005. Between 2005 and 2023, the number of premature deaths in the EU-27 Member States attributable to PM_{2.5} concentrations above 5µg/m³ fell by 57%, achieving the target for 2023. Despite ongoing improvements, there were still 182,000 premature deaths attributable to PM_{2.5} in the EU-27 in 2023.

Figure 1. Premature deaths attributable to exposure to fine particulate matter (PM_{2.5}), European Union



Between 2005 and 2023, **premature deaths** attributable to PM_{2.5} exposure above the **WHO air quality guideline** level of 5µg/m³ fell by 57% in the EU-27 (Figure 1), to an estimated number of 182,000. This was the result of implementing policies at different levels (international, EU, national and local) to improve air quality (e.g. the **EU Ambient Air Quality Directives**) and to reduce emissions of air pollutants (e.g. the **National Emission Reduction Commitments Directive**). Those policies have contributed to a **decline in the total emissions** of primary PM_{2.5} (emitted directly into the atmosphere) by 38% between 2005 and 2023.

The population-weighted concentration of PM_{2.5} (the concentration to which an average **inhabitant is exposed**) fell from 19.4µg/m³ in 2005 to 10.2µg/m³ in 2023 (a drop of 1.2µg/m³ compared to 2022). It is still above the WHO guideline level of 5µg/m³. In 2023, **94.4% of the urban population in the EU was exposed to PM_{2.5} concentrations** above the WHO guideline level.

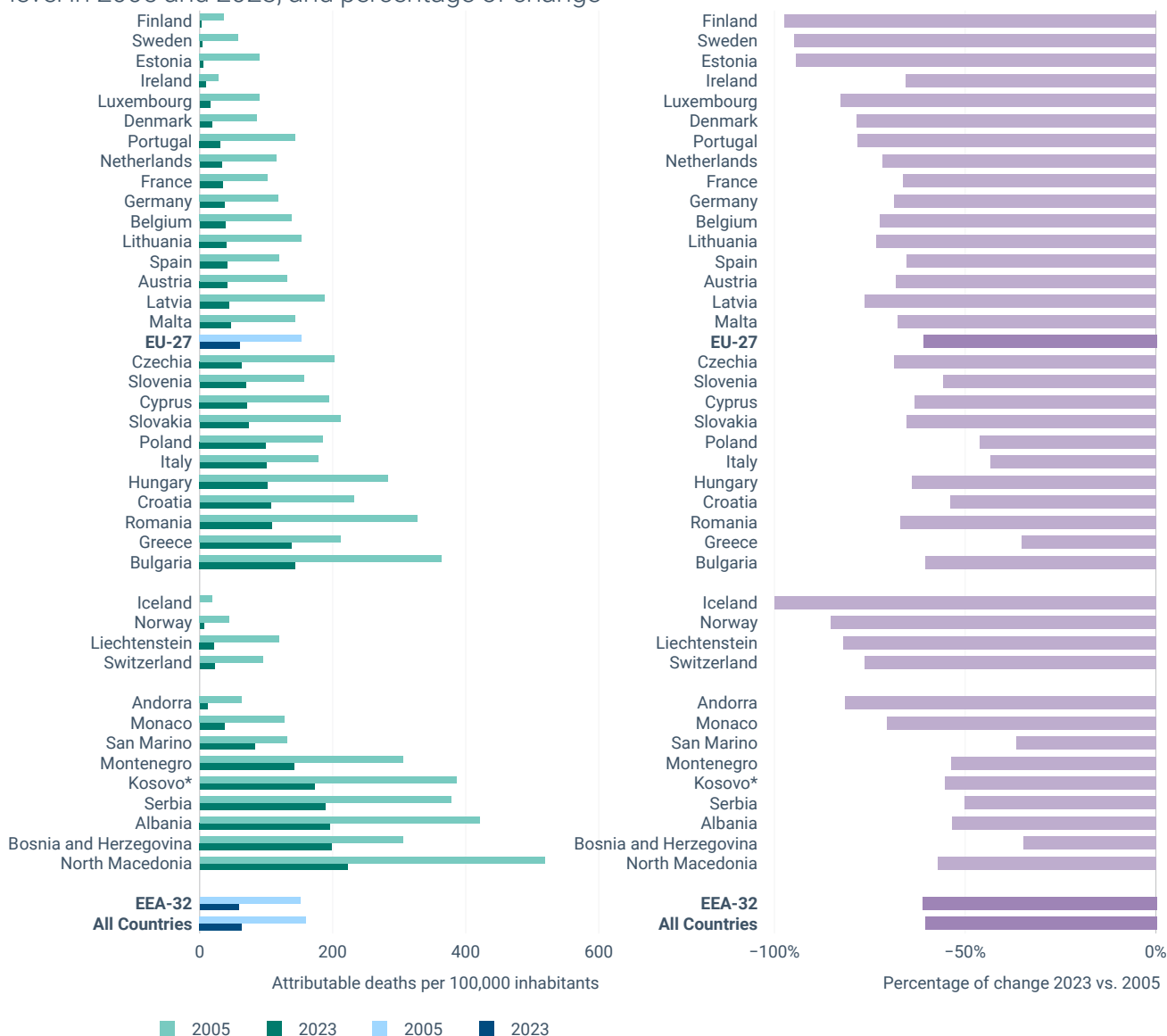
Examining specific primary PM_{2.5} sources, reductions in their EU emissions from residential heating are particularly significant. Specifically, most regions with the **highest absolute reduction** in attributable mortality in 2023, compared to 2022, are located in countries with the highest reduction in emissions from the residential, commercial and institutional sector. This decline may partly stem from a warmer winter, as shown by the reduction in the number of heating degree days between both years as compiled by **Eurostat**.

Important decreases are also seen in regions where the reductions in emissions from road transport in cities may have contributed. The role of secondary PM_{2.5} (**formed in the atmosphere**) seems more uncertain, partly due to the complexity of their chemical transformation processes. Out of the main precursors of secondary particles, sulphur dioxide and nitrogen oxides emissions have fallen by 84% and 53%, respectively, since 2005; emissions of ammonia have only reduced by 17%.

There is certain interannual variability in the number of estimated attributable deaths (Figure 1). Hence, long-term achievement of the **ZPAP** objective cannot be taken for granted. In 2023, the 95% confidence interval, which indicates the uncertainty associated with the concentration response function, is estimated at 139,000-204,000. This overlaps with the confidence

interval of the 2030 objective of 147,000-212,000. This confirms that measures to reduce the PM_{2.5} emissions and concentrations need to be maintained and enhanced to ensure achievement of the **2030 target** and ultimately the long-term (2050) **zero pollution objective**. The revised [air quality directive](#) should help to maintain progress in the coming years.

Figure 2. Premature deaths normalised by population attributable to exposure to PM_{2.5} at country level in 2005 and 2023, and percentage of change



The **ZPAP target** is set for the EU as a whole and there are significant differences in the change in mortality due to PM_{2.5} exposure at **country level** between 2005 and 2023. Attributable mortality per capita has decreased in all Member States, and by more than 55% in 23 countries (Figure 2). The country level decreases range from 35.1% in Greece to 97.5% in Finland.

All non-EU countries **reduced** the number of premature deaths attributable to exposure to PM_{2.5}, with decreases ranging from 34.8% in Bosnia and Herzegovina to almost 100% in Iceland. The decrease was greater than 55% in eight countries.

For comparison of the impact of air pollution on human health across the different **NUTS3 regions** of Europe, [this map](#) shows the rate of premature deaths attributable to PM_{2.5}. The **highest rate** of attributable deaths in 2023 within the EU were in the regions of Plovdiv (Bulgaria), Padova (Italy) and Brodsko-posavska županija (Croatia). However, all Finnish regions except two, several Swedish regions and one region in Estonia and Portugal had very **low attributable death rates** (i.e. less than one).

The highest rate of attributable deaths for European countries outside the EU in 2023 were in the regions of Skopski (North Macedonia), Tiranë (Albania) and Nišavska oblast (Serbia). The lowest numbers were seen in the two Icelandic and three (out of eleven) Norwegian regions with a rate less than one.

▼ Supporting information

Definition

Air pollution is a major cause of [disease and mortality](#) and the so far [largest single environmental health risk](#) in Europe. The air pollutant with the strongest evidence for [adverse health outcomes](#) and also with the largest attributable burden is fine particulate matter (PM_{2.5}).

This indicator provides information on the number of premature deaths in the EU-27 attributable to long-term exposure to fine particulate matter (PM_{2.5}) since the year 2005.

It also shows a comparison in the mortality attributable to PM_{2.5} between years 2005 and the most recent year with available data, at country level, for 40 European countries.

Furthermore, it provides European [NUTS3](#) regional-level information on the number of premature deaths adjusted for the number of inhabitants aged above 30 years attributable to long-term exposure to PM_{2.5} for the most recent year with available data. Nomenclature of territorial units for statistics, or NUTS classification, is a system for dividing up the European territory for the collection of regional statistics, where NUTS3 corresponds to small regions.

Methodology

The EEA has been estimating the mortality attributable to air pollution in the last years. Until year 2021 (when the mortality for year 2019 was estimated), it used the recommendations provided by the WHO Europe in its 2013 report. This methodology has been explained in several documents, among them:

- the EEA briefing '[Assessing the risks to health from air pollution](#)';
- ETC/ATNI (2019, 2021).

After the publication of the new [WHO global air quality guidelines in 2021](#), and to reflect the updated recommendations, there has been some changes in the data used in that methodology; those changes were implemented for the first time in 2022 (to estimate the mortality in year 2020):

- The relative risk has been updated from the previous 0.062 to 0.08; this implies that the risk of dying prematurely increases by 8% per each increase in 10µg/m³ in the PM_{2.5} concentrations (previously the increment in the risk was 6.2%).
- The concentration from which the effect of exposure to PM_{2.5} is considered has changed from 0µg/m³ to 5µg/m³; in this way the EEA estimates the mortality attributable to not reaching the air quality guideline level recommended by [WHO](#), and considers in this way the concentrations for which the form of the concentration-response function is linear and for which this function is more certain. Nevertheless, it should be considered that there is no evidence of a threshold below which air pollution does not impact on health. (Please see additional information at the [EEA's briefing Health impacts of air pollution in Europe, 2025](#)).

Finally, since the 2024 update, the mortality per number of inhabitants has been calculated considering only the population aged above 30 years, since this is the population for which the total mortality is calculated, following the concentration-response functions recommended by [WHO](#).

Mortality calculations for all years back from 2005 have been recalculated using this updated methodology.

The aggregations are either at European, EU, country or at NUTS3 level.

Policy/environmental relevance

The [zero pollution action plan](#), adopted in the context of the [European Green Deal](#), has, among other things, set the goal to reduce by 2030 the number of premature deaths in the EU caused by air pollution by at least 55%, relative to 2005 levels and specified that this will be monitored via the premature deaths attributed to PM_{2.5}. The plan also identifies the long-term ambition, by 2050, of air pollution being reduced to levels no longer harmful to health.

The [European Green Deal's](#) call for revising the [EU's air quality standards](#) and aligning them more closely with the World Health Organization (WHO) [recommendations on air quality](#) was achieved with the [revised EU Ambient Air Quality Directive](#). This Directive, adopted in October 2024, introduces stricter and new standards to be attained by 2030. In line with the WHO recommendations, it also introduces an obligation to monitor additional pollutants such as ultrafine particles and ammonia.

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme](#). It mainly contributes to monitoring aspects of the 8th EAP priority objective Article 2.2.d that shall be met by 2030: 'pursuing zero pollution, including in relation to harmful chemicals, in order to achieve a toxic-free environment, including for air, water and soil, as well as in relation to light and noise pollution, and protecting the health and wellbeing of people, animals and ecosystems from environment-related risks and negative impacts', ([European Union Decision on the 8th EAP](#)). In line with the zero pollution action plan, the [European Commission's Communication on the 8th EAP monitoring framework](#) specifies that this indicator monitors progress towards reducing 'premature deaths from air pollution by 55% (from 2005 levels) by 2030', ([European Commission Communication on the 8th EAP monitoring framework](#)).

Accuracy and uncertainties

The main uncertainties are those derived from the health risk calculations. They are described at the EEA briefing '[Assessing the risks to health from air pollution](#)'.

Data sources and providers

- [Burden of disease of air pollution \(Countries & NUTS\)](#), European Environment Agency (EEA)

▼ Metadata

DPSIR

Impact

Topics

[# Environmental health impacts](#) [# Air pollution](#) [# Pollution](#)

Tags

[# mortality by exposure to PM2.5](#) [# health impacts](#) [# Zero pollution](#) [# 8th EAP](#) [# Particulate matter](#) [# PM2.5](#)
[# AIR007](#) [# environmental burden of disease](#)

Temporal coverage

2005-2023

Geographic coverage

Albania	Austria
Belgium	Bosnia and Herzegovina
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Kosovo (UNSCR 1244/99)	Latvia
Liechtenstein	Lithuania
Luxembourg	Malta
Montenegro	Netherlands
North Macedonia	Norway

Poland
Principality of Andorra
Repubblica di San Marino
Serbia
Slovenia
Sweden
Türkiye

Portugal
Principality of Monaco
Romania
Slovakia
Spain
Switzerland

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

FIG1: Number of premature deaths attributed to exposure to PM2.5
FIG2: Attributable deaths per 100,000 inhabitants and percentage of change 2023 vs. 2005

Frequency of dissemination

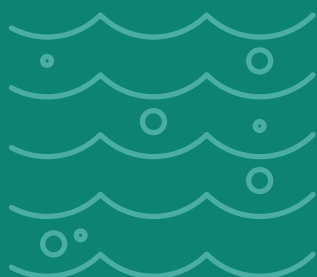
Once a year

▼ **References and footnotes**



8th Environment Action Programme

Nitrate in groundwater



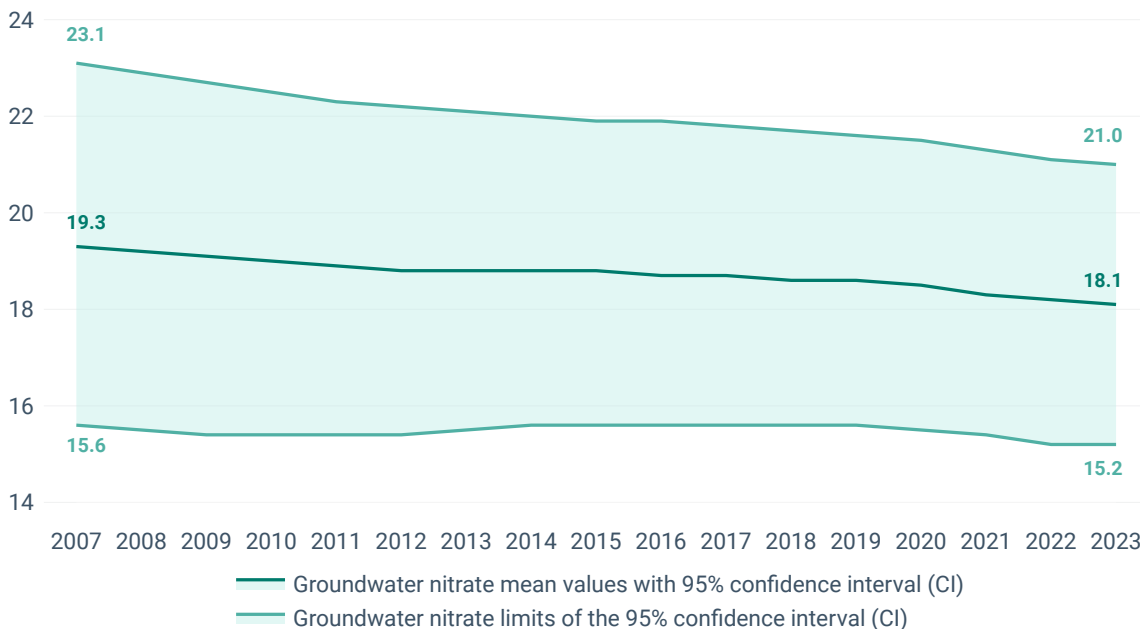
Nitrate in groundwater in Europe

Published 10 Nov 2025

The average nitrate concentration in European Union groundwaters did not change significantly from 2007 to 2023. The number of groundwater monitoring stations in 2016-2019 with nitrate concentrations greater than 50mg/l also remains largely unchanged compared to the reference period 2012-2015. Further, results from a high ambition model scenario show that potential nutrient load reductions are substantial, but still below the 2030 target. Currently, it remains unlikely that the trend is sufficient to achieve EU obligations or the 50% nutrient loss reduction target.

Figure 1. Groundwater nitrate 2007-2023

Milligrams of Nitrate per litre (mgNO₃/l)



Nutrients such as nitrogen and phosphorus, not absorbed by plants, are lost and become pollutants when present in excessive amounts. This includes high levels of nitrate (NO₃) in groundwater, which poses a **threat to the environment and human health**.

Reducing high levels of nitrate in groundwater has been a target of EU policy since the adoption of the [Nitrates Directive](#). Mineral fertilisers and manure are **main sources** of nitrate concentrations in EU groundwaters and an estimated 80% of the nitrogen discharge to the EU aquatic environment stems from agriculture. A large part of nutrients lost to surface- and groundwaters reaches the sea. Around 30% of surface water and 80% of marine waters monitored under the Nitrates Directive are eutrophic^{[1][2][3][4]}.

Several directives address nitrogen losses to the environment^{[1][5][6][7][8]}. The [Groundwater Directive](#) and [Drinking Water Directive](#) set the maximum **allowable concentration** for nitrate at 50mgNO₃/l in order to protect human health and the environment.

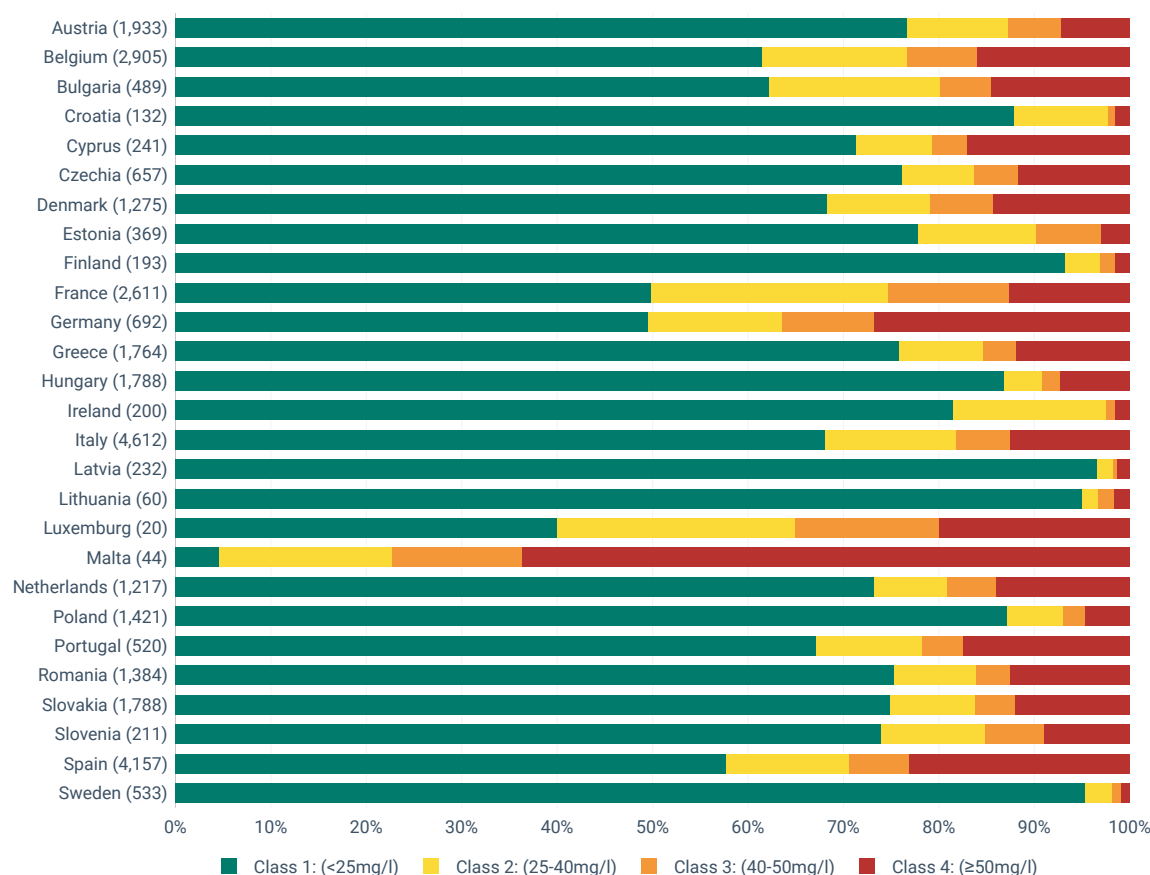
The [Zero Pollution Action Plan](#), [Biodiversity strategy](#) and [Farm to Fork strategy](#) are initiatives of the [European Green Deal](#), which aims to **reduce nutrient losses** to the environment by 50% in the EU, by 2030. The reduction could lower groundwater nitrate concentrations and decrease the number of monitoring stations with nitrate concentrations above 50mg/l, compared to the

reference period 2012-2015^{[9][10]}.

Despite legislation addressing nutrient pollution, the average nitrate (NO_3) concentration in monitored EU groundwaters did not change significantly from 2007 to 2023, **decreasing** from 19.3 to 18.1mg NO_3 /l but with a large variability as shown by the confidence interval in Figure 1. The **Nitrates Directive** reporting data over the period 2016-2019 shows 14.1% of groundwater monitoring stations **exceeded** the maximum allowable concentration of 50mg NO_3 /l. This is slightly higher than the observed 13.2% from the reporting period of 2012-2015.

An analysis from the Joint Research Centre modelled impacts in a high ambition scenario of improvements in domestic wastewater treatment and reduction of nutrient emissions to air. It used measures under the **CAP 2023-2027**, needed to achieve the Biodiversity and Farm to Fork strategy targets. The measures, where CAP measures are relevant for groundwater, could together reduce the nutrient load in European seas by 30% for nitrogen and 20% for phosphorus by 2030^[11]. While these potential reductions would be substantial, they still fall **below the target** of 50% reduction overall in nutrient losses.

Figure 2. Nitrate in Groundwater - Nitrates Directive reporting period 7 (2016-2019)



EU Member States report groundwater nitrate concentrations under the **Nitrates Directive**. At country level, nitrate concentrations in groundwater monitoring stations for the period 2016-2019 are distributed into **four classes** (Figure 2). Class 1 represents monitoring stations where concentrations are below 25mg/l. At the other end of the scale, Class 4 shows the share of stations that exceed the 50mg NO_3 /l maximum allowable concentration.

All 27 EU Member States had some groundwaters with **reported** nitrate concentrations above the maximum allowable concentration of 50mg NO_3 /l (class 4). The seven countries with more than 15% of their groundwater monitoring stations exceeding this maximum level were Belgium, Cyprus, Germany, Luxembourg, Malta, Portugal, and Spain. In contrast, the seven countries with more than 80% of groundwater monitoring stations below 25mg/l (class 1) were Croatia, Finland, Hungary, Ireland, Latvia, Poland and Sweden.

Definition

This indicator shows concentrations of nitrate in groundwater bodies. The indicator can be used to illustrate geographical variations in current concentrations and temporal trends. Large inputs of nitrogen to water bodies from urban areas, industry, and agricultural areas, can have negative impacts on the use of water for human consumption and other purposes.

Methodology

This indicator uses data reported under two different obligations. For the time series of average concentrations in figure 1 data from [WISE SoE - Water quality \(WISE-6\) reporting obligation](#) are used (published in Waterbase – Water Quality ICM). For the country level assessment in figure 2 data from the [Nitrates Directive reporting obligation](#) are used.

For the time series in Figure 1 a detailed methodology document “[Methodology, oxygen consuming substances and nutrients indicators](#)” is provided on WISE Freshwater. The methodology described in the document is used for more multiple indicators. A brief summary is provided here as well:

Annual mean concentrations per monitoring site are used as a basis in the analyses. Unless the country reports aggregated data, the aggregation to annual mean concentrations is done by the EEA. The data undergo [automatic](#) and manual quality checks to remove errors and outliers. Monitoring site time series from the same water body are combined and gap filled before further analysis. Gap filling is necessary to ensure that the average European time series represents the same water bodies every year. Water body time series are only included in the analysis if they have data within the first and last five years of the time range and data from at least 40% of the years in the time range.

Data are aggregated from site to water body level and gap-filled using generalized additive models (GAM) in the free [software R](#), using the [mgcv package](#). For water bodies with more than one site, a GAM model with concentration as response variable, year as fixed effect and site as random effect is used to estimate annual concentrations per site. Annual values for the water body are subsequently estimated by averaging the annual site predictions. For water bodies with only one site, or where the random effect for site is non-significant, a GAM without a random site effect is used to estimate annual values and for gap filling. The gap-filled water body time series are averaged by country and a weighted average of the country time series (weighting by the total area of groundwater in the country) is calculated to give the time series for Europe. A 95% confidence interval for the weighted average is calculated using of the formula for standard error of a weighted mean recommended in [Gatz and Smith \(1995\)](#).

For analysis of the present state on country level (figure 2), data reported under the Nitrates Directive^[1] for reporting period 2016-2019 are used, where data on monitoring station level are collected for each reporting period (four year period) and include characteristics on the water monitoring stations and values for the concentrations of NO₃ for each station. The data is summarised by country and by concentration classes. This information can also be viewed in the [JRC exploratory dashboard](#) for reporting period seven. While 2016-2019 is the last period for which there are consolidated data published, Member States have completed their reporting for 2020-2023 and it will be published in 2026.

Policy/environmental relevance

The quality of freshwater, with respect to nutrient concentrations, is an objective of several directives: The Nitrates Directive^[1], aimed at reducing nitrate pollution from agricultural land; the Urban Waste Water Treatment Directive^[5], aimed at reducing pollution from sewage treatment works and certain industries; the Industrial Emissions Directive^[6], aimed at reducing emissions from industry; the Water Framework Directive^[7], which requires the achievement of good ecological status; the Groundwater Directive^[12] on the protection of groundwater against pollution and deterioration. The Water Framework Directive also requires the reversal of significant and sustained upward trends in the concentrations of pollutants. Based on [the Drinking Water Directive](#)^[13], the Nitrates Directive and the Groundwater Directive under the Water Framework Directive, set the maximum allowable concentration for nitrate at 50mgNO₃/l. This is to eliminate the need for expensive water treatment because it has been shown that drinking water in excess of the nitrate limit can result in adverse health effects ^[3].

Reducing nutrient losses by 50% by 2030 is an important aspect of the European Green Deal^[14] initiatives: 'Farm to Fork' Strategy; Biodiversity strategy; Zero pollution action plan^{[15][16][17]}. The Common Agricultural Policy^{[18][19]} (CAP) is a key tool in this respect. The assessment of the 50% target is set out in the Annex to the Recommendations for the CAP Strategic Plans^[10] and is evaluated in the context of the Zero Pollution Monitoring Assessment^[20] published on 8 December 2022.

The 8th Environment Action Programme^[9] supports the objectives of the European Green Deal^[14] and forms the basis for the EU to achieve the [Sustainable Development Goals](#) of the United Nations.

The 'nitrate in groundwater indicator' is a headline indicator for monitoring progress towards the 8th Environment Action Programme (8th EAP). It mainly contributes to monitoring aspects of the 8th EAP priority objective Article 2.2.d that shall be met by 2030: 'pursuing zero pollution, including in relation to harmful chemicals, in order to achieve a toxic-free environment, including for air, water and soil, as well as in relation to light and noise pollution, and protecting the health and wellbeing of people, animals and ecosystems from environment-related risks and negative impacts'. The European Commission's Communication on the 8th EAP monitoring framework^[9] specifies that this indicator should monitor progress towards reducing nutrient losses by at least 50% in safe groundwater resources by 2030.

Accuracy and uncertainties

The indicator is meant to give a representative overview of nitrate conditions in the groundwaters of the European Union. This means it should reflect the variability in conditions over space and time. Countries are asked to provide data on groundwater bodies according to specified criteria.

The Waterbase - Water Quality ICM data for groundwater include almost all countries within the EU, while the Nitrates Directive data includes all EU countries. It is assumed that the data from each country represents the variability in space in their country. Likewise, it is assumed that the sampling frequency is sufficiently high to reflect variability in time. In practice, for Waterbase data, the representativeness will vary between countries, while for the Nitrates Directive data the coverage is more complete but reported at lower frequency.

Annual updates of Waterbase - Water Quality ICM data means that, due to changes in the database, the derived results of the assessment may vary in comparison to previous assessments. Database changes include changes in the QC procedure that excludes or re-includes individual sites or samples and retroactive reporting of data for past periods - which may re-introduce lost time series that were not used in the recent indicator assessments. Through communication with the reporting countries, the quality of the database can be, and incrementally is, further improved.

Data sources and providers

- [Nitrates Directive reporting period 7 \(2016-2019\)](#)(direct link to the dataset is not available), European Environment Agency (EEA)
- [Waterbase - Water Quality ICM](#), European Environment Agency (EEA)
- [WISE Statistics](#), European Environment Agency (EEA)

▼ Metadata

DPSIR

State

Topics

[# Water](#) [# Agriculture and food](#)

Tags

[# 8th EAP](#) [# WAT004](#) [# Freshwater quality](#) [# Groundwater](#) [# Nitrates](#)

Temporal coverage

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG6: Clean water and sanitation

Unit of measure

FIG1: the concentration of nitrate in groundwater is expressed as milligrams of nitrate per litre (mgNO₃/l)

FIG2: percentage

Frequency of dissemination

Once a year

References and footnotes

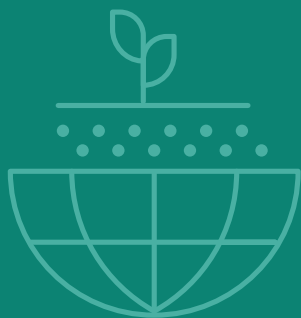
1. EU, 1991, Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources, OJ L 375, 31.12.1991, p. 1-8.
[a](#) [b](#) [c](#) [d](#)
2. EEA, 2022, 'Europe's groundwater — a key resource under pressure', European Environment Agency", *Briefing, European Environment Agency* (<https://www.eea.europa.eu/publications/europes-groundwater>).
[e](#)
3. WHO, 2003, 'Nitrate and nitrite in drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality (WHO/SDE/WSH/04.03/56)', (https://cdn.who.int/media/docs/default-source/wash-documents/wash-chemicals/who-sde-wsh-04-03-56-eng.pdf?sfvrsn=e2fe0837_4).
[a](#) [b](#)
4. EC, 2021, *REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2016–2019*, COM/2021/1000 final, European Commission.

5. EC, 1991, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment
a b
6. EU, 2010, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control), OJ L 334, 17.12.2010, p. 17-119.
a b
7. EC, 2000, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, 2000/60., 2000/60
a b
8. EU, 2001, Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, OJ L 309, 27.11.2001, p. 22-30.
e
9. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives - COM/2022/357 final
a b c
10. EC, 2020, *ANNEXES to the COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS - Recommendations to the Member States as regards their strategic plan for the Common Agricultural Policy*, COM(2020) 846 final, European Commission.
a b
11. European Commission. Joint Research Centre., 2022, *Zero pollution :outlook 2022.*, EUR 31248 EN, Publications Office, LU.
e
12. EC, 2014, Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration
e
13. EU, 2020, Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption, OJ L 435, 23.12.2020, p. 1-62.
e
14. EC, 2019, *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'The European Green Deal'*, COM(2019) 640 final,
a b
15. EC, 2020, 'COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS - A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system (COM(2020) 381 final)', (https://eur-lex.europa.eu/resource.html?uri=cellar:ea0f9f73-9ab2-11ea-9d2d-01aa75ed71a1.0001.02/DOC_1&format=PDF).
e
16. EC, 2020, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - EU Biodiversity Strategy for 2030 Bringing nature back into our lives*,
e
17. EC, 2021, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Pathway to a Healthy Planet for All EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil' COM/2021/400 final, 2021/400.
e
18. EU, 2021, Regulation (EU) 2021/2116 of the European Parliament and of the Council of 2 December 2021 on the financing, management and monitoring of the common agricultural policy and repealing Regulation (EU) No 1306/2013, OJ L 435, 6.12.2021, p. 187.
e
19. Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013, 2021, OJ L.
e
20. EEA, 2022, *Zero pollution monitoring assessment*, EEA Web Report, 03/2022, European Environment Agency.



8th Environment Action Programme

Designated terrestrial protected areas in Europe



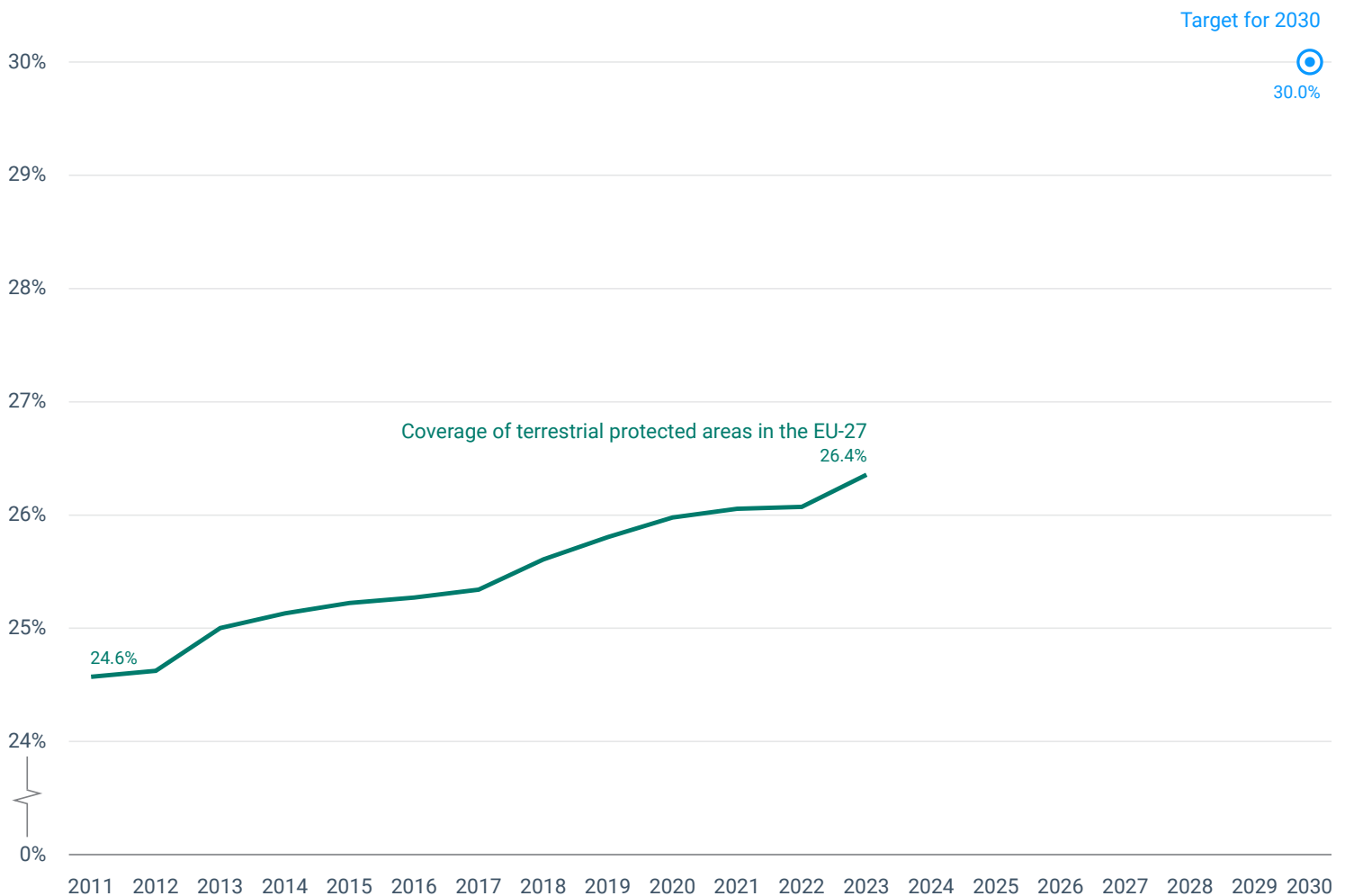


Designated terrestrial protected areas in Europe

Published 13 Oct 2025

By the end of 2023, protected areas covered 26.4% of European Union land, with 18.6% of EU land designated as Natura 2000 sites and 7.8% under other complementary national designations. The EU biodiversity strategy for 2030 sets out a target of protecting at least 30% of EU land by 2030, while ensuring that all protected areas are managed effectively. The area reported as protected has steadily increased since 2011, by 1.8 percentage points, yet the pace of designation needs to more than double for the EU to meet the 30% target.

Figure 1. Coverage of protected areas in the EU-27 land area in 2011-2023



Protected areas benefit species, ecosystems, and the environment. They provide significant **economic and societal benefits**, including employment opportunities ^[1], contribute to human health and well-being, and have significant cultural value ^[2]. Historically, protected areas have taken many forms and have been established for different purposes, such as protecting wild game resources, preserving landscape natural beauty and, more recently, safeguarding biodiversity.

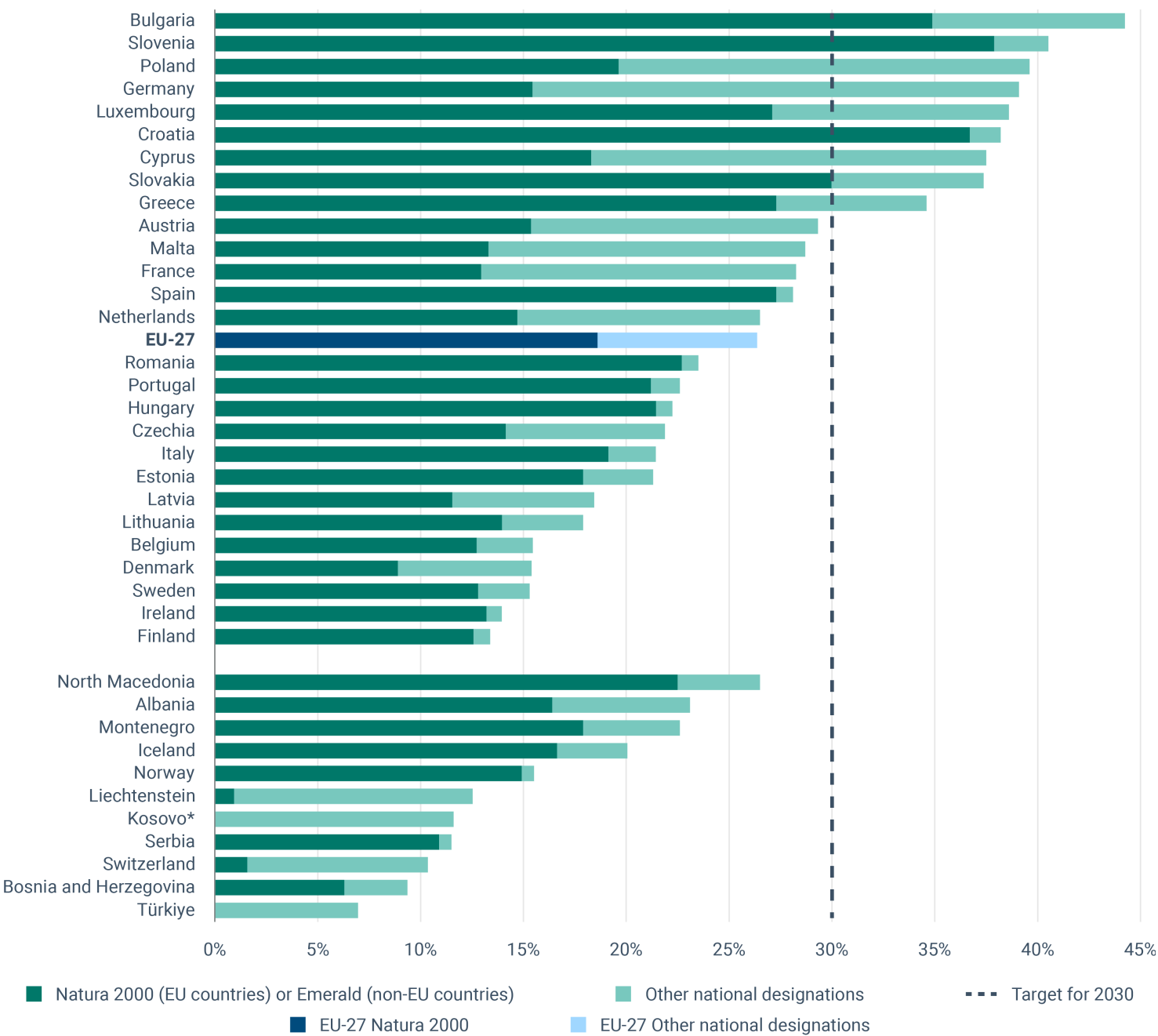
The EU's protected areas are highly diverse, varying in size, aim, and management approach ^[3]. They are large in number – over 100,000 sites in total – but mostly small in size, with an overall protected surface of 1,090 million km². This reflects the high **pressure** on land use, arising from agricultural intensification, transport and urban development.

The designation of protected areas is important to halt and reverse biodiversity loss. One target of the [EU biodiversity strategy for 2030](#) is to legally protect and effectively manage a minimum of 30% of EU land by 2030. The CBD [Kunming-Montreal Global Biodiversity Framework](#) also includes a similar coverage target. Based on Member States reports, 26.4% of EU land was **protected** by the end of 2023, with 18.6% of EU land designated as [Natura 2000 sites](#) – areas protected under the [EU Birds and Habitats Directives](#) – and 7.8% as other complementary national designations.

While the area reported as protected has steadily increased since 2011 (by 1.8 percentage points), it remains uncertain whether the EU will meet its **30% target**. For this to occur, an additional 3.6% of the EU's land area would need to be protected, an area larger than the size of Greece.

The designation of protected areas is not a guarantee of biodiversity protection, as their management is a decisive factor in achieving conservation aims. However, there is a lack of comprehensive information on how effectively these areas are managed. A spatially robust, well-connected and effectively managed **network of protected areas** is a pre-condition to prevent species and habitats being lost. This requires building a network of protected areas that ensures both ecological coherence and connectivity within countries and across borders. To achieve this, Member States would need to establish appropriate conservation objectives and measures for all existing and future sites and ensure their consistent monitoring.

Figure 2. Terrestrial protected area coverage by country and in the EU-27 by the end of 2023



The environmental diversity of Europe’s countries and biogeographical regions is matched by the diversity in its protected areas. By the end of 2023, nine Member States had designated **more than 30%** of their land area as protected: Bulgaria, Croatia, Cyprus, Germany, Greece, Luxembourg, Poland, Slovakia and Slovenia.

While **Natura 2000** is the backbone of the protected areas network in the EU, it is complemented by additional areas designated at national level. The different patterns among Natura 2000 and other national designations reflect the diversity of historical, geographical, administrative, political and cultural circumstances and the management regime. However it is clear that the designation of Natura 2000 sites has significantly increased protected areas in Europe [4].

Protected areas coverage in non-EU EEA member countries and cooperating countries varied hugely by the end of 2023. Many countries will **need to increase** their efforts to help reach the target for protected areas adopted as part of the [Kunming-Montreal Global Biodiversity Framework](#).

In addition, Figure 2 shows the contribution of the [Emerald network](#) of sites, established under the [Bern Convention](#), to protect species and habitats in those countries.

▼ Supporting information

Definition

The indicator illustrates the changes in the share of terrestrial protected areas in the EU-27 land over time. It also distinguishes between protected areas designated as Natura 2000 sites or Emerald sites and other national designations.

A protected area is a clearly defined geographical space, recognised, dedicated and managed through legal or other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values ^[3].

Methodology

The data for the nationally designated protected areas inventory are delivered by the [Eionet partnership countries](#) as spatial and tabular information. The inventory began in 1995 under the CORINE programme of the European Commission.

The Natura 2000 network is based on the [1979 Birds Directive](#) and the [1992 Habitats Directive](#). The European database of Natura 2000 sites consists of a compilation of the data submitted by the Member States of the European Union. This European database is generally updated once a year to take into account any updating of national databases by Member States. However, the release of a new EU-wide database does not necessarily mean that a particular national dataset has recently been updated.

The [Emerald network](#) is an ecological network made up of Areas of Special Conservation Interest. The objective of the Emerald Network is the long-term survival of the species and habitats. The Emerald Network consists of the Areas of Special Conservation Interest (ASCI) designated under Recommendation No. 16 (1989) and Resolution No. 3 (1996) of the Standing Committee to the [Bern Convention](#). The [Emerald Network aggregated database](#) is updated annually.

The 'other national designations' category includes a variety of designation types with different protection regimes and regulations. EEA collects information on nationally designated areas from 38 EEA member countries. This information is [updated annually](#) and provides an overview of the number of nationally designated areas in each country, their size and designation type.

The same geographical area may be designated several times under different legislation. When producing area statistics on protected areas, nationally designated protected areas and Natura 2000 datasets are overlayed to avoid double counting of overlapping site designations in the datasets. The Reporting guidelines with full details on the methodology are available from: <http://cdr.eionet.europa.eu/help/cdda> and <https://cdr.eionet.europa.eu/help/natura2000/>.

Policy/environmental relevance

The indicator is a headline indicator for monitoring progress towards the 8th Environment Action Programme (8th EAP) [5]. It contributes mainly to the monitoring of the 8th EAP biodiversity-related priority objective Article 2.e that shall be met by 2030: 'protecting, preserving and restoring marine and terrestrial biodiversity and the biodiversity of inland waters inside and outside protected areas by, inter alia, halting and reversing biodiversity loss and improving the state of ecosystems and their functions and the services they provide, and by improving the state of the environment, in particular air, water and soil, as well as by combating desertification and soil degradation'. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor progress towards the target to 'legally protect at least 30% of the EU's land area ... by 2030'.

The establishment of protected areas is a direct response to concerns over biodiversity loss. Accordingly, an indicator that measures protected area coverage is a valuable indication of commitment to conserving biodiversity.

Comprehensive data on officially designated protected areas are regularly compiled and there is international acceptance of the use of the indicator at the global, regional and national scales.

The EU biodiversity strategy for 2030 contains specific commitments and actions to be delivered by 2030, including establishing a larger EU-wide network of protected areas on land and at sea, building upon existing Natura 2000 areas, with strict protection for areas of very high biodiversity value.

The key commitments for nature protection in the EU biodiversity strategy for 2030 are:

- "1. Legally protect a minimum of 30% of the EU's land area and 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
2. Strictly protect at least a third of the EU's protected areas, including all remaining EU primary and old-growth forests.
3. Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately."

Terrestrial protected areas are used in the [EU biodiversity dashboard](#) to monitor progress towards the EU Biodiversity Strategy for 2030 and as an EU indicator to monitor progress towards the [Sustainable Development Goal 15: "Life on land"](#).

At the global level, new targets for protected areas have been adopted as part of the [Kunming-Montreal Global Biodiversity Framework](#) ^[6], including [Target 3](#) to effectively conserve and manage at least 30% of the world’s terrestrial areas.

Accuracy and uncertainties

No uncertainty has been specified.

Data sources and providers

- [Nationally designated areas for public access \(vector data\) - May 2024](#), European Environment Agency (EEA)
- [Natura 2000 \(vector\) - version end 2023](#), European Environment Agency (EEA)
- [Emerald Network data \(vector\) - the Pan-European network of protected sites version 2024](#), European Environment Agency (EEA)
- [EuroBoundaryMap 2020 \(EBM 2020\)](#), Jan. 2020, EuroGeographics

▼ **Metadata**

DPSIR

Response

Topics

[# Biodiversity](#) [# Nature protection and restoration](#)

Tags

[# protected areas](#) [# Birds Directive](#) [# 8th EAP](#) [# Habitats Directive](#) [# SEBI007](#)
[# Emerald network](#) [# Natura 2000](#)

Temporal coverage

2011-2023

Geographic coverage

Albania	Austria
Belgium	Bosnia and Herzegovina
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece

Hungary
Ireland
Kosovo (UNSCR 1244/99)
Liechtenstein
Luxembourg
Montenegro
North Macedonia
Poland
Romania
Slovakia
Spain
Switzerland

Iceland
Italy
Latvia
Lithuania
Malta
Netherlands
Norway
Portugal
Serbia
Slovenia
Sweden
Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG15: Life on land

Unit of measure

Percentage

Frequency of dissemination

Once a year

▼ References and footnotes

1. Mutafoğlu K., ten Brink, P., Schweitzer J-P., Underwood E., Tucker G., Russi D., Howe M., Maréchal A., Olmeda C., Pantzar M., Gionfra, S. and Kettunen M., 2017, *Natura 2000 and Jobs: Scoping Study*, IEEP, Brussels.
[↩](#)
2. European Commission: Directorate-General for Environment and Sundseth, K., 2019, *Natural and cultural heritage in Europe – Working together within the Natura 2000 network*,
[↩](#)
3. Dudley, N., Shadie, P. and Stolton, S., 2013, *Guidelines for applying protected area management categories including IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types*, IUCN, Gland.
[a](#) [b](#)

4. EEA, 2012. Protected areas in Europe: an overview, 2012, No 5/2012, Publications Office, Luxembourg.

5. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36.

6. CBD, 2022, 'COP 15: final text of Kunming-Montreal global biodiversity framework', *Convention on Biological Diversity* (<https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222>) accessed June 28, 2023.




8th Environment Action Programme

Designated marine protected areas in Europe's seas

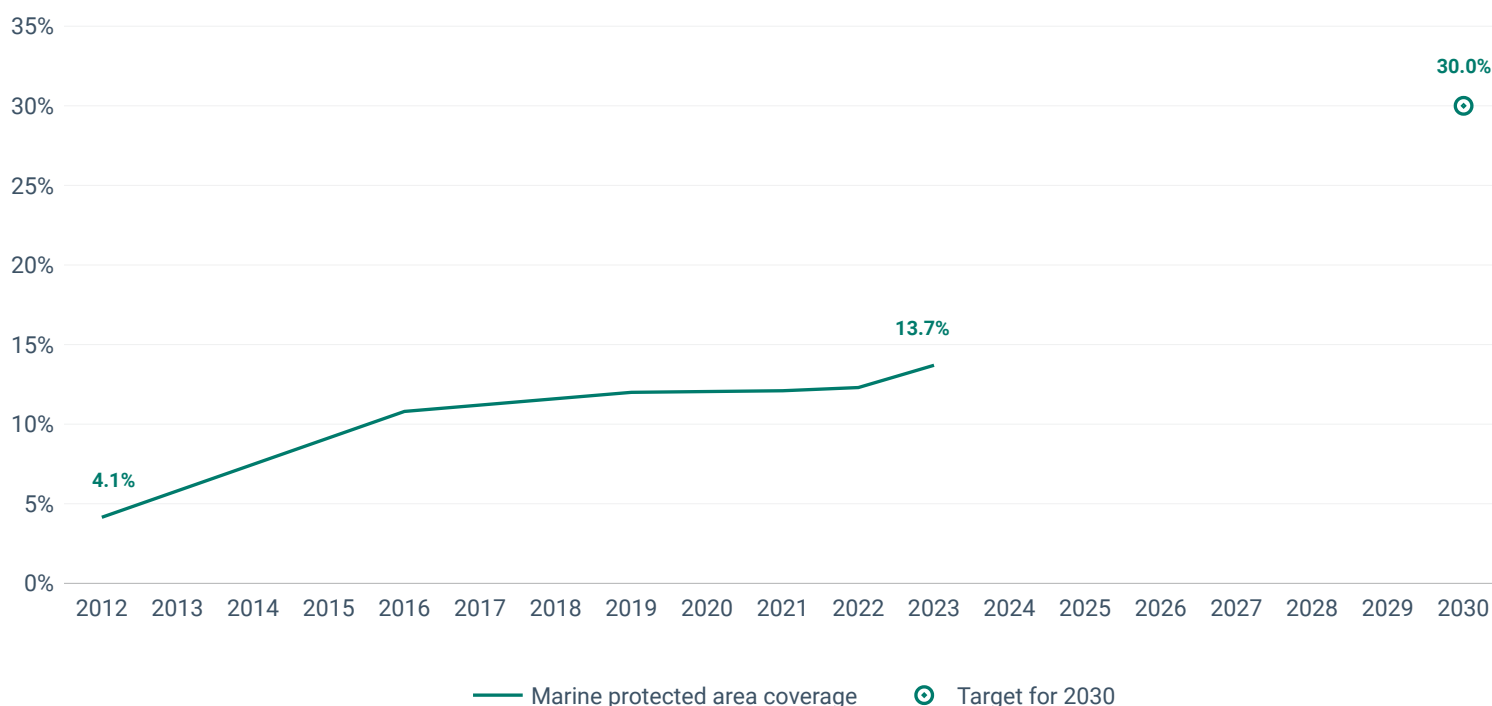


Marine protected areas in Europe's seas

Published 06 Nov 2025

The European Union has made progress in designating new marine protected areas, both as part of the Natura 2000 network and through complementary national designations. As a result, marine protected area coverage more than tripled, to 13.7%, between 2012 and 2023. However, further significant efforts are required to achieve the EU Biodiversity strategy target of protecting at least 30% of EU seas by 2030, while also ensuring that all protected areas are effectively managed. At present it appears unlikely that the target will be met.

Figure 1. Marine protected area coverage in the EU, 2012-2023



The conservation of coastal and marine areas is important for maintaining **biodiversity** and ensuring that ecosystems and their services are fully functional. Marine protected areas (MPAs) play a key role in conserving coastal and marine ecosystems, and provide significant economic and societal benefits supporting local livelihoods.

Designating protected areas is essential to halt biodiversity decline. One target of the [EU Biodiversity strategy for 2030](#) is to legally **protect** and effectively **manage** a minimum of 30% of European Union seas by 2030. [Target 3 of the CBD's Kunming-Montreal Global Biodiversity Framework](#) also includes a similar coverage target of "at least 30%".

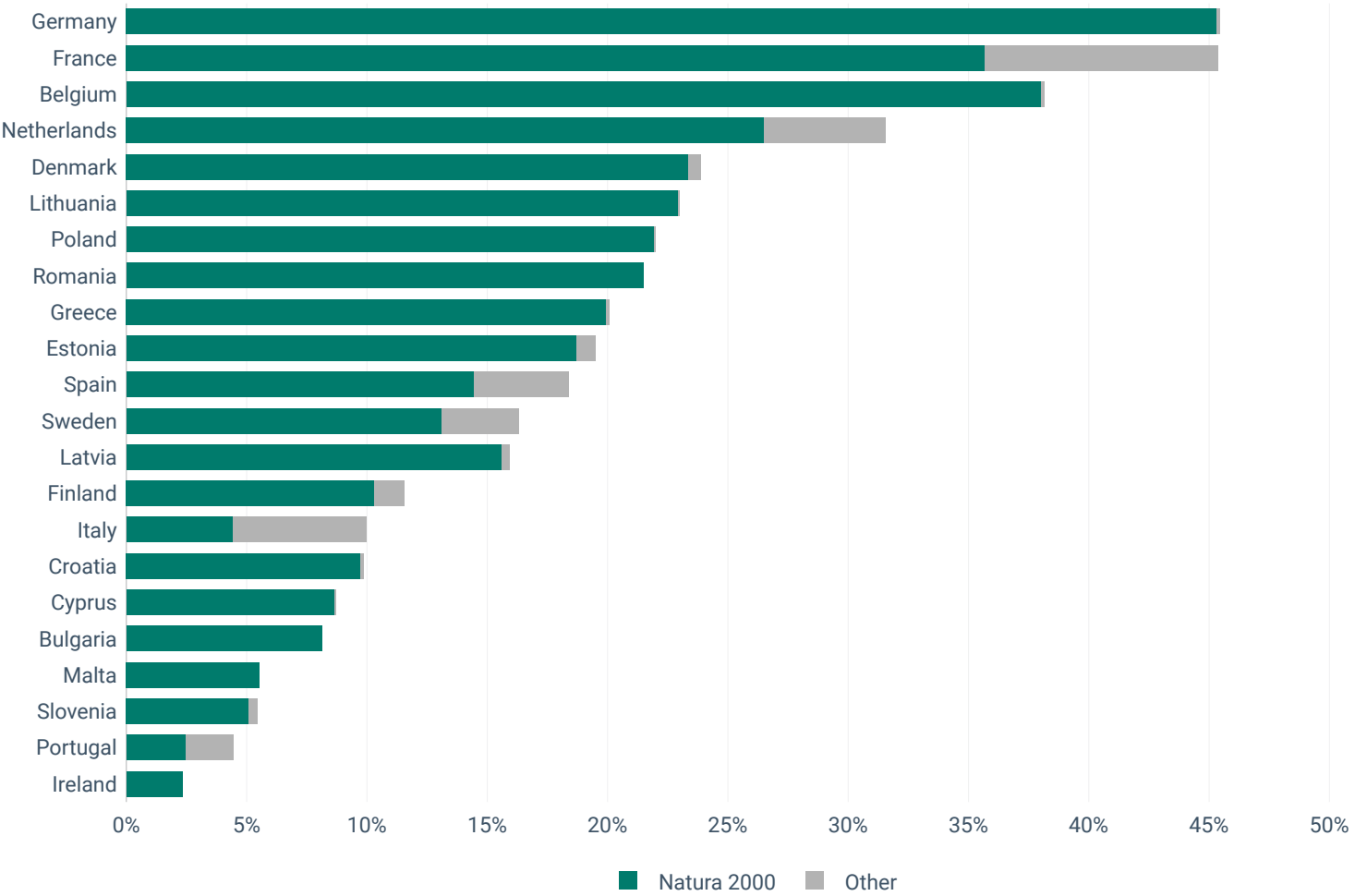
Over the last decade, the total area covered by marine protected areas in the EU has **increased** gradually, from 4.15% in 2012 to 13.7% in 2023. This is the result of both the expansion of the [Natura 2000 network](#) (a network of protected areas designated under the EU nature directives) and protected areas established through complementary national designations. It also includes protected areas designated under the [Regional Seas Conventions \(RSC\)](#), namely the Barcelona Convention, HELCOM & OSPAR.

Although this trend is positive, **further expansion** will be needed to reach the target of legally protecting at least 30% of EU’s seas by 2030. The current rate of designation must increase more than double compared to the progress made over the last decade.

The [EU Biodiversity Strategy for 2030](#) highlights the importance of building a truly coherent Trans-European network of protected areas through improving their connectivity. It will therefore be particularly important for the designation of new protected areas in EU’s seas to ensure that these areas are defined based on sound **scientific analysis** ensuring ecological representativity, coherence and connectivity.

Additionally, improving management effectiveness of individual marine protected areas and of their networks should become a major focus in the coming years. While no comprehensive information is available yet to provide an overview of how effectively managed European MPAs are, it will be essential to develop such indicators in the coming years to track progress in implementing targets of the [EU Biodiversity Strategy for 2030](#).

Figure 2. Marine protected area coverage in EU Member States, 2012-2023



By 2023, several EU Member States had made **significant progress** in protecting their marine ecosystems through the designation of MPAs. Germany, France, Belgium and the Netherlands have surpassed 30% coverage. Other countries such as Denmark, Lithuania, Poland and Romania have expanded their networks of MPAs beyond 20%. [Natura 2000](#) plays a very significant role in the MPAs networks in most countries, with complementary national designations adding to the network.

Progress in designating new MPAs could be observed in most Member States over the last 10 years; however, it has been slow in several countries. While it is important for Member States to continue working at national level to define new MPAs, it is also crucial to ensure cooperation across European regional seas. This will support the development of a coherent network of MPAs across the EU and achieve the joint target of protecting at least 30% of seas.

▼ Supporting information

Definition

This indicator illustrates the changes in the share of marine protected areas in the EU-27 Member States over time. It also distinguishes between protected areas designated as Natura 2000 sites, other national designations, and those designated under Regional Sea Conventions.

A protected area is a clearly defined geographical space, recognised, dedicated and managed through legal or other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Methodology

Methodology for data collection

The [Natura 2000 network](#) is based on the [1979 Birds Directive](#) and the [1992 Habitats Directive](#). The European database of Natura 2000 sites consists of a compilation of the data submitted by the Member States of the European Union. This European database is generally updated once a year to take into account any updating of national databases by Member States.

However, the release of a new EU-wide database does not necessarily mean that a particular national dataset has recently been updated.

The data for the nationally designated protected areas inventory are delivered by the [Eionet partnership countries](#) as spatial and tabular information. The inventory began in 1995 under the CORINE programme of the European Commission.

The same geographical area may be designated several times under different legislation. When producing area statistics on protected areas, nationally designated protected areas and Natura 2000 datasets are overlaid to avoid double counting of overlapping site designations in the datasets. To streamline the management of the complex spatial vector data from Natura 2000 and Nationally Designated Areas the data were combined into a single dataset. This unified dataset was transferred to the EEA-JEDI data cube as a 10m gridded "dimension".

The reporting guidelines with full details on the methodology are available from: <http://cdr.eionet.europa.eu/help/cdda> and <https://cdr.eionet.europa.eu/help/natura2000/>

To ensure a comprehensive coverage of EU waters, protected areas designated under the [Regional Seas Conventions](#), including the Barcelona Convention, HELCOM and OSPAR were included using the latest available data from the databases published by these conventions.

Methodology for indicator calculation

As the terrestrial protected area indicator is already calculated within the JEDI systems, the same methodology was adopted for calculating the marine protected areas indicator. To achieve this, the relevant data was first transferred to a data cube, consolidating all necessary information:

In the next step, the protected area coverage was calculated individually for each country. If multiple countries reported protected areas within the same marine region, these areas were assigned to both countries.

Next, a second statistic was calculated to assess the coverage of protected marine areas within the EEA marine assessment areas for the EU. Since individual countries do not need to be considered in this case, no overlaps were accounted for, and the results accurately reflect the percentage of protected areas.

All calculations were performed using Azure Databricks.

Policy/environmental relevance

The indicator is a headline indicator for monitoring progress towards the goals of the 8th [Environment Action Programme \(8th EAP\)](#). It will contribute mainly to monitoring progress towards the 8th EAP biodiversity-related priority objective set out in Article 2(e), to be met by 2030: 'protecting, preserving and restoring marine and terrestrial biodiversity and the biodiversity of inland waters inside and outside protected areas by, inter alia, halting and reversing biodiversity loss and improving the state of ecosystems and their functions and the services they provide, and by improving the state of the environment, in particular air, water and soil, as well as by combating desertification and soil degradation'^[1]. The European Commission's communication on 8th EAP monitoring specifies that this indicator should monitor progress towards meeting the target to legally protect at least 30% of the EU's sea area by 2030^[2].

The indicator is included in the [EU Biodiversity Strategy dashboard](#). The [EU Biodiversity Strategy for 2030](#) contains specific targets for protected areas to be delivered by 2030, including expanding the current network, in line with the following targets:

- to legally protect a minimum of 30% of the EU's land area and 30% of the EU's sea area and integrate ecological corridors, as part of a true trans-European nature network;
- to strictly protect at least a third of the EU's protected areas, including all remaining EU primary- and old-growth forests;
- to effectively manage all protected areas, defining clear conservation objectives and measures, and monitor them appropriately.

This indicator directly tracks progress towards achieving the 30% target for protecting the EU's seas. The indicator is used by several EU monitoring mechanisms, such as the EU biodiversity dashboard and for the [EU's Sustainable Development Goal \(SDG\) monitoring](#).

Other relevant EU policy instruments include the [EU Marine Strategy Framework Directive \(MSFD\)](#).

At the global level, targets for protected areas have been adopted as part of the [Kunming-Montreal Global Biodiversity Framework](#), including [Target 3](#) to effectively conserve and manage at least 30% of the world's marine area.

The indicator is also used for monitoring progress towards SDG14 in the European context.

Accuracy and uncertainties

Methodology uncertainty

Due to differences in data resolution, variations in coastline delineations may occur, potentially leading to minor inaccuracies near coastal regions. For instance, small sections of terrestrial protected areas might be mistakenly included in the marine area data.

Data sources and providers

- [Natura 2000 \(vector\) - version 2023](#), European Environment Agency (EEA)
- [Nationally designated areas for public access \(vector data\) - May 2024](#), European Environment Agency (EEA)
- [EEA marine assessment areas - version 3.0, Oct. 2022](#), European Environment Agency (EEA)
- [EEA coastline for analysis \(polygon\) - version 3.0, March 2017](#), European Environment Agency (EEA)
- [EEA Marine waters for analysis - INTERNAL VERSION, Oct. 2022 \(includes sensitive data\)](#), European Environment Agency (EEA)
- [OSPAR Marine Protected Areas Network \(version 2023\)](#), OSPAR Commission
- [HELCOM MPAs \(2022-12-05\)](#), Helsinki Commission (HELCOM)
- [Specially Protected Areas of Mediterranean Importance \(SPAMIs\), \(2019 edition, version 2\)](#), Regional Activity Centre for Specially Protected Areas (SPA/RAC)

DPSIR

Response

Topics

[# Biodiversity](#)

Tags

[# Designated areas](#) [# protected areas](#) [# 8th EAP](#) [# CDDA](#) [# Habitats Directive](#) [# MAR004](#) [# Natura 2000](#)

Temporal coverage

2012-2023

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG14: Life below water

Unit of measure

Percentage

Frequency of dissemination

Once a year

▼ References and footnotes

1. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22–36.
[↩](#)
2. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM(2022) 357 final.
[↩](#)



8th Environment Action Programme

Common bird index in Europe



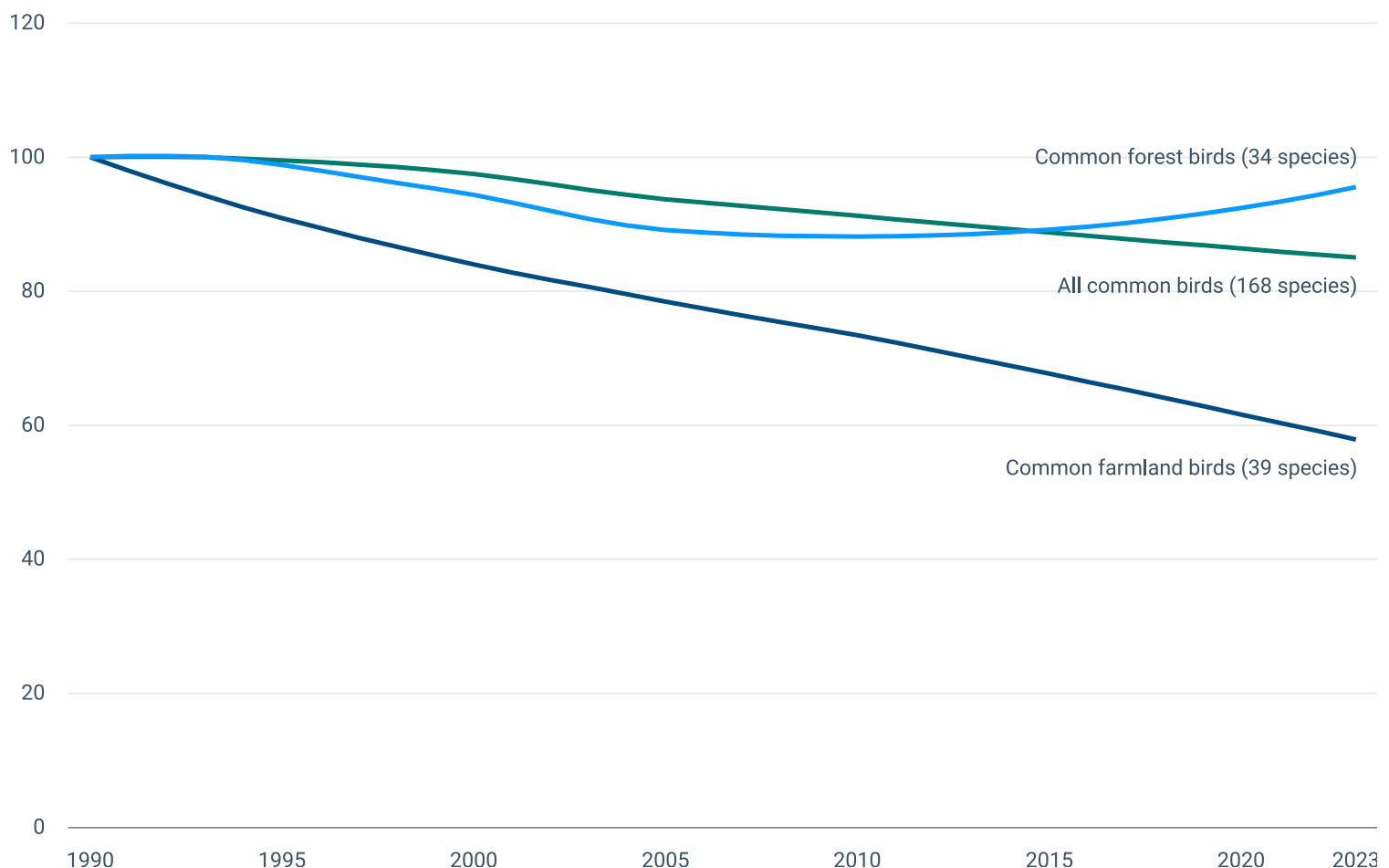
Common bird index in Europe

Published 15 Jul 2025

Birds play an essential role in ecosystems and provide a variety of ecosystem services. They are sensitive to environmental change and good indicators of environmental health. Between 1990 and 2023, the index of 168 common birds decreased by 15% in the EU. The decline was much stronger in common farmland birds, at 42%, while the common forest bird index decreased by 4.5%. Currently, it seems unlikely that the decline in populations of common birds will be reversed by 2030. Member States need to strengthen the implementation of existing policies and put new conservation and restoration measures in place to ensure their recovery.

Figure 1. Common bird index in the EU, 1990-2023

Population index (1990=100)



Birds play an **crucial role** in the functioning of ecosystems and provide a range of ecosystem services. They contribute to pest control, seed dispersal and nutrient cycling as well as cultural services, including recreation and health and well-being^[1].

Birds are sensitive to environmental change. This means their population numbers can serve as an indicator of the health of the environment and help **measure progress** towards **the EU's aim** to put **biodiversity on the path to recovery by 2030**. The status of bird populations has been the subject of **long-term monitoring in Europe**, much of it via voluntary effort. This is a good example of how the power of **citizen science** can be released through effective targeting and clearly defined monitoring methods^[2].

Long-term trends of 168 common birds in the 26 EU Member States with monitoring schemes reveal significant **population declines**. Between 1990 and 2023, the common bird index decreased by 15%, while the common forest bird index decreased by 4.5%. The decline in common farmland birds was much more pronounced, by 42%. Although this indicator uses 1990 as a baseline, significant decreases had already occurred before this date ^[3].

These trends highlight a major decline in biodiversity in Europe, caused by anthropogenic pressures^{[4][5]} ^[6]. **Agricultural intensification**, in particular pesticides and fertiliser use, is the **main pressure** causing bird population declines^[7]. This not only impacts farmland species but also many other common species, especially those whose diet relies on insects and other invertebrates.

There are **other factors** that have adverse effects on the bird populations. These factors include:

- land use change and associated habitat loss and degradation^{[8][9][10]};
- fragmentation and loss of landscape features ^{[11][12][13][14]} ;
- intensive forest management ^{[15][16]};
- urbanisation ^[7];
- climate change ^{[17][18]};
- increasing competition for land for production of renewable energy and biofuels ^{[19][20]};
- illegal killing ^[21].

The **recovery of birds** is influenced by a complex combination of socio-economic drivers, environmental factors, and policy measures. The EU has taken action to protect all wild bird species present in the EU territory since the adoption of the **Birds Directive** in 1979^{[22][23]}. The directive protects rare and threatened as well as common species.

Special Protected Areas (SPA), established as part of **Natura 2000 network**, help protect the threatened species and their habitats. However, the overall decline of bird populations in the EU is mainly driven by **large declines** in a number of common species, which contribute to this indicator^{[5][7]}. These are the house

sparrow (*Passer domesticus*), yellow wagtail (*Motacilla flava*), starling (*Sturnus vulgaris*), skylark (*Alauda arvensis*), willow warbler (*Phylloscopus trochilus*), serin (*Serinus serinus*), common linnet (*Linaria cannabina*), and tree sparrow (*Passer montanus*).

The [EU regulation on nature restoration](#) includes **obligations** to achieve an increasing trend of common farmland and forest bird indices by 2030 and beyond, based on species sets that are relevant to each Member State. It also requires Member States to put in place **restoration measures** to improve the quantity and quality of habitats of species covered by the [Birds Directive](#) where this is needed to ensure the long-term survival of the species.

In addition, it is crucial that more effective and ambitious measures to halt biodiversity loss are included in other policies, such as the [EU common agricultural policy](#) (CAP). Furthermore, that the [CAP Strategic Plans](#) support the implementation and effectiveness of the current and upcoming EU biodiversity and nature legislation ^[24].

▼ Supporting information

Definition

This indicator is a multi-species index measuring changes in population abundance of all common bird species (n=168), as well as those associated with specific habitats: common farmland bird species (n=39) and common forest bird species (n=34). The index for each group is calculated as an EU aggregate, using 1990 as reference year. Each of the three EU bird indices is presented as a smoothed time series and is calculated with 95% confidence limits.

Methodology

The data for this indicator originate from national monitoring data collected by the [Pan-European Common Bird Monitoring Scheme](#) (PECBMS). The PECBMS coordination unit is part of the [Czech Society for Ornithology](#) (CSO), based in Prague, Czechia.

Trend information spanning different time periods is derived from annual national breeding bird surveys in 26 EU countries. Skilled survey participants, including volunteers, carry out counting and data collection. Data are collected nationally on an annual basis during the breeding season through common bird monitoring schemes. National bird monitoring data are gathered using several count methods (e.g., standardised point transects/line transects, territory mapping), using a variety of sampling strategies (from free choice of plots to stratified random sampling), and individual plot sizes vary within each country (from 1×1km or 2×2km squares or 2.5-degree grid squares to irregular polygons).

Indicators (multi-species indices) are computed using the [MSI-tool](#) (R-script) for calculating multi-species indicators (MSIs) and trends in MSIs. A Monte Carlo method is used to account for sampling error and when not all yearly index numbers for all species are available. The method of calculation is

described in ^[25]. European, EU or regional species indices including standard errors are used as source data.

The PECBMS European species classification (farmland, forest and other common birds) has been developed over time as the indicators have been published and refined. See the PECBMS website for further details on "[Species selection and classification](#)".

The current population index of common birds at EU level was produced for the following 168 species:

- **Common farmland birds:** *Alauda arvensis*, *Alectoris rufa*, *Anthus campestris*, *Anthus pratensis*, *Bubulcus ibis*, *Burhinus oedicephalus*, *Calandrella brachydactyla*, *Ciconia ciconia*, *Corvus frugilegus*, *Emberiza calandra*, *Emberiza cirrus*, *Emberiza citrinella*, *Emberiza hortulana*, *Emberiza melanocephala*, *Falco tinnunculus*, *Galerida cristata*, *Galerida theklae*, *Hirundo rustica*, *Lanius collurio*, *Lanius minor*, *Lanius senator*, *Limosa limosa*, *Linaria cannabina*, *Melanocorypha calandra*, *Motacilla flava*, *Oenanthe hispanica*, *Passer montanus*, *Perdix perdix*, *Petronia petronia*, *Saxicola rubetra*, *Saxicola torquatus*, *Serinus serinus*, *Streptopelia turtur*, *Sturnus unicolor*, *Sturnus vulgaris*, *Sylvia communis*, *Tetrax tetrax*, *Upupa epops* and *Vanellus vanellus*;
- **Common forest birds:** *Accipiter nisus*, *Anthus trivialis*, *Bombus garrulus*, *Bombus terrestris*, *Carduelis cinclia*, *Certhia brachydactyla*, *Certhia familiaris*, *Coccothraustes coccothraustes*, *Columba oenas*, *Cyanopica cyanus*, *Dryobates minor*, *Dryocopus martius*, *Emberiza rustica*, *Ficedula albicollis*, *Ficedula hypoleuca*, *Garrulus glandarius*, *Leipizicus medius*, *Lophophanes cristatus*, *Nucifraga caryocatactes*, *Parus ater*, *Phoenicurus phoenicurus*, *Phylloscopus bonelli*, *Phylloscopus collybita*, *Phylloscopus sibilatrix*, *Picus canus*, *Poecile montanus*, *Poecile palustris*, *Pyrrhula pyrrhula*, *Regulus ignicapilla*, *Regulus regulus*, *Sitta europaea*, *Spinus spinus*, *Tringa ochropus* and *Turdus viscivorus*;
- **Other common birds:** *Acanthis flammea*, *Acrocephalus arundinaceus*, *Acrocephalus palustris*, *Acrocephalus schoenobaenus*, *Acrocephalus scirpaceus*, *Actitis hypoleucos*, *Aegithalos caudatus*, *Alcedo atthis*, *Anas platyrhynchos*, *Apus apus*, *Ardea cinerea*, *Buteo buteo*, *Calcarius lapponicus*, *Cecropis daurica*, *Cettia cetti*, *Chloris chloris*, *Circus aeruginosus*, *Cisticola juncidis*, *Clamator glandarius*, *Columba palumbus*, *Corvus corax*, *Corvus corone*, *Corvus monedula*, *Cuculus canorus*, *Cyanecula svecica*, *Cyanistes caeruleus*, *Cygnus olor*, *Delichon urbicum*, *Dendrocopos major*, *Dendrocopos syriacus*, *Egretta garzetta*, *Emberiza cia*, *Emberiza schoeniclus*, *Erithacus rubecula*, *Fringilla coelebs*, *Fringilla montifringilla*, *Fulica atra*, *Gallinago gallinago*, *Gallinula chloropus*, *Grus grus*, *Haematopus ostralegus*, *Hippolais icterina*, *Hippolais polyglotta*, *Iduna pallida*, *Jynx torquilla*, *Larus ridibundus*, *Locustella fluviatilis*, *Locustella naevia*, *Lullula arborea*, *Luscinia luscinia*, *Luscinia megarhynchos*, *Lyrurus tetrix*, *Merops apiaster*, *Motacilla alba*, *Motacilla cinerea*, *Muscicapa striata*, *Numenius arquata*, *Numenius phaeopus*, *Oenanthe oenanthe*, *Oriolus oriolus*, *Parus major*, *Passer domesticus*, *Phasianus colchicus*, *Phoenicurus ochruros*, *Phylloscopus trochilus*, *Pica pica*, *Picus viridis*, *Pluvialis apricaria*, *Podiceps cristatus*, *Prunella modularis*, *Ptyonoprogne rupestris*, *Pyrrhocorax pyrrhocorax*, *Streptopelia decaocto*, *Sylvia atricapilla*, *Sylvia borin*, *Sylvia cantillans*, *Sylvia curruca*, *Sylvia hortensis*, *Sylvia melanocephala*, *Sylvia nisoria*, *Sylvia undata*, *Tachybaptus*

ruficollis, *Tadorna tadorna*, *Tringa erythropus*, *Tringa glareola*, *Tringa nebularia*, *Tringa totanus*, *Troglodytes troglodytes*, *Turdus iliacus*, *Turdus merula*, *Turdus philomelos*, *Turdus pilaris* and *Turdus torquatus*.

National monitoring schemes and indices can contain a subset of these 168 species, reflecting their varying occurrence in different countries. More information is available at:

<https://pecbms.info/country/>.

Policy/environmental relevance

The common bird index is a headline indicator for monitoring progress towards the **8th Environment Action Programme** (8th EAP). It mainly contributes to monitoring aspects of the 8th EAP priority objective Article 2.2.e that shall be met by 2030: ‘protecting, preserving and restoring marine and terrestrial biodiversity and the biodiversity of inland waters inside and outside protected areas by, inter alia, halting and reversing biodiversity loss and improving the state of ecosystems and their functions and the services they provide, and by improving the state of the environment, in particular air, water and soil, as well as by combating desertification and soil degradation’ (EU, 2022). For the purposes of the **8th EAP monitoring framework** this indicator assesses specifically whether the EU will ‘reverse by 2030 the decline in populations of common birds’, (EC, 2022).

The **EU regulation on nature restoration** in Articles 11 and 12 includes obligations for Member States to achieve an increasing trend at national level of common farmland and forest bird indices by 2030 and thereafter, as further specified in Annexes V and VI to the regulation.

The common bird index is also used in the **EU biodiversity dashboard** to monitor progress towards the **EU Biodiversity Strategy for 2030** and as an EU indicator to monitor progress towards the **Sustainable Development Goal 15: “Life on land”**.

The EU has been taking action to protect biodiversity for a considerable number of years, for example by adopting the **Birds Directive – Council Directive 79/409/EEC** (updated by Directive **2009/147/EC**) and the **Habitats Directive – Council Directive 92/43/EEC**.

Accuracy and uncertainties

Country coverage (i.e. reflecting the availability of high-quality monitoring data from annually operated common bird monitoring schemes employing generic survey methods and producing reliable national trends): Austria (since 1998), Belgium (Brussels since 1992; Flanders since 2007; Wallonia since 1990), Bulgaria (since 2005), Croatia (since 2015), Cyprus (since 2006), Czechia (since 1982), Denmark (since 1976), Estonia (since 1983), Finland (since 1975), France (since 1989), Germany (since 1989), Greece (since 2007), Hungary (since 1999), Ireland (since 1998), Italy (since 2000), Latvia (since 1995), Lithuania (since 2011), Luxembourg (since 2009), the Netherlands (since 1984), Poland (since 2000), Portugal (since 2004), Romania (since 2007), Slovakia (since 2005), Slovenia (since 2008), Spain (since 1998) and Sweden (since 1975).

Data sources and providers

- [European Wild Bird Indices, 2024 update](#), European Bird Census Council, BirdLife International, Royal Society for the Protection of Birds, Czech Society for Ornithology

▼ Metadata

DPSIR

Impact

Topics

[# Biodiversity](#) [# Nature protection and restoration](#)

Tags

[# biodiversity](#) [# common birds](#) [# population trends](#) [# bird populations](#) [# Common bird index](#)
[# SEBI027](#) [# common farmland and forest birds](#) [# conservation](#) [# birds](#)
[# animal and plant population](#) [# 8th EAP](#)

Temporal coverage

1990-2023

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Netherlands	Poland
Portugal	Romania
Slovakia	Slovenia
Spain	Sweden

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG15: Life on land

Unit of measure

Population index (1990=100)

Frequency of dissemination

Once a year

▼ References and footnotes

1. Gaston, K. J., Cox, D. T. C., Canavelli, S. B., García, D., Hughes, B., Maas, B., Martínez, D., Ogada, D. and Inger, R., 2018, 'Population Abundance and Ecosystem Service Provision: The Case of Birds', *BioScience* 68(4), pp. 264–272 (<https://academic.oup.com/bioscience/article/68/4/264/4913793>) accessed June 23, 2025.
↩
2. Brlík, V., Šilarová, E., Škorpilová, J., Alonso, H., Anton, M., Aunins, A., Benkő, Z., Biver, G., Busch, M., Chodkiewicz, T., Chylarecki, P., Coombes, D., De Carli, E., Del Moral, J. C., Derouaux, A., Escandell, V., Eskildsen, D. P., Fontaine, B., Foppen, R. P. B. et al., 2021, 'Long-term and large-scale multispecies dataset tracking population changes of common European breeding birds', *Scientific Data* 8(1), pp. 21 (<https://www.nature.com/articles/s41597-021-00804-2>) accessed September 10, 2024.
↩
3. Butchart, S. H. M., Walpole, M., Collen, B., Strien, A. van, Scharlemann, J. P. W., Almond, R. E. A., Baillie, J. E. M., Bomhard, B., Brown, C., Bruno, J., Carpenter, K. E., Carr, G. M., Chanson, J., Chenery, A. M., Csirke, J., Davidson, N. C., Dentener, F., Foster, M., Galli, A. et al., 2010, 'Global biodiversity: indicators of recent declines', *Science* 328(5982), pp. 1164–1168 (<http://www.sciencemag.org/content/328/5982/1164>) accessed October 21, 2013.
↩
4. IPBES, 2019, *Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, IPBES secretariat, Bonn, Germany.
↩
5. Burns, F., Eaton, M. A., Burfield, I. J., Klvaňová, A., Šilarová, E., Staneva, A. and Gregory, R. D., 2021, 'Abundance decline in the avifauna of the European Union reveals cross-continental similarities in biodiversity change', *Ecology and Evolution* 11(23), pp. 16647–16660 (<https://onlinelibrary.wiley.com/doi/abs/10.1002/ece3.8282>) accessed May 19, 2023.
a b

6. Gregory, R. D., Eaton, M. A., Burfield, I. J., Grice, P. V., Howard, C., Klvaňová, A., Noble, D., Šilarová, E., Staneva, A., Stephens, P. A., Willis, S. G., Woodward, I. D. and Burns, F., 2023, 'Drivers of the changing abundance of European birds at two spatial scales', *Philosophical Transactions of the Royal Society B: Biological Sciences* 378(1881) (<https://royalsocietypublishing.org/doi/10.1098/rstb.2022.0198>) accessed July 10, 2025.
↵
7. Rigal, S., Dakos, V., Alonso, H., Auniņš, A., Benkő, Z., Brotons, L., Chodkiewicz, T., Chylarecki, P., de Carli, E., del Moral, J. C., Domşa, C., Escandell, V., Fontaine, B., Foppen, R., Gregory, R., Harris, S., Herrando, S., Husby, M., Ieronymidou, C. et al., 2023, 'Farmland practices are driving bird population decline across Europe', *Proceedings of the National Academy of Sciences* 120(21), pp. e2216573120 (<https://www.pnas.org/doi/10.1073/pnas.2216573120>) accessed May 19, 2023.
a b c
8. Donald, P. F., Green, R. E. and Heath, M. F., 2001, 'Agricultural intensification and the collapse of Europe's farmland bird populations', *Proceedings of the Royal Society. B, Biological Sciences* 268(1462), pp. 25–29 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1087596/>) accessed January 8, 2019.
↵
9. Musitelli, F., Romano, A., Møller, A. P. and Ambrosini, R., 2016, 'Effects of livestock farming on birds of rural areas in Europe', *Biodiversity and Conservation* 25(4), pp. 615–631 (<https://doi.org/10.1007/s10531-016-1087-9>) accessed January 8, 2019.
↵
10. Guerrero, I., Morales, M. B., Oñate, J. J., Geiger, F., Berendse, F., Snoo, G. de, Eggers, S., Pärt, T., Bengtsson, J., Clement, L. W., Weisser, W. W., Olszewski, A., Ceryngier, P., Hawro, V., Liira, J., Aavik, T., Fischer, C., Flohre, A., Thies, C. et al., 2012, 'Response of ground-nesting farmland birds to agricultural intensification across Europe: landscape and field level management factors', *Biological Conservation* 152, pp. 74–80 (<http://www.sciencedirect.com/science/article/pii/S0006320712001838>) accessed January 8, 2019.
↵
11. Stoate, C., Boatman, N. D., Borralho, R. J., Carvalho, C. R., Snoo, G. R. de and Eden, P., 2001, 'Ecological impacts of arable intensification in Europe', *Journal of Environmental Management* 63(4), pp. 337–365 (<https://www.sciencedirect.com/science/article/pii/S0301479701904736>) accessed May 19, 2023.
↵
12. Vickery, J. A., Feber, R. E. and Fuller, R. J., 2009, 'Arable field margins managed for biodiversity conservation: a review of food resource provision for farmland birds', *Agriculture, Ecosystems and Environment* 133(1), pp. 1–13 (<http://www.sciencedirect.com/science/article/pii/S0167880909001625>) accessed January 8, 2019.
↵
13. Traba, J. and Morales, M. B., 2019, 'The decline of farmland birds in Spain is strongly associated to the loss of fallowland', *Scientific Reports* 9(1), pp. 9473 (<https://www.nature.com/articles/s41598-019-45854-0>) accessed May 19, 2023.
↵
14. Reif, J. and Vermouzek, Z., 2019, 'Collapse of farmland bird populations in an Eastern European country following its EU accession', *Conservation Letters* 12(1), pp. e12585 (<https://onlinelibrary.wiley.com/doi/abs/10.1111/conl.12585>) accessed May 19, 2023.

15. Fraixedas, S., Lindén, A. and Lehikoinen, A., 2015, 'Population trends of common breeding forest birds in southern Finland are consistent with trends in forest management and climate change', *Ornis Fennica* 92, pp. 187–203.
16. Virkkala, R., 2016, 'Long-term decline of southern boreal forest birds: consequence of habitat alteration or climate change?', *Biodiversity and Conservation* 25(1), pp. 151–167 (<https://doi.org/10.1007/s10531-015-1043-0>) accessed March 20, 2019.
17. Stewart, P. S., Voskamp, A., Santini, L., Biber, M. F., Devenish, A. J. M., Hof, C., Willis, S. G. and Tobias, J. A., 2022, 'Global impacts of climate change on avian functional diversity', *Ecology Letters* 25(3), pp. 673–685 (<https://onlinelibrary.wiley.com/doi/abs/10.1111/ele.13830>) accessed May 19, 2023.
18. Fletcher Jr, R. J., Robertson, B. A., Evans, J., Doran, P. J., Alavalapati, J. R. and Schemske, D. W., 2011, 'Biodiversity conservation in the era of biofuels: risks and opportunities', *Frontiers in Ecology and the Environment* 9(3), pp. 161–168 (<https://onlinelibrary.wiley.com/doi/abs/10.1890/0900091>) accessed May 19, 2023.
19. Gasparatos, A., Doll, C. N. H., Esteban, M., Ahmed, A. and Olang, T. A., 2017, 'Renewable energy and biodiversity: Implications for transitioning to a Green Economy', *Renewable and Sustainable Energy Reviews* 70, pp. 161–184 (<http://www.sciencedirect.com/science/article/pii/S1364032116304622>) accessed June 1, 2018.
20. Conkling, T. J., Vander Zanden, H. B., Allison, T. D., Diffendorfer, J. E., Dietsch, T. V., Duerr, A. E., Fesnock, A. L., Hernandez, R. R., Loss, S. R., Nelson, D. M., Sanzenbacher, P. M., Yee, J. L. and Katzner, T. E., 2022, 'Vulnerability of avian populations to renewable energy production', *Royal Society Open Science* 9(3), pp. 211558 (<https://royalsocietypublishing.org/doi/10.1098/rsos.211558>) accessed May 19, 2023.
21. BirdLife International and EuroNatur, 2025, *Progress assessment on the eradication of illegal killing, taking and trade of wild birds in the Mediterranean and Europe.*,
22. Sanderson, F. J., Pople, R. G., Ieronymidou, C., Burfield, I. J., Gregory, R. D., Willis, S. G., Howard, C., Stephens, P. A., Beresford, A. E. and Donald, P. F., 2016, 'Assessing the Performance of EU Nature Legislation in Protecting Target Bird Species in an Era of Climate Change', *Conservation Letters* 9(3), pp. 172–180 (<https://conbio.onlinelibrary.wiley.com/doi/10.1111/conl.12196>) accessed July 10, 2025.
23. European Environment Agency., 2020, *State of nature in the EU: results from reporting under the nature directives 2013 2018.*, Publications Office, LU.

24. Pe'er, G., Finn, J. A., Díaz, M., Birkenstock, M., Lakner, S., Röder, N., Kazakova, Y., Šumrada, T., Bezák, P., Concepción, E. D., Dänhardt, J., Morales, M. B., Rac, I., Špulerová, J., Schindler, S., Stavrínides, M., Targetti, S., Viaggi, D., Vogiatzakis, I. N. et al., 2022, 'How can the European Common Agricultural Policy help halt biodiversity loss? Recommendations by over 300 experts', *Conservation Letters* (<https://onlinelibrary.wiley.com/doi/10.1111/conl.12901>) accessed September 16, 2022.

↩

25. Soldaat, L. L., Pannekoek, J. and Verweij, R. J. T., 2017, 'A Monte Carlo method to account for sampling error in multi-species indicators', *Ecological Indicators* 81, pp. 340–347.

↩



8th Environment Action Programme

Forest connectivity (forest fragmentation) in Europe

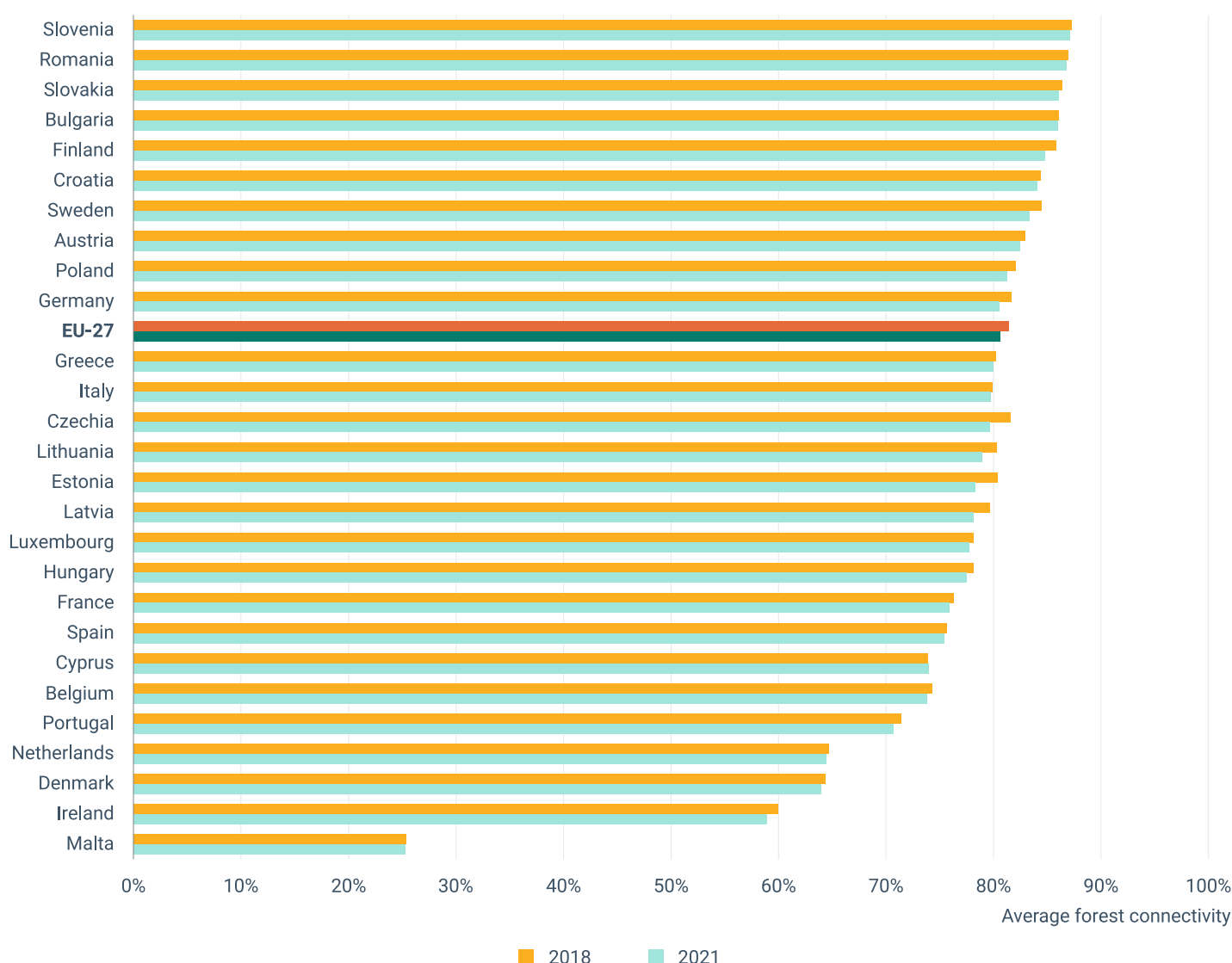


Forest connectivity in Europe

Published 15 Oct 2024

Increasing forest connectivity is crucial for supporting biodiversity. Connectivity within stocked forest areas is limited by elements fragmenting the tree cover. The European Union's average forest connectivity was 80.6% in 2021, a 0.8% percentage point decrease from 2018. The EU has effective policies promoting forest connectivity. However, the effects of these policies will take time to appear as pest and fire outbreaks which intensify with climate change lead to immediate, often temporary, losses in connectivity. Therefore, it is unlikely that forest connectivity will increase by 2030.

Figure 1. Change in average forest connectivity in EU member states between 2018 and 2021



Forests have significant cultural and economic value and are vital in supporting biodiversity and human well-being. Historically, forests have become fragmented due to conversion to cropland and pastures, urbanisation and infrastructure developments^{[1][2]}. Maintaining forest **connectivity** and avoiding forest fragmentation benefits species that thrive in larger forested areas which enables their dispersal^{[3][4]}.

Policies are promoting forest connectivity within the EU. The [Nature Restoration regulation](#), the [EU forest strategy for 2030](#), the [EU biodiversity strategy for 2030](#) and the pledge to plant at least [three billion additional trees by 2030](#) all highlight the importance of expanding tree and forest cover to safeguard biodiversity.

This indicator measures the degree of forest coverage within a local, pre-defined neighbourhood area (assessment scale)^[5]. It provides a general insight into the environment's **local habitats** without requiring additional knowledge on the type and quality of the forest, or individual species or species groups demands.

The primary information source used for calculation is the [High-Resolution Layer Forest Type](#) from Copernicus Land Monitoring Service (CLMS). This layer is derived from satellite imagery (Sentinel-2), which due to the nature of spectral analysis, only maps the stocked areas, and not temporarily unstocked areas (clearcut, burnt or windthrown forests). Therefore, both temporarily and (semi-)permanently unstocked areas are considered as fragmenting the **forest cover**.

The EU's average forest connectivity was 80.6%^[6] (Figure 2) in 2021. This indicates that on average, 80.6% of the 10-hectare area surrounding a 100m² forest grid cell was covered by forest. Forest connectivity **decreased** by 0.8% percentage points from 2018 to 2021.

Assessing prospects for improved forest connectivity by 2030 is challenging and past findings show **no significant changes**^[7]. Effects of implementing the Nature Restoration regulation, the EU forest and biodiversity strategies - such as promoting afforestation, reforestation, and restoring forest ecosystems - may only become visible after 2030 due to the time lag between actions in the field and increased connectivity. Actions increasing forest fragmentation, such as deforestation, clearcuts and salvage logging, and the effect of major disturbances such as wildfire, windstorms, pests and diseases, can have immediate effects.

Figure 2. Forest connectivity in the EU Member States in 2018 and 2021

Country	Average connectivity		Change in connectivity 2018-2021	Share of forest by connectivity classes in 2021				
	2018	2021		Very low	Low	Intermediate	High	Very high
Slovenia	87.2%	87.1%	-0.2%	0.1%	3.1%	7.2%	26.6%	63.0%
Romania	87.0%	86.8%	-0.2%	0.3%	4.4%	7.5%	22.5%	65.3%
Slovakia	86.3%	86.1%	-0.3%	0.3%	4.9%	7.2%	24.2%	63.4%
Bulgaria	86.0%	86.0%	0.0%	0.3%	5.4%	7.5%	22.4%	64.4%
Finland	85.8%	84.8%	-1.0%	0.0%	2.5%	7.9%	36.6%	53.0%
Croatia	84.3%	84.0%	-0.3%	0.3%	5.8%	9.3%	25.6%	59.0%
Sweden	84.4%	83.3%	-1.1%	0.1%	3.3%	9.1%	37.7%	49.9%
Austria	82.9%	82.5%	-0.4%	0.2%	5.1%	9.8%	33.0%	51.9%
Poland	82.0%	81.2%	-0.8%	0.5%	7.6%	9.8%	29.4%	52.7%
Germany	81.6%	80.6%	-1.1%	0.6%	8.1%	10.8%	27.9%	52.6%
EU-27	81.4%	80.6%	-0.8%	0.4%	6.9%	10.8%	32.5%	49.5%
Greece	80.2%	80.0%	-0.2%	0.4%	8.1%	11.4%	30.3%	49.9%
Italy	79.9%	79.7%	-0.1%	0.5%	8.7%	11.3%	29.1%	50.4%
Czechia	81.6%	79.6%	-2.0%	0.5%	8.4%	11.6%	29.6%	49.9%
Lithuania	80.3%	79.0%	-1.3%	0.4%	7.0%	11.9%	37.2%	43.6%
Estonia	80.4%	78.3%	-2.1%	0.1%	5.5%	13.4%	41.9%	39.1%
Latvia	79.6%	78.1%	-1.5%	0.2%	5.9%	12.8%	42.6%	38.5%
Luxembourg	78.1%	77.7%	-0.4%	0.5%	7.5%	13.4%	36.4%	42.2%
Hungary	78.1%	77.5%	-0.7%	0.8%	10.2%	12.5%	29.7%	46.7%
France	76.3%	75.8%	-0.4%	0.7%	11.2%	13.8%	31.2%	43.1%
Spain	75.7%	75.4%	-0.2%	0.5%	10.3%	14.5%	35.1%	39.6%
Cyprus	73.9%	73.9%	0.1%	1.3%	14.9%	12.6%	27.6%	43.6%
Belgium	74.3%	73.8%	-0.5%	1.0%	12.9%	14.5%	31.5%	40.1%
Portugal	71.4%	70.7%	-0.7%	0.6%	13.8%	17.7%	36.8%	31.1%
Netherlands	64.7%	64.4%	-0.2%	2.4%	22.0%	17.5%	29.7%	28.5%
Denmark	64.3%	63.9%	-0.4%	2.1%	21.0%	18.9%	32.7%	25.2%
Ireland	60.0%	58.9%	-1.1%	2.5%	24.1%	23.2%	33.2%	17.0%
Malta	25.3%	25.3%	-0.1%	13.2%	71.0%	12.1%	3.3%	0.4%

Forest connectivity in the EU Member States correlates strongly with the presence of large forest areas (displayed by the class ‘very high connectivity’). **Forest strips** may play an important role in maintaining connectivity (classes ‘low’ and ‘intermediate’ connectivity) in Member States with smaller and fewer continuous forest patches.

This indicator is derived from a forest cover mask using a methodology developed by the European Commission’s Joint Research Centre^[5]. **Higher connectivity** is found within extended larger tree-covered forest patches with this approach. Therefore, most connectivity estimates at the country level range from 71% to 87%. Based on the country quintiles, an indicator above 84% may be considered very high and an indicator below 71% may be considered very low connectivity.

The **EU average** is highly influenced by areas with large continuous forest coverage, mainly in Slovenia, Romania, Finland and Sweden. Few countries show average connectivity below 70%. Forest connectivity was stable (less than 0.1% change) in four countries, whereas it decreased by more than 1.5% in Estonia, Czechia and Latvia, possibly due to logging, partly related to storms and bark beetle outbreaks.

▼ Supporting information

Definition

The forest connectivity indicator quantifies the degree of spatial agglomeration of forest cover. It assesses structural connectivity using EU level forest.

High forest connectivity supports animal movement, plant dispersal, preserves forest microclimate^[8], and genetic exchange. Connectivity maps are crucial for biodiversity initiatives, like tree planting, by identifying areas lacking connectivity. However, increased connectivity may also facilitate the spread of invasive species, pests, and diseases^[9] and fire^[10].

The calculation of the indicator is based on the High-Resolution Forest Type Layer from the [Copernicus programme](#). For this layer, in line with the definition of the Food and Agriculture Organisation of the United Nations^[11], forest are “land spanning more than 0.5 hectares with trees higher than five metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It excludes agricultural and urban land”. However, for technical reasons, forest land use not covered by trees is not mapped as forest. Therefore, on the one hand, in the case of afforestation, there is a delay between the conversion of land use to forestry (at the time of plantation) and the time the forest cover is reported in this indicator (canopy cover reaching the thresholds). This delay is however quite consistent with the new forest reaching characteristics that make it play a role in connectivity. On the other hand, temporarily unstocked forest areas (such as clearcut or burnt areas) are not mapped as forest in this layer, which leads to considering that these areas fragment the forest.

Methodology

The methodology used for assessing forest connectivity is called [Forest Area Density](#) (FAD). FAD is the ratio of forest area with respect to the local neighbourhood area surrounding a given forest grid cell^[5]. Connectivity is scale-dependent, and the scale is chosen by the size of the local neighbourhood for which connectivity is assessed, here 10 hectares. FAD measures the degree of spatial agglomeration of forest land cover and accounts for key fragmentation aspects, such as isolation of small fragments and perforations within compact forest patches^[12]. It provides scalable and consistent assessments across large regions, like the EU, but does not account for specific ecological functions or species-specific needs. Unlike species-specific models, which are manifold and highly variable, FAD focuses on general structural connectivity, which is independent of habitat quality or species-specific demands. Efforts are underway to refine FAD by integrating additional data layers to complement the connectivity assessments.

The indicator is derived from the FAO compliant 10-metre resolution forest type products 2018 and 2021 from Copernicus.

The primary result is a spatially explicit map showing the degree of forest connectivity for each 10x10-metre forest grid cell. For the statistics presented in Figure 2, the grid cell values are divided into five categories, where forest connectivity is either very high (90% – 100% FAD), high (60% – <90% FAD), intermediate (40% – <60% FAD), low (10% – <40% FAD), or very low (0% – <10% FAD). The connectivity map can be used to aggregate the grid cell level values to an average indicator value at for any given reporting level, for example, at country or EU-level. This aggregated average value indicates the overall degree of structural connectivity of forest cover in the reporting unit. This is one of the summary statistics available to characterise forest connectivity, which is mainly driven by the presence of large continuous forest patches.

Policy/environmental relevance

Forest connectivity is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It mainly contributes to monitoring aspects of the 8th EAP priority objective (Article 2.2.e) that shall be met by 2030: ‘protecting, preserving and restoring marine and terrestrial biodiversity and the biodiversity of inland waters inside and outside protected areas by, inter alia, halting and reversing biodiversity loss and improving the state of ecosystems and their functions and the services they provide, and by improving the state of the environment, in particular air, water and soil, as well as by combating desertification and soil degradation’^[13]. For the purposes of the 8th EAP monitoring framework, this indicator assesses whether the EU will ‘increase the degree of connectivity in forest ecosystems’ by 2030^[14]. Ensuring connectivity between and inside habitats is a goal set in the Regulation on Nature Restoration^[15] and the EU Biodiversity Strategy for 2030^[16]. [The 3-Billion-Tree Pledge For 2030](#)^[17] indicates that ‘afforestation should be carried out at landscape level to strengthen connectivity with natural or semi-natural areas’ and therefore lead to increased forest connectivity.

Accuracy and uncertainties

Under processing

Data sources and providers

- [Forest Type 2018 \(raster 10 m\), Europe, 3-yearly, Oct. 2020, EEA](#)

▼ Metadata

DPSIR

State

Topics

[# Nature protection and restoration](#) [# Forests and forestry](#) [# Biodiversity](#)

Tags

[# biodiversity](#) [# Forest fragmentation](#) [# 8th EAP](#) [# forests](#) [# Forest connectivity](#)

[# SEBI029](#)

Temporal coverage

2018

2021

Geographic coverage

Austria

Bulgaria

Cyprus

Denmark

Finland

Germany

Hungary

Italy

Lithuania

Malta

Poland

Romania

Slovenia

Sweden

Belgium

Croatia

Czechia

Estonia

France

Greece

Ireland

Latvia

Luxembourg

Netherlands

Portugal

Slovakia

Spain

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG15: Life on land

Unit of measure

The degree of forest connectivity is measured in a range from 0% to 100%, with 0% meaning no forest connectivity (a single grid cell forest patch without any other forest grid cell in a 10-hectare surrounding neighbourhood), and 100% meaning full connectivity (full continuous forest cover in a 10-hectare surrounding neighbourhood). At reporting unit level, the indicator is calculated as the average value of Forest Area Density (FAD) of all forest grid cells of the reporting unit.

Frequency of dissemination

Every 3 years

▼ References and footnotes

1. Maes, J. and et al., 2020, *Mapping and assessment of ecosystems and their services: an EU wide ecosystem assessment in support of the EU biodiversity strategy*, Publications Office of the European Union, Luxembourg.
[↩](#)
2. Rudel, T. K. and et al., 2005, 'Forest transitions: towards a global understanding of land use change', *Global Environmental Change* 15(1), pp. 23–31 (<https://www.sciencedirect.com/science/article/pii/S0959378004000809>) accessed June 9, 2023.
[↩](#)
3. Slattery, Z. and Fenner, R., 2021, 'Spatial Analysis of the Drivers, Characteristics, and Effects of Forest Fragmentation', *Sustainability* 13(6), pp. 3246 (<https://www.mdpi.com/2071-1050/13/6/3246>) accessed June 12, 2023.
[↩](#)
4. Taylor, P. D., 2000, 'Landscape Connectivity', in: Ekbom, B., Irwin, M. E., and Robert, Y. (eds), *Interchanges of Insects between Agricultural and Surrounding Landscapes*, Springer Netherlands, Dordrecht, pp. 109–122.
[↩](#)
5. Vogt, P. and et al., 2019, *An approach for pan-European monitoring of forest fragmentation*, Publications Office of the European Union, Luxembourg.
[a](#) [b](#) [c](#)
6. This share differs from the 2023 release due to a change in the underlying data. The method stayed the same. The 2023 release was derived from a 10-metre resolution forest and woody vegetation layer for 2018, combining the FAO compliant 10 metre Forest type product and a generalisation at 10 metres of the 5-metre woody vegetation map product from Copernicus. This 2024 release relies on the Copernicus FAO-compliant 10-metre Forest type product for 2018 and 2021.
[↩](#)
7. Forest Europe, 2020, *State of Europe's forests 2020*, Ministerial Conference on the Protection of Forests in Europe - Forest Europe, Bratislava, Slovakia.
[↩](#)
8. Hofmeister, J., Hošek, J., Brabec, M., Stralková, R., Mýlová, P., Bouda, M., Pettit, J. L., Rydval, M. and Svoboda, M., 2019, 'Microclimate edge effect in small fragments of temperate forests in the context of climate change', *Forest Ecology and Management* 448, pp. 48–56 (<https://www.sciencedirect.com/science/article/pii/S0378112719301707>) accessed September 26, 2024.
[↩](#)
9. Pyšek, P. and et al., 2020, 'Scientists' warning on invasive alien species', *Biological Reviews* 95(6), pp. 1511–1534 (<https://onlinelibrary.wiley.com/doi/abs/10.1111/brv.12627>) accessed November 24, 2023.
[↩](#)
10. Duane, A. and et al., 2021, 'Forest connectivity percolation thresholds for fire spread under different weather conditions', *Forest Ecology and Management* 498, pp. 119558 (<https://linkinghub.elsevier.com/retrieve/pii/S0378112721006484>) accessed June 16, 2023.

↵

11. FAO, 2018, *Terms and Definitions - FRA 2020*, Food and Agriculture Organization of the United Nations, Rome, Italy.
↵
12. Maes, J. and et al., 2023, 'Accounting for forest condition in Europe based on an international statistical standard', *Nature Communications* 14(1), pp. 3723 (<https://www.nature.com/articles/s41467-023-39434-0>) accessed November 3, 2023.
↵
13. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030, OJ L.
↵
14. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives. COM(2022) 357 final
↵
15. European Parliament and Council of the European Union, 2024, Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869
↵
16. EC, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy for 2030 Bringing nature back into our lives
↵
17. EC, 2021, Commission Staff Working Document - The 3 Billion Tree Planting Pledge For 2030 Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. New EU Forest Strategy for 2030. SWD(2021) 651 final
↵



8th Environment Action Programme

Energy consumption: primary and final energy consumption in Europe

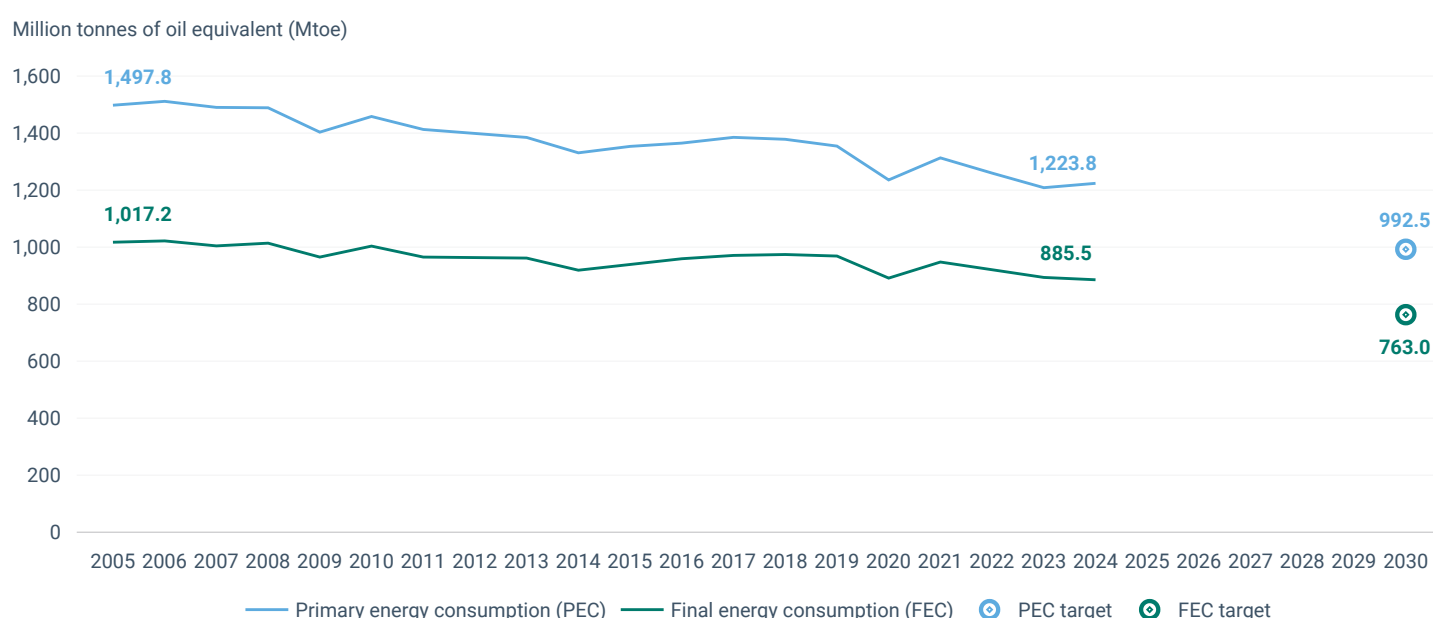


Primary and final energy consumption in the European Union

Published 06 Nov 2025

The European Union's primary energy consumption (PEC) in 2024 is estimated to have increased by 1.3% compared to 2023, while final energy consumption (FEC) decreased by 0.9%. PEC represents the total energy demand within a country, including losses, while FEC represents the energy used by final consumers. These estimates, and the historical energy consumption trends across Europe, show that more ambitious developments and decisive action is required to achieve the 2030 PEC and FEC targets set by the EU Energy Efficiency Directive.

Figure 1. Primary and final energy consumption in the European Union



Reducing energy consumption typically leads to a reduction in **environmental pressures** associated with the production and consumption of energy. It supports the achievement of **EU renewable energy and GHG targets**, lowers emissions of air pollutants with its associated health benefits, enhances energy security and reduces import energy dependency.

The EU's recast **Energy Efficiency Directive** sets an indicative **EU-wide target** of 992.5 million tonnes of oil equivalent (Mtoe) for PEC, and a binding EU-wide target of 763Mtoe for FEC to be achieved by 2030.

EU PEC levels in 2024 are estimated to have been 1210Mtoe, while EU FEC levels were estimated at 894Mtoe. This represents an increase of 1.3% and decrease of 0.9% respectively compared to 2023. The slight increase in PEC is partially driven by France's increase in electricity production predominantly derived from nuclear sources.

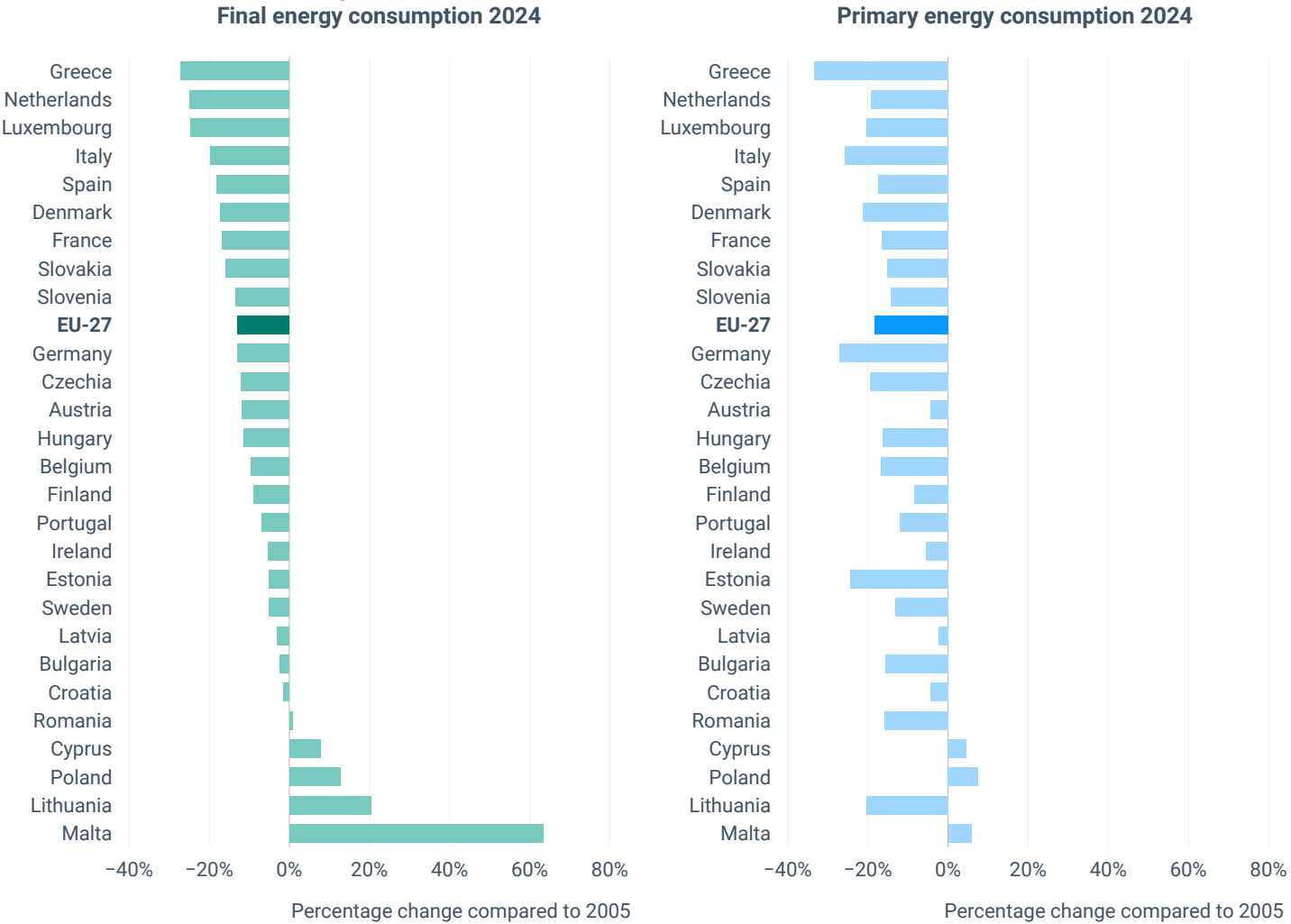
Policies to address energy efficiency improvements and to reduce reliance on fossil fuels have contributed to general decreasing trends in both PEC and FEC in recent years, compared to historical figures. The EU has taken **active measures** to save energy, e.g. via the **Council Regulation** on coordinated demand reduction measures for gas, where Member States agreed to reduce gas demand by 15% from 1 August 2022 to 31 March 2023 compared to average consumption in the same period over the preceding five years (2017-2022). This collectively led to notable decreases in energy consumption by industry and households.

The full time series of developments show that overall reductions in energy efficiency in Europe since 2005 have been more pronounced for PEC (-18.3%) than for FEC (-12.9%). The replacement of fossil fuels and nuclear energy by **renewables** in electricity generation typically reduces PEC without affecting FEC.

The **share of renewable energy** in the EU has **more than doubled** since 2005. Other factors contributed to a reduction in energy demand, such as energy saving measures, energy transformation improvements, structural changes toward less energy intensive industries, increased energy prices after Russia's invasion of Ukraine, and warmer winters due to climate change.

Compared to average annual reductions of the last 10 years, reaching ambitious **2030 targets** will require continued introduction of robust measures. Based on this historical trend, the EU is likely **not on track** to meet the 2030 targets on energy consumption.

Figure 2. Change in energy consumption of EU Member States between 2005 and 2024



Based on 2024 estimates, 24 Member States have **decreased their PEC** between 2005 and 2024. Greece was the highest achiever in relative terms at -33.4%, followed by Germany (-27.1%) and Italy (-25.8%). PEC levels in 2024 grew in Poland (+7.5%), Malta (+5.8%) and Cyprus (+4.7%) compared to 2005.

In the same time frame, 22 Member States **decreased their FEC**. Greece (-27.0%) also represents the greatest decrease in this category, followed by the Netherlands (-24.9%) and Luxembourg (-24.7%). Five Member States had higher FEC levels compared to 2005, with Malta leading at 63.2%.

For the year between 2023-2024, nine Member States estimated to have decreased their PEC, with Czechia and Slovakia having the largest relative reductions of -3.5% and -3.3% respectively. For 18 Member States whose PEC is estimated to have increased, Austria had the highest proportion of +6.6% and France had the highest absolute PEC increase at 8.3Mtoe.

Between 2023 and 2024, 15 Member States reduced their estimated FEC. Poland reported the greatest relative reduction at -6.3%. Of the 11 Member States whose estimated FEC increased in 2024, Lithuania and Cyprus led in relative terms with +5.7% and +5.4% respectively.

▼ Supporting information

Definition

Final energy consumption (FEC) represents the energy used by final consumers (such as households, transport, industry etc) for all energy uses. It is the energy that reaches the final consumer's door.

Primary energy consumption (PEC) represents the total energy demand within a country, excluding the energy products consumed for purposes other than producing useful energy (non-energy uses, e.g., oil for plastics). For example, the electricity consumed by a household counts towards FEC; the fuel burned to generate that electricity and bring it to the household counts towards PEC.

Methodology

PEC-FEC

To ensure comparability with energy efficiency targets, this indicator is defined according to Eurostat methodology for final energy consumption (Europe 2020-2030) [FEC2020-2030] and primary energy consumption (Europe 2020-2030) [PEC2020-2030].

Primary energy consumption (Europe 2020-2030) = gross inland consumption (all products total) - gross inland consumption (ambient heat (heat pumps)) - final non-energy consumption (all products total).

Final energy consumption (Europe 2020-2030) = final energy consumption (all products total) - final energy consumption (ambient heat (heat pumps)) + international aviation (all products total) + transformation input blast furnaces (all products total) - transformation output blast furnaces (all products total) + energy sector blast furnaces (solid fossil fuels) + energy sector blast furnaces (manufactured gases) + energy sector blast furnaces (peat and peat products) + energy sector blast furnaces (oil shale and oil sands) + energy sector blast furnaces (oil and petroleum products) + energy sector blast furnaces (Natural gas).

Data set used: 'Complete energy balances nrg_bal_c'

Codes:

- FEC2020-2030 Final energy consumption (Europe 2020-2030)/all products;
- PEC2020-2030 Primary energy consumption (Europe 2020-2030)/all products;
- GIC Gross inland consumption/all products;
- NRG_BF_E Energy sector – blast furnaces – energy use/all products;
- FC_NE Final non-energy consumption/all products;
- FC_TRA_E Final consumption – transport sector – energy use/renewables and biofuels;
- FC_E Final consumption – energy use/ambient heat;
- PPRD Primary production/ambient heat.

Details about this methodology are available from Eurostat at: [ENERGY BALANCE GUIDE \(Draft 31 January 2019\)](#).

The time series for the EU-27 was made by summing the values for each year of the 27 countries that are currently Member States, regardless of whether they were members of the EU in any given year.

Proxy data

Values for 2005-2022 are compiled by Eurostat. Approximated figures for 2023 are based on EEA estimates.

Policy/environmental relevance

The [Energy Efficiency Directive \(2012/27/EU\)](#) established a set of binding measures to help the EU reach its target of decreasing energy consumption by 20% by 2020, compared with projected levels. This was amended by [Directive \(EU\) 2018/2002](#), which provides a policy framework for 2030 and beyond. A new amendment was agreed in 2023, which set new targets for 2030.

The composition of the energy mix and the level of consumption provide an indication of the environmental pressures associated with energy consumption. The type and magnitude of the environmental impacts associated with energy consumption, such as resource depletion, greenhouse gas emissions, air pollutant emissions, water pollution and the accumulation of radioactive waste, strongly depend on the types and amounts of fuels consumed, as well as on the abatement technologies applied.

This indicator is a headline indicator for monitoring progress towards achieving the aims of the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring progress towards energy efficiency aspects of [Article 2.f of the 8th EAP](#) which requires: 'promoting environmental aspects of sustainability and significantly reducing key environmental and climate pressures related to the Union's production and consumption, in particular in the areas of energy, industry, buildings and infrastructure, mobility, tourism, international trade and the food system'. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor the achievement by 2030 of the recently agreed 2030 EU targets as detailed in the next paragraph ^[1].

Targets

On 20 September 2023, the EU officially published the recast [Energy Efficiency Directive \(EU\) 2023/1791](#), which set a target for the reduction of final energy consumption (FEC) of at least 11.7% in 2030, compared with the energy consumption forecasts for 2030 made in 2020. This translates into a mandatory target of 763Mtoe for FEC, and an indicative target of 993Mtoe for primary energy consumption (PEC). Member states will benefit from flexibilities in reaching the target.

For more information, see the [European Commission website on the Energy Efficiency Directive](#) and the [recent agreement](#).

Sources:

EC, 2022a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives, COM/2022/357 final, [EUR-Lex - 52022DC0357 - EN - EUR-Lex \(europa.eu\)](#)

Eurostat, 2023. Complete energy balances (NRG_BAL_C), PEC (2020-2030) and FEC (2020-2030). <https://ec.europa.eu/eurostat/databrowser/bookmark/dea184ea-4883-453d-ba24-71e960a4f161?lang=en>. Accessed May 2024.

Accuracy and uncertainties

Methodology uncertainty

No uncertainty has been specified.

Data sets uncertainty

No uncertainty has been specified.

Rationale uncertainty

No uncertainty has been specified.

Data sources and providers

- [Simplified Energy Balances: Primary Energy Consumption - Energy Efficiency Directive](#), EUROSTAT -Statistical Office of the European Union
- [Simplified Energy Balances: Final Energy Consumption - Energy Efficiency Directive](#), EUROSTAT - Statistical Office of the European Union
- [Primary energy consumption](#), Statistical Office of the European Union (Eurostat)

- [Final energy consumption](#), Statistical Office of the European Union (Eurostat)
- [Approximated estimates for the primary and final consumption of energy, 2024](#), European Environment Agency (EEA)

DPSIR

Driving forces

Topics

[# Energy](#) [# Climate change mitigation](#) [# Energy efficiency](#)

Tags

[# 8th EAP](#) [# ENER016](#) [# Energy](#) [# Energy efficiency](#) [# Targets](#)

Temporal coverage

2005-2030

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Efficiency indicator (Type C - Are we improving?)

UN SDGs

SDG7: Affordable and clean energy

Unit of measure

FIG1: Million tonnes of oil equivalent (Mtoe);

FIG2: Percentage change compared to 2005

Frequency of dissemination

Once a year

▼ References and footnotes

1. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives. COM(2022) 357 final



8th Environment Action Programme

Share of energy consumption from renewable sources in Europe

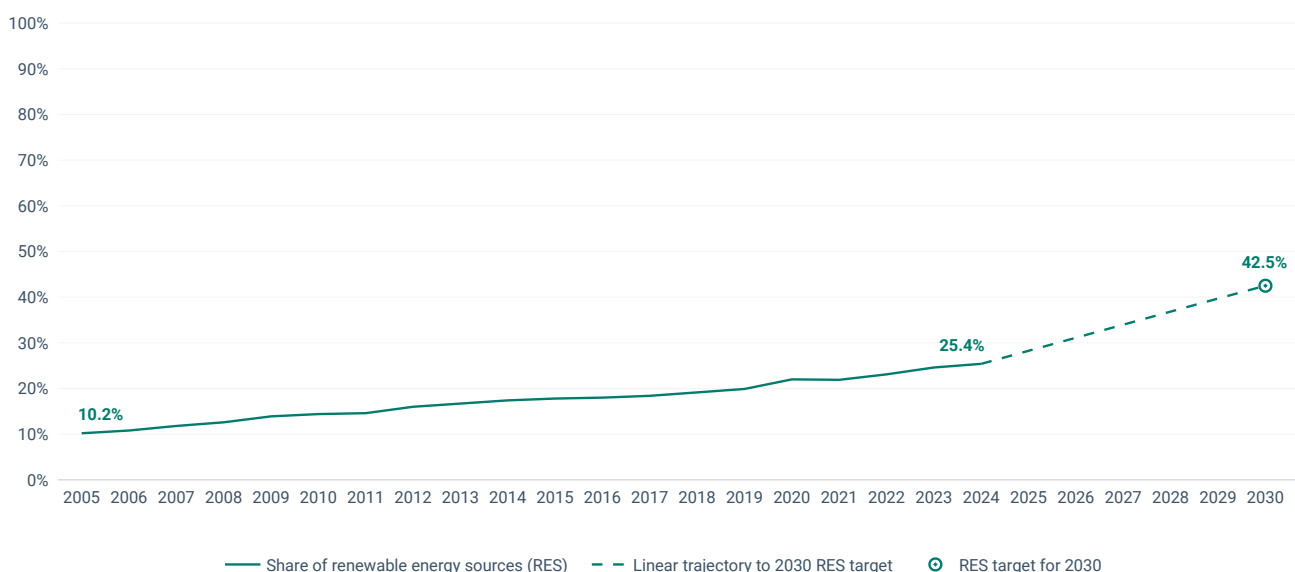


Share of energy consumption from renewable sources in Europe

Published 06 Nov 2025

In 2024, 25.4% of all final energy consumed in the European Union was obtained from renewable sources, about one percentage point more than in 2023. This increase was largely driven by growth of solar and wind power, followed by heat pumps. The share of renewables in Europe is expected to grow further. Meeting the new minimum EU target for renewable sources of 42.5% by 2030 will require doubling the rates of renewables deployment seen over the past decade, and a deep transformation of the European energy system.

Figure 1. Progress towards renewable energy source targets for EU-27



Renewable energy sources (RES) have multiple **benefits** for society compared with fossil fuels, such as mitigating climate change, reducing the emission of air pollutants and improving energy supply security. The revised [Renewable Energy Directive](#) increases the binding target for 2030 from 32% to a minimum of 42.5% share of renewables in EU energy consumption, with the aim of achieving 45%. Each Member State will contribute to this common target. No binding national targets have been set.

At 25.4% in 2024, the share of renewables in the EU is estimated to have **increased** by almost one percentage point from 2023. The increase is slightly lower than the average annual pace of growth recorded in the previous five years. The [Fit-for-55 EU policy package](#) and higher EU ambitions introduced by the [RepowerEU plan](#), leading to the adoption of the [revised Renewable Energy Directive](#), are especially relevant to eliminate the EU's dependency on Russian fossil fuels, in response to Russia's invasion of Ukraine.

In absolute values, the gross final consumption of renewables grew by an estimated 8.7 million tonnes oil equivalent (Mtoe) between 2023 and 2024, driven by a substantial increase in solar power (by 19%) and wind power generation (by 6%).

Non-renewables saw a smaller reduction than in previous years, of only 1%, linked to lower energy supply from coal and higher output from nuclear energy.

The electricity system continued to lead decarbonisation efforts in 2024, with 47% of all EU power generated from renewable sources. It was followed by heating and cooling (27%) and transport (11%), where renewable energy from heat pumps (+6%) and renewable electricity consumption in road transport (+27%) increased notably, compared to 2023.

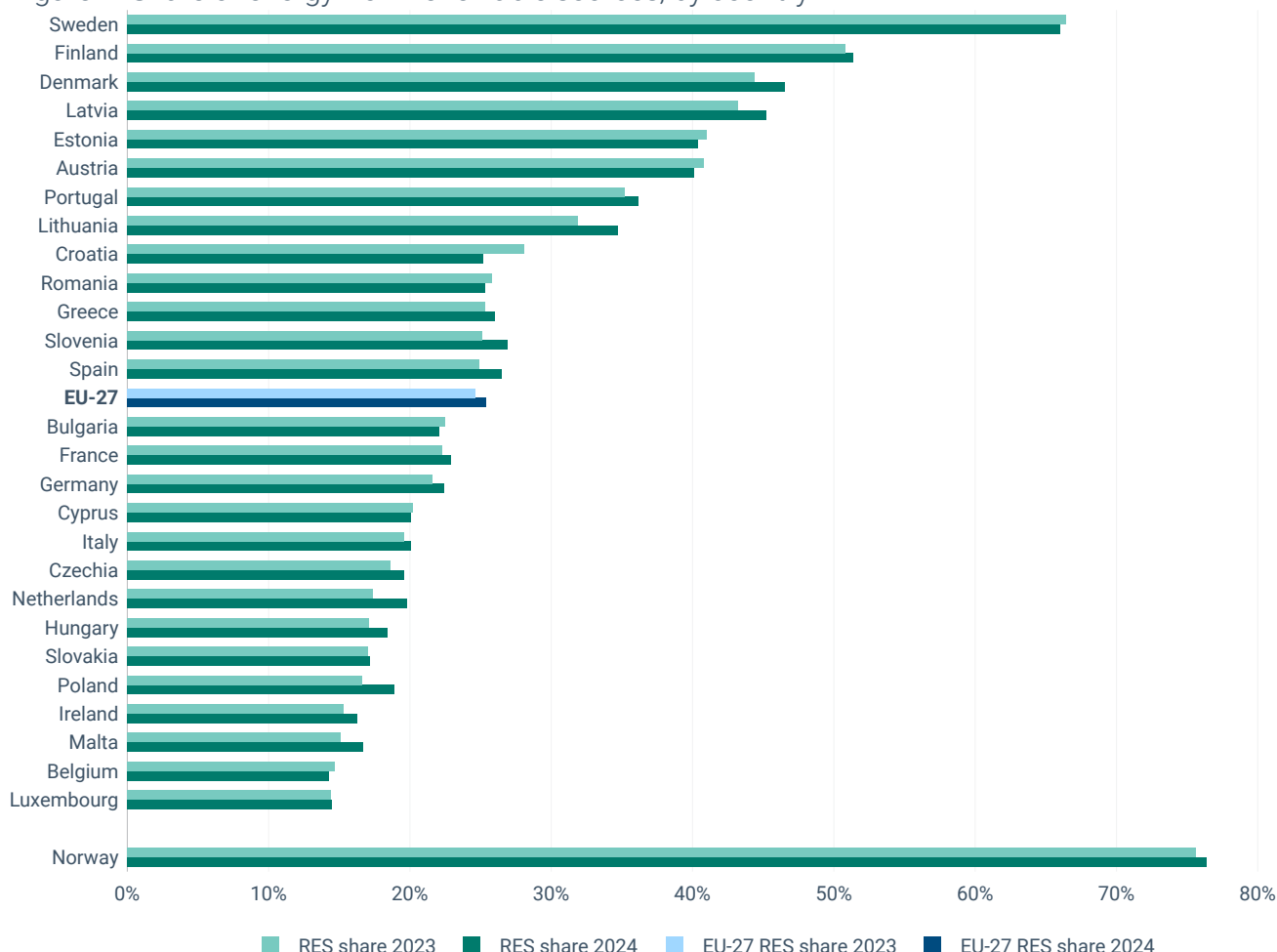
Solid, gaseous and liquid biomass fuels together formed the **largest category** in 2024, totalling 46% of all renewable energy consumption (49% when including municipal solid waste) ^[1].

Wind (18%), hydro power (12%) and solar photovoltaics (11%) were the other three largest renewable energy sources, followed by heat pumps and liquid biofuels (both with 8% share of all renewable energy use). Other renewables sources were biogases, renewable waste, geothermal and solar thermal.

Looking at **long-term trends**, the RES share more than doubled between 2005 and 2024. This was driven by dedicated policies and support schemes, as well as increased economic competitiveness of renewables. The increase represents a compound annual growth rate (CAGR) of 4.0% over the last decade (4.9% since 2005).

Modelling by the [IEA](#) and [Ember](#) shows that reaching the **2030 target** of a 42.5% share of renewables is feasible if fast action is taken to improve access to capital for investments in renewables and energy efficiency. This [EEA report](#) echoes these findings and outlines levers to enhance the energy transition^[2].

Figure 2. Share of energy from renewable sources, by country



Sweden, Finland and Denmark had the **highest RES shares** among Member States in 2024 due to strong hydro industries (Sweden and Finland), wind power and wide use of solid biofuels for district heating. By contrast, Luxembourg and Belgium reported the lowest deployment of renewables (15% and 14% respectively) in 2024.

Over time, Denmark, Sweden, Estonia and Finland have shown the highest growth in RES shares, with more than 23 percentage points increase since 2005. However, Croatia, Slovenia and Romania have seen an increase of less than eight percentage points since 2005.

In the short-term, renewable energy shares are estimated to have increased in 18 Member States between 2023 and 2024. Lithuania, Poland, the Netherlands and Denmark top the list, increasing their RES share by two percentage points or more in 2024.

In the European Economic Area, Norway and Iceland both have RES shares above 75%. The two countries generate most of their electricity from hydropower, while in Iceland, geothermal energy provides most of the heating.

▼ Supporting information

Definition

This indicator measures the EU's progress towards achieving its 2020 and 2030 renewable energy targets. Gross final renewable energy consumption is the amount of renewable energy consumed for electricity, heating and cooling, and transport in the 27 EU Member States, and is expressed as a share of gross final energy consumption.

The [Renewable Energy Directive \(2009/28/EC\)](#) defines gross final energy consumption as the energy commodities delivered for energy purposes to final consumers (industry, transport, households, services, agriculture, forestry and fisheries), including the consumption of electricity and heat by the energy branch for electricity and heat production, and including losses of electricity and heat in transmission and distribution.

Figure 1 shows consumption of energy from renewable sources (including only certified biofuels complying with the Renewable Energy Directive (RED) sustainability criteria) as a proportion of gross final energy consumption and the recently adopted 2030 target.

Figure 2 shows the consumption of energy from renewable sources as a proportion of gross final energy consumption by country. It illustrates the progress made by the EU and its Member States in the last year.

For more information, please refer to the EEA's annual [Trends and projections in Europe](#), Eurostat's page on [renewable energy statistics](#), and the Commission's [Energy Union reports](#) and [Climate Action Progress reports](#).

Methodology

Eurostat data

The renewable energy share data used for 2005-2023 were taken directly from the Eurostat SHARES tool. The SHARES tool focuses on the harmonised calculation of the share of energy consumption from renewable sources among the 27 EU Member States. This is done in accordance with the RED guidelines and is based on national energy data reported to Eurostat. The SHARES tool detailed results and manual are available online: (<https://ec.europa.eu/eurostat/web/energy/database/additional-data>).

Electricity generation from hydropower and wind power must be normalised to smooth the effect of weather-related variations. In the case of hydropower, the normalisation is based on the ratio of electricity generation to the installed capacity averaged over 15 years; in the case of wind power, a similar normalisation formula is applied over five years. The SHARES tool takes into account all biofuels consumed in transport between 2005 and 2010, and only biofuels certified as being in compliance with the RED sustainability criteria for the years starting from 2011.

With regard to the calculation of the gross final energy consumption for Cyprus and Malta, the derogation in RED was used. This derogation allows these countries to consider the amount of energy consumed in aviation, as a proportion of their gross final energy consumption, to be no more than 4.12%.

The discussion on individual renewable energy sources was based on Eurostat energy balances, since the SHARES tool focus on sectors, rather than individual sources. The comparison is made based on their primary energy supply.

Proxy data

Values for 2005-2023 are compiled by Eurostat and reported by Member States. An update of this indicator with EEA estimates for the previous year takes place every autumn.

Targets

The 2030 target presented in this indicator was adopted in October 2023 and is defined as a share of renewable energy in the EU's gross final energy consumption of 42.5% by 2030 with an additional "aspirational" 2.5% indicative top up that would allow to reach 45%.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards achieving the aims of the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring progress towards sustainable energy aspects of Article 2.f of the 8th EAP which requires: 'promoting environmental aspects of sustainability and significantly reducing key environmental and climate pressures related to the Union's production and consumption, in particular in the areas of energy, industry,

buildings and infrastructure, mobility, tourism, international trade and the food system^[3]. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor the achievement by 2030 of the EU target of 42.5% renewable energy share in gross final energy consumption^[4].

The [RED \(2009/28/EC\)](#) and its recast directive [RED II \(2018/2001/EU\)](#) establish an overall policy for the production of energy from renewable sources and the promotion of its use in the EU. The [RED III](#) was adopted in 2023, introducing stronger measures and a new 2030 target for renewables, aimed at achieving climate neutrality by 2050.

Achieving the 2030 target will depend on the fast implementation of the reinforced policy and legal framework in the Member States, especially via speeding up permitting procedures, better visibility of auctions for renewables and a better integration of the different sectors. Implementation needs to be accompanied by accelerated grid developments in order to absorb more renewables and the full implementation of a guarantee-of-origin system with energy purchase agreements to allow further development of the renewable consumer market. In addition, better and more integrated planning will be required to ensure not only a high efficiency of investment and an accelerated pace of development, but also that the market penetration of these renewable sources takes into account other policy objectives such as environment protection.

The share of renewable energy consumption in final energy consumption is a broad indicator of progress towards reducing the impact of energy consumption on the environment (i.e., through decreased greenhouse gas emissions and air pollutant emissions). At the same time, impacts of increasing renewable energy consumption on landscapes, habitats and ecosystems, namely from construction, the use of water, the use of fertilisers and pesticides for biomass and biofuel crops, and the extraction of heavy metals for photovoltaic cells must also be considered.

Replacing fossil fuels with renewables results in lower carbon emissions. However, total carbon emissions are not necessarily determined by the share of renewable energy in final energy consumption, but by the total amount of energy consumed from fossil sources.

Accuracy and uncertainties

Methodology uncertainty

Officially reported renewable energy data were compiled by Eurostat using annual joint questionnaires, which are shared by Eurostat and the International Energy Agency, following a well-established and harmonised methodology.

Methodological information on the annual joint questionnaires and data compilation can be found on [Eurostat's web page on metadata on energy statistics](#).

Values concerning the previous year, which normally are published by EEA during the autumn, are approximate (proxies) and have been estimated by the EEA. These proxies were not obtained following the formal collection process for official statistics and are therefore less accurate and reliable than official statistics.

Notes on uncertainties in the underlying statistics and methodology:

Biomass and bio-waste, as defined by Eurostat, cover organic, non-fossil material of biological origin, which may be used for heat production or electricity generation. They comprise wood and wood waste, biogas, municipal solid waste (MSW) and biofuels. MSW comprises biodegradable and non-biodegradable wastes produced by different sectors. Non-biodegradable municipal and solid wastes are not considered renewable, but current data availability does not allow the non-biodegradable content of wastes to be identified separately, except in industry. [Large data-gaps also exist regarding the energy use of wood](#), which further adds to the methodological uncertainty.

The electricity produced from hydropower storage systems is not classified as a renewable source of energy in terms of electricity production, but is considered part of the gross electricity consumption of a country. Hydropower and wind power generation are calculated as actual generation and normalised generation. Normalised generation is calculated using the weighted average load factor over the last 15 years for hydropower and the last five years for wind power.

The indicator measures the consumption of energy from renewable sources relative to total energy consumption for a particular country. The share of renewable energy could increase even if actual energy consumption from renewable sources falls. Similarly, the share could fall despite an increase in energy consumption from renewable sources.

Electricity consumption within a national territory includes imports of electricity from neighbouring countries. It excludes electricity produced nationally but exported abroad. In some countries, the contribution of electricity trade to total electricity consumption and the changes observed from year to year need to be looked at carefully when analysing trends in electricity from RESs. Impacts on the (national) environment are also affected, since emissions are taken into account for the country in which the electricity is produced, whereas consumption is taken into account for the country in which the electricity is consumed.

Data sets uncertainty

No uncertainty has been specified.

Rationale uncertainty

No uncertainty has been specified.

Data sources and providers

- [Share of energy from renewable sources](#), Eurostat - European statistics
- [Approximated estimates for the share of gross final consumption of renewable energy sources in 2023 \(EEA 2023 RES share proxies\)](#), European Environment Agency (EEA)

▼ Metadata

DPSIR

Response

Topics

[# Climate change mitigation](#) [# Energy](#) [# Renewable energy](#)

Tags

[# renewable energy](#) [# Energy](#) [# 8th EAP](#) [# ENER028](#) [# hydropower](#)

Temporal coverage

2005-2030

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Norway	Poland
Portugal	Romania
Slovakia	Slovenia
Spain	Sweden

Typology

Policy-effectiveness indicator (Type D)

UN SDGs

SDG7: Affordable and clean energy, SDG13: Climate action

Unit of measure

Share of renewable energy in gross final energy consumption (%);

Share of energy from renewable sources (%)

Frequency of dissemination

▼ References and footnotes

1. More than two-thirds of bioenergy is produced from solid biomass, of which the majority is related to forest biomass. The most common uses of solid biomass are for residential heating and district heating, followed by electricity generation and (thermal) energy use in industrial processes. Increasing primary demand of forest biomass, including for supplying energy, represents one driver for decreasing forest carbon sinks in Europe (see also 'GHG emissions from LULUCF in Europe' | <https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-land>). Gaseous biomass (biogas) is used to replace fossil gas uses, either for combined heat and power, balancing the electricity grid, or upgrading to biomethane. Liquid biofuels are mainly used directly or blended with gasoline and diesel in transport. EU policies define sustainability and GHG emission saving criteria for bioenergy to be eligible for state aid and count towards national and the EU's renewable energy targets.
↕
2. The trends in the deployment of solar photovoltaics and heat pumps also provides reasons for optimism. However, reaching the target will require a challenging CAGR of 8% on the EU renewables share until 2030, which is almost twice as high as the observed rate over the past decade. Considering this, the EU must allocate more resources for a deep transformation of the energy system in line with targets for 2030 and beyond.
↕
3. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030, OJ L.
↕
4. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives. COM(2022) 357 final
↕



8th Environment Action Programme

Circular material use rate in Europe

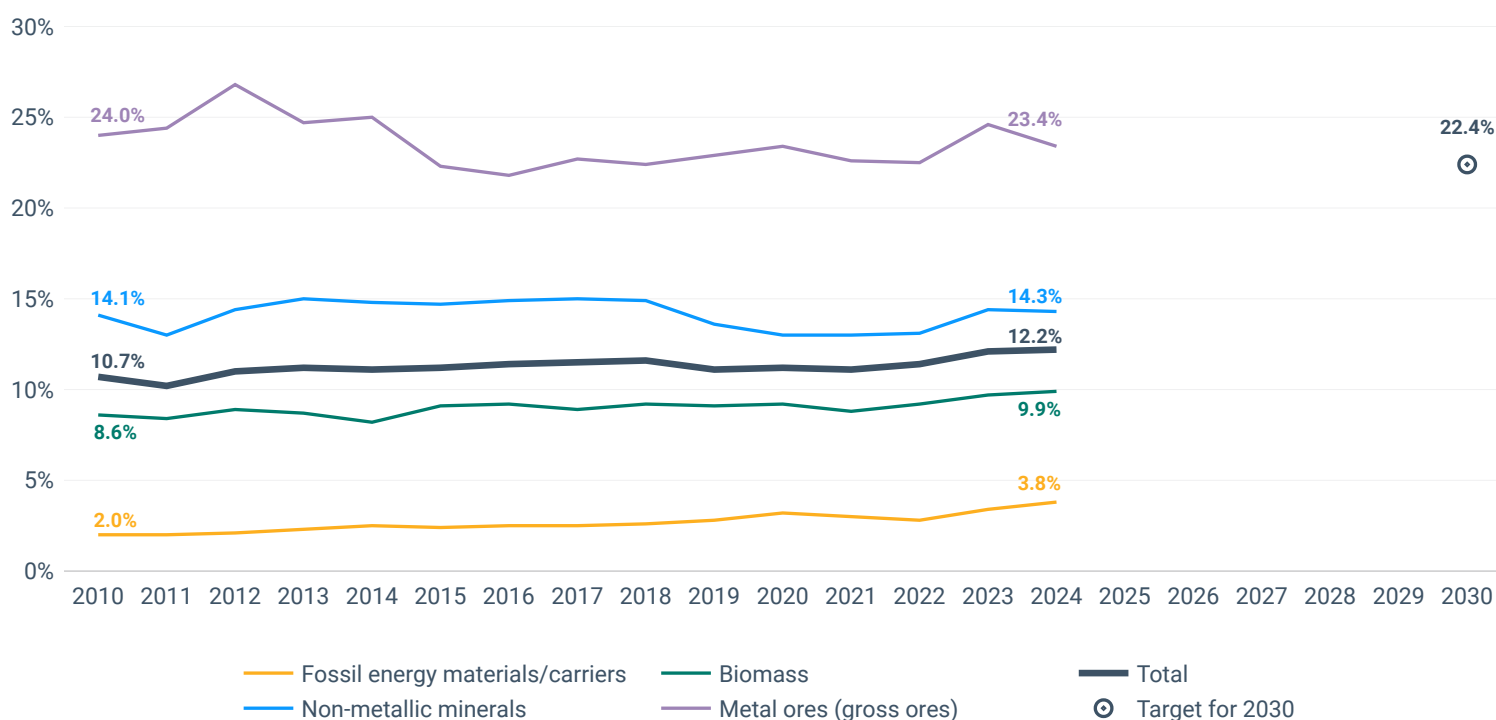


Circular material use rate in Europe

Published 28 Nov 2025

The EU aims to double recycled material use, in terms of its share of the economy's total material use, between 2020 and 2030 to reach 22.4% by 2030. A goal set in the 8th Environmental Action Programme, an ambition confirmed and even slightly increased to 24% in the Clean Industrial Deal. Increasing the use of secondary materials relatively reduces the demand for primary raw materials and their associated environmental impacts. Secondary materials accounted for 12.2% of total material use in 2024, an increase of 1.5 percentage points compared with 2010. This slow progress, along with projected increased material demand by 2030, implies that the EU is currently not on track to double the circular material use rate by 2030.

Figure 1. Circular material use rate in the EU and breakdown by material group between 2010 and 2023



The EU's [circular economy action plan](#) aims to reduce pressure on natural resources and double its **circular material use rate** (CMUR) between 2020 and 2030^[1]. Recent initiatives, like the [EU Clean Industrial Deal](#), reinforce this commitment by slightly increasing the target to 24% in 2030

The CMUR measures the circularity of materials in the economy and refers to the share of the total amount of material used in the economy that comes from recycled waste. Improving the CMUR, either by increasing the use of recycled materials and/or decreasing the amount of primary materials used mitigates the adverse impacts on the environment and climate of primary material extraction and processing. A reduction in the EU's reliance on primary resources, particularly imported materials, would in turn lead to an increased EU economic security. This means the EU would increase its ability to meet its own needs, without **relying excessively on third countries**.

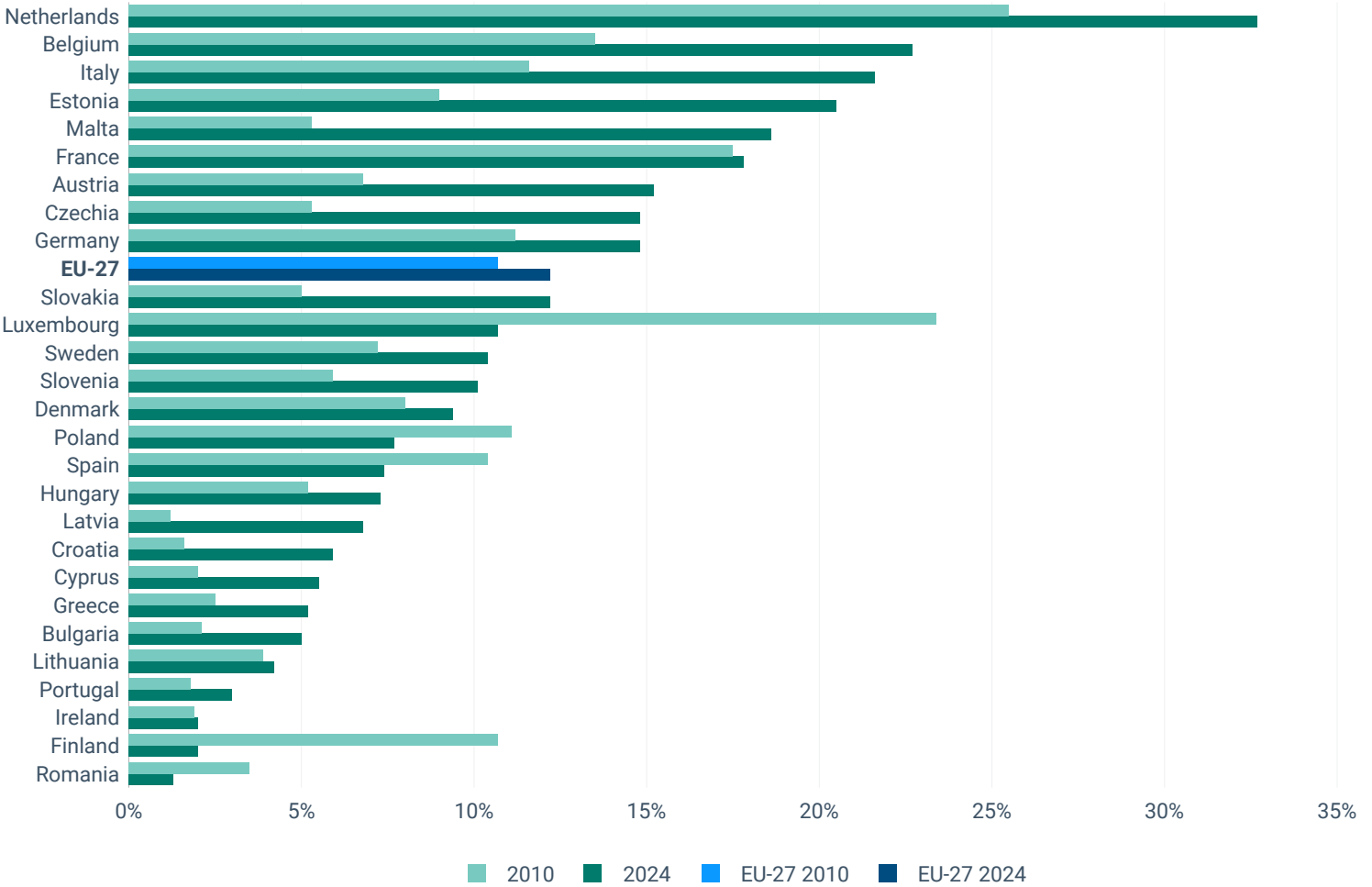
Although the EU's CMUR has increased slightly in the last 14 years, from 10.7% in 2010 to 12.2% in 2024, it is still considered low compared to the frontrunner EU Member States that achieve a higher share, indicating the economy is mostly linear. The positive trend until 2022 is mainly due to **increases** in waste recycling efforts (almost 9% increase between 2010 and 2022 with domestic material consumption stable in the same period), driven by many factors, including EU recycling targets, improved technologies and an improving economic viability of circular solutions. Meanwhile, domestic material consumption has dropped sharply between 2022 and 2024 (**9% decrease**, explained mainly by a **drop in consumption of metals**) which increases the CMUR.

Non-metallic minerals account for **more than 50% of total material consumption** and their CMUR has increased slightly since 2010. The CMURs increased also for biomass and fossil-based materials between 2010 and 2024. The CMURs for the various material groups differ significantly with 23.4% for metal ores in 2024 and only 3.8% for fossil materials. This reflects the different nature of materials and their use. Metals are technically easier and more economical to recycle, feeding back into the economy. Fossil fuels are mostly burned and thus cannot be recycled.

Circular economy measures aim to retain the value and prolong the lifespan of products helping to reduce resource consumption and, in turn, lower environmental and climate impacts. Meeting the **target** of doubling the CMUR would mean an increase from 12.2% (2024) to 22.4% by 2030. This requires the CMUR to grow annually by more than 1.7 percentage points, which is more than the total increase achieved over the period 2010-2024. Therefore, the EU is not on track to double the CMUR by 2030, nor to achieve the 24% target stated in the Clean Industrial Deal, also considering **OECD projections** of increased future materials demand. The latter is important as increasing recycling alone will not allow the EU to **achieve the target**.

Increased recycling and/or reduced material use is required. Increasing the re-use and recycling of heavier material groups like non-metallic minerals and metals has a greater potential for increasing the CMUR. Since material extraction has different **environmental impacts**, measures should also focus on reducing the consumption of fossil energy materials and increasing the sustainability of biomass production in view of reducing environmental pressures.

Figure 2. Circular material use rate by EU country



Considerable differences in CMURs are observed between countries, ranging from 32.7% (in the Netherlands) to 1.3% (in Romania) in 2024. This reflects significant structural difference in countries' recycling systems and in their levels of material use ^[2]. In the Netherlands, Belgium, Italy and Estonia, more than 20% (one of five tonnes) of material used was recycled material. The CMUR level for the Netherlands and Belgium is already higher than the EU target for 2030, suggesting that such rates are achievable.

Most (22 out of 27) countries' CMURs have increased since 2010. The largest absolute CMUR increases (more than ten percentage points) were seen in Malta, Estonia and Italy. Some countries show impressive relative increases in their CMURs, with Latvia, Croatia and Matla more than tripling their CMURs between 2010 and 2024. On the other hand, significant decreases (more than 50%) in CMURs were seen in Finland, Romania and Luxembourg.

▼ Supporting information

Definition

The CMUR measures an economy's circularity. This is defined by the circular use of materials, which is approximated by the amount of waste recycled in domestic recovery plants minus imported waste destined for recovery plus exported waste destined for recovery abroad, divided by the material use. The material use is the sum of domestic material consumption and the aforementioned circular use of materials ^[3].

Methodology

This indicator is directly based on data published by Eurostat and the underpinning methodology can be found in [Eurostat \(2021\)](#)^[4].

Policy/environmental relevance

The EU's circular economy action plan calls for a doubling of the Union's CMUR in the coming decade up to 2030^[1]. This policy objective aims to increase the EU economy's circularity and thus benefit the environmental and climate. These benefits would mainly stem from the reduced need for natural resource extraction. The 2025 [Clean Industrial Deal](#) includes a KPI for 2030 to increase the CMUR to 24%.

This indicator is a headline indicator for monitoring progress towards achieving the aims of the 8th Environment Action Programme^[5]. By measuring the use of secondary materials in the economy, it is used to evaluate the sustainability of the industrial sector towards the 8th EAP priority objective for 2030 set out in Article 2.f which requires: 'promoting environmental aspects of sustainability and significantly reducing key environmental and climate pressures related to the Union's production and consumption, in particular in the areas of energy, industry, buildings and infrastructure, mobility, tourism, international trade and the food system'. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor the 'doubling of the ratio of circular material use by 2030 compared to 2020'. The CMUR is also a performance indicator in the Long-Term Competitiveness Strategy recently adopted by the Commission to set the direction for industry beyond 2030.

Accuracy and uncertainties

No uncertainties have been specified.

Data sources and providers

- [Circular material use rate by material type](#), Eurostat - European statistics
- [Circular material use rate](#), Eurostat - European statistics

DPSIR

Impact

Topics

[# Circular economy](#) [# Resource use and materials](#) [# Waste and recycling](#)

Tags

[# 8th EAP](#) [# Material use](#) [# waste](#) [# WST009](#) [# Circular economy](#)

Temporal coverage

2010-2024

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Performance indicator (Type B - Does it matter?)

UN SDGs

SDG12: Responsible consumption and production

Unit of measure

Percentage

Frequency of dissemination

Once a year

▼ References and footnotes

1. EC, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'A new circular economy action plan for a cleaner and more competitive Europe', COM(2020) 98 final.
[a](#) [b](#)
2. Eurostat, 2018, *Circular material use rate – calculation method*, Manuals and Guidelines, Publications Office of the European Union, Luxembourg.
[c](#)
3. Eurostat, 2020, 'Circular material use rate', *Product Datasets* (https://ec.europa.eu/eurostat/web/products-datasets/-/cei_srm030) accessed June 30, 2022.
[d](#)
4. Eurostat, 2021, 'Circular economy – material flows', *Statistics Explained* (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Circular_economy_-_material_flows#Circularity_rate_.E2.80.93_methodology) accessed June 30, 2022.
[e](#)
5. EC, 2022, 'Environment action programme to 2030', *European Commission* (https://environment.ec.europa.eu/strategy/environment-action-programme-2030_en) accessed June 24, 2022.
[f](#)



8th Environment Action Programme

Share of buses and trains in inland passenger transport

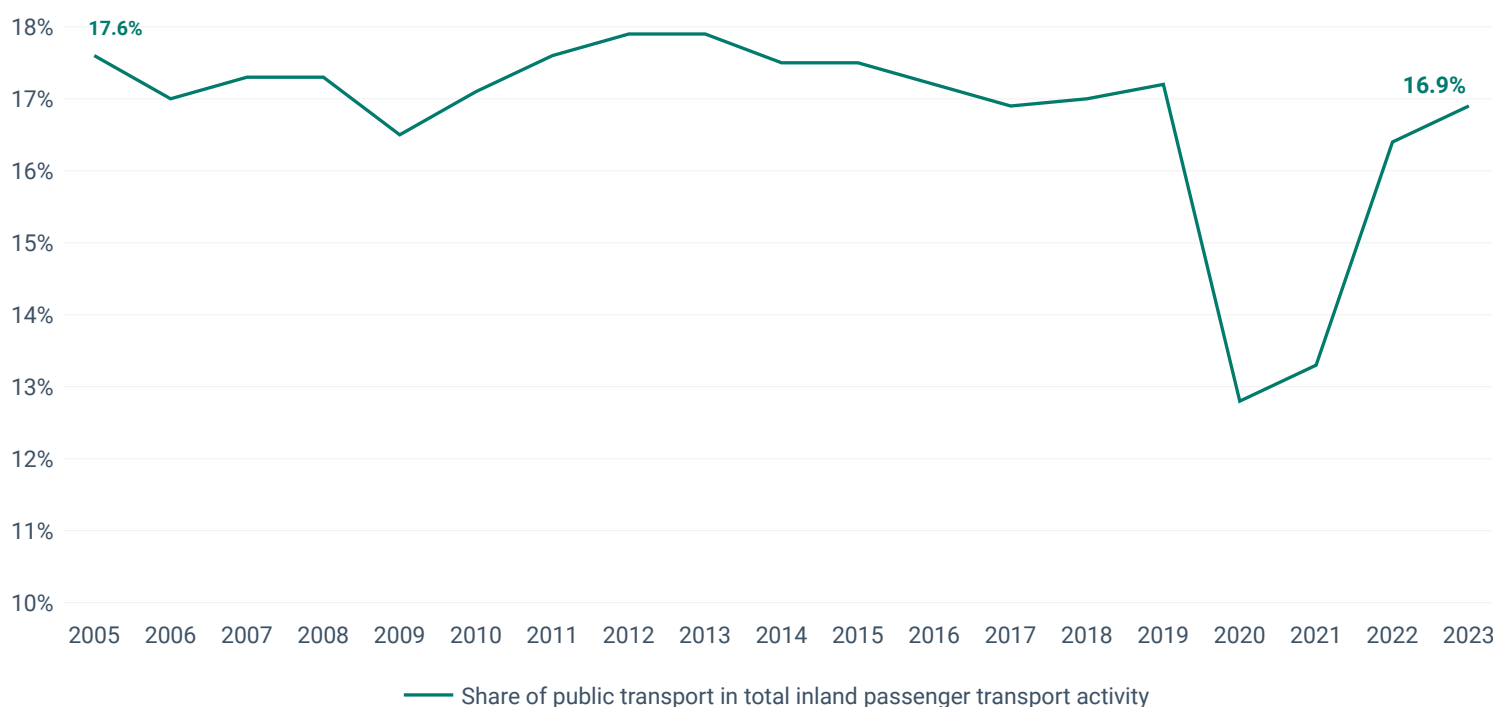


Share of buses and trains in inland passenger transport in Europe

Published 10 Nov 2025

Promoting sustainable transport modes like public transport can reduce greenhouse gas emissions and other environmental pressures such as air pollution and noise. The EU Sustainable and Smart Mobility Strategy underlines the importance of public passenger transport in greater transport sustainability. The share of buses and trains in total passenger transport has changed very little since 2005, with some fluctuation due to the COVID-19 pandemic. Shifting more people to public transport still requires decisive action and a break from long-standing habits.

Figure 1. Share of bus and trains in total inland passenger transport activity in the EU-27



In 2020, under the scope of the [European Green Deal](#), the European Commission (EC) adopted a [Sustainable and Smart Mobility Strategy](#) supporting, among others, the use of more **sustainable transport modes**. One [objective of the strategy](#) is to increase the number of passengers travelling by rail and commuting by public transport, instead of with a personal car. Achieving [this objective](#) could reduce greenhouse gas and air pollutant emissions, and other environmental pressures. Changes to the EU's mobility system are vital to realise the green and digital transformation ambitions and become more resilient to future crises.

The EU share of total passenger transport **demand** met by buses and trains has remained relatively constant, at around 17%, except for the years of the COVID-19 pandemic. It had already bounced back to 16.9% in 2023.

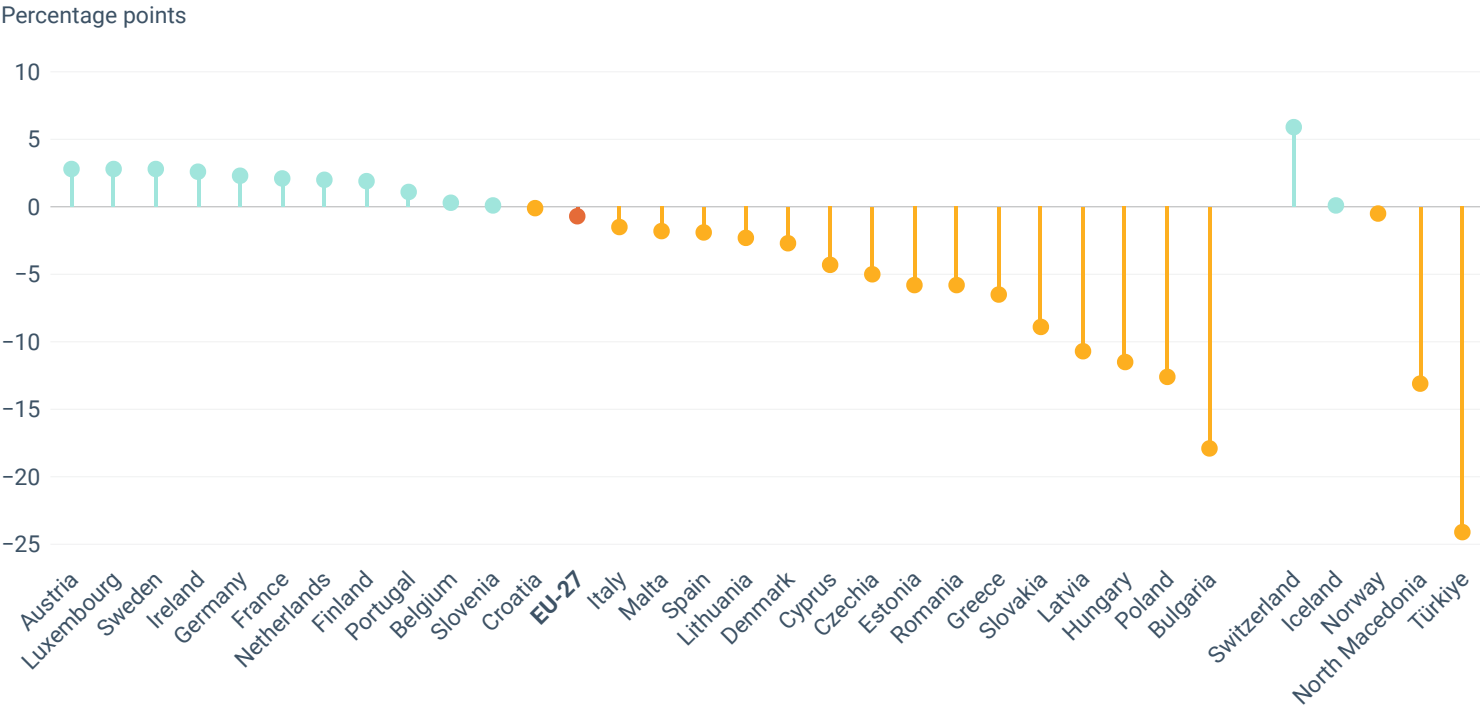
At the same time, total inland passenger transport activity increased by 8% between 2005 and 2023. The greatest increase in this period took place in aviation, with 61%. On the other hand, buses showed decreasing activity, with -14%. Overall, more effort is still required to increase the use of public transport and achieve a shift towards more sustainable modes. This would

require **changes** in the way Europeans commute and travel, and changes in city planning.

The EC launched important **initiatives** for the supply side, such as the revised [TEN-T regulation](#) and [rail capacity regulation](#), which aim to increase the availability of public transport modes. National and multi-level policies could further contribute to a higher uptake of public transport, reducing public transport ticket prices and integrating fare and ticketing systems, supported by low emission zones and congestion charging^[1].

Digitalisation, like real-time journey planners or integrated mobile ticketing, provides tools to internalise the external costs of transport and raise awareness of the pressures exerted by mobility needs. The EC is developing **frameworks** to support modal shifts and multimodal trips, as outlined in the EEA's [TERM report](#). In this context, investments and funding are also required to finance safe, clean and modern infrastructure to ensure full accessibility to public transport.

Figure 2. Percentage point variation in the share of bus and trains (collective modes) in total inland passenger transport activity by country



The use of buses and trains in passenger transport activity **differs** vastly across countries, both in terms of share values and time evolution. From 2005 to 2023, the share of buses and trains in total inland passenger transport increased in 11 EU Member States. Austria, Luxembourg and Sweden experienced the greatest growth, by 2.8 percentage points each. Yet, the share declined by more than five percentage points in 8 countries: Romania, Estonia, Greece, Slovakia, Latvia, Hungary, Poland and Bulgaria.

For other EEA member and cooperating countries for which data are available in the same period, changes in the share ranged from -24 percentage points in Türkiye to 6 percentage points in Switzerland. Note that Serbia and Montenegro passenger transport data are available only from year 2010^[2].

To **fully transition** to a more sustainable and fair transportation system a mix of solutions is needed, including a more efficient, connected and inclusive public network serving both urban and rural communities. [Active and shared transport options like walking and cycling, along with improved accessibility](#), are essential parts of a multimodal mobility system, supporting EU's green and digital goals. However, as data are not currently available for these modes, they are not presented as part of this indicator for the time being.

▼ Supporting information

Definition

Share of collective modes in total inland passenger transport. Collective modes refer to passenger transport via buses, coaches, and trains. Total inland passenger transport performance includes transport by passenger cars, buses and coaches, and trains. All data are based on movements within national territories, regardless of the vehicle's nationality.

Methodology

Figure 1: raw data for the EU-27 share (in %) of collective modes in total inland passenger transport performance were retrieved from Eurostat. Raw data for the increase in total inland passenger transport demand were retrieved from the 2025 version of the [EU transport in figures statistical pocketbook published by DG MOVE](#). EU-27 aggregate data were used. No additional gap filling was applied to the data. Information on data set uncertainties can be found directly in the metadata and explanatory notes provided by Eurostat. Only official Eurostat data sets have been used.

Figure 2: raw data by country of variation (2005-2023) in the share of collective modes in total inland passenger transport performance were retrieved from Eurostat. Data are displayed at country level and are expressed in percentage points. To provide the broadest possible picture of European countries, geographical coverage was extended to the 32 EEA member countries and the Western Balkan cooperating countries when data were available. No additional gap filling was applied to the data. Information on data set uncertainties can be found directly in the metadata and explanatory notes provided by Eurostat. Only official Eurostat data sets have been used.

Additional information on the methodology used for data collection can be found here: [Share of buses and trains in inland passenger transport \(sdg_09_50\) \(europa.eu\)](#)

Policy/environmental relevance

This indicator is one of a set of indicators that track the EU's progress towards meeting the [United Nations' Sustainable Development Goals](#) and their 169 related targets which are at the heart of the [United Nations 2030 Agenda for Sustainable Development](#). The indicator monitors trends in the shift towards environmentally friendly transport modes and the progress towards building a resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation (SDG 9) and making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11). These targets are embedded in the following European Commission priorities: 'a [European Green Deal](#)', 'a [Europe fit for the digital age](#)' and 'an [economy that works for people](#)'. The indicator is also relevant in the context of the Commission's 'Sustainable and Smart Mobility strategy', adopted in 2020. This strategy lays the foundation for the EU transport system's green and digital transformation and for making it more resilient to future crises.

The share of buses and trains in inland passenger transport is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring mobility aspects of the 8th EAP priority objective Article 2.(2)(f) that shall be met by 2030: '*promoting environmental aspects of sustainability and significantly reducing key environmental and climate pressures related to the Union's production and consumption, in particular in the areas of energy, industry, buildings and infrastructure, mobility, tourism, international trade and the food system.*' For the purposes of the [8th EAP monitoring framework](#) this indicator assesses specifically whether the EU will increase the share of buses and trains in inland passenger transport expressed in passenger-kilometres.

Accuracy and uncertainties

The accuracy of the is currently limited due to the voluntary collection of road passenger data. As a result, the transport performance data are based on a large variety of statistical sources and some data gaps are filled with estimates. Additional information can be found here: [Share of buses and trains in inland passenger transport \(sdg_09_50\) \(europa.eu\)](#)

Data sources and providers

- [Share of buses and trains in inland passenger transport \[SDG_09_50\]](#), Eurostat - European statistics

- [Statistical pocketbook 2025 - Part 2 Section 3: Performance of Passenger Transport expressed in passenger-kilometres](#), European Commission - Mobility and Transport

▼ Metadata

DPSIR

Pressure

Topics

[# Transport and mobility](#) [# Urban sustainability](#)

Tags

[# mobility](#) [# Buses](#) [# modal shift](#) [# 8th EAP](#) [# TERM046](#) [# Passenger transport](#) [# Trains](#) [# Transport](#)

Temporal coverage

2005-2023

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Latvia	Lithuania
Luxembourg	Malta
Netherlands	North Macedonia
Norway	Poland
Portugal	Romania
Slovakia	Slovenia
Spain	Sweden
Switzerland	Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG9: Industry, innovation and infrastructure, SDG11: Sustainable cities and communities

Unit of measure

Percentage

Frequency of dissemination

Once a year

▼ References and footnotes

1. Recently, updated targets were established in Regulation (EU) 2024/1610, requiring 90% of new city buses to be zero-emission by 2030 and fully zero-emission by 2035, accelerating the transition towards cleaner and more sustainable urban mobility.
[↗](#)
2. For additional details on the methodology, see the supporting information. In particular, the limited accuracy of passenger data could impact data comparability between countries and the reported trends.
[↗](#)



8th Environment Action Programme

Agricultural area under organic farming in Europe

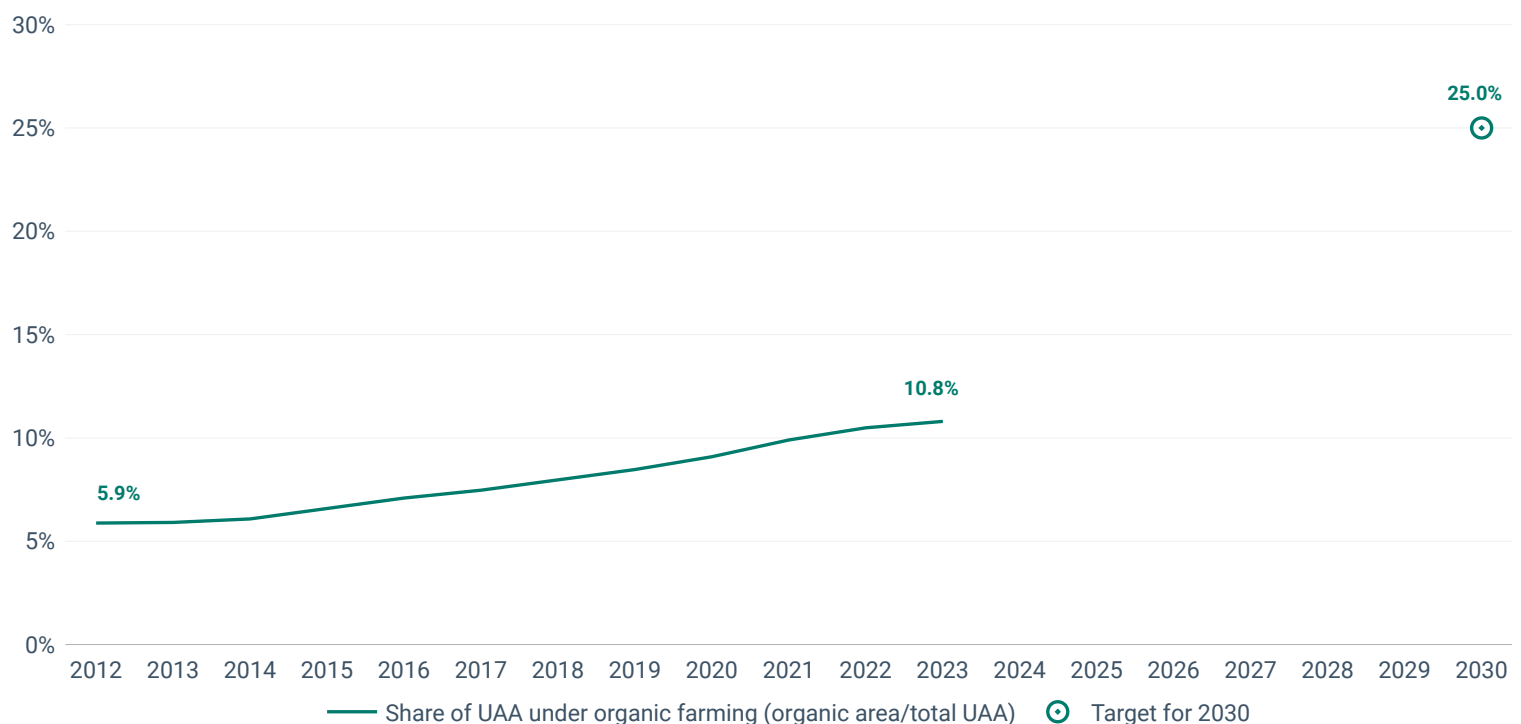


Agricultural area under organic farming in Europe

Published 17 Oct 2025

The European Green Deal strategies set the target that at least 25% of the European Union's agricultural area should be dedicated to organic farming by 2030. The share of the EU's agricultural land under organic farming increased from 5.9% in 2012 to 10.8% in 2023 as a result of an increasing demand for organic products and policy support. The pace would need to more than double in the remaining years up to 2030 in order to meet the target. Although the current policies aim to increase the share of organic farming, this alone will not be enough to reach the set target.

Figure 1. Share of the utilised agricultural area (UAA) used for organic farming in the EU-27 over the period 2012-2023



Rules for **organic farming** on production and labelling of organic products in the EU are set by [Regulation](#). Organic farming refers to the production of food using natural substances and processes. It avoids or notably reduces the use of synthetic chemicals, applies high standards of animal welfare and excludes the use of genetically modified organisms (GMOs). It has benefits for biodiversity, soil health and water quality.

[European Green Deal](#) (EGD) initiatives, particularly the [Farm to Fork](#) and [EU Biodiversity for 2030](#) strategies, set the **target** that at least 25% of the EU's utilised agricultural area (UAA) should be organically farmed by 2030. In addition, the [Vision for Agriculture and Food](#) confirms the relevance of continuous support to organic farming. The UAA under organic farming has continuously increased in the EU since 2012 due to demand for organic products and policy support. It covered an estimated 17.4 million hectares, 10.8% of the EU's UAA, in 2023.

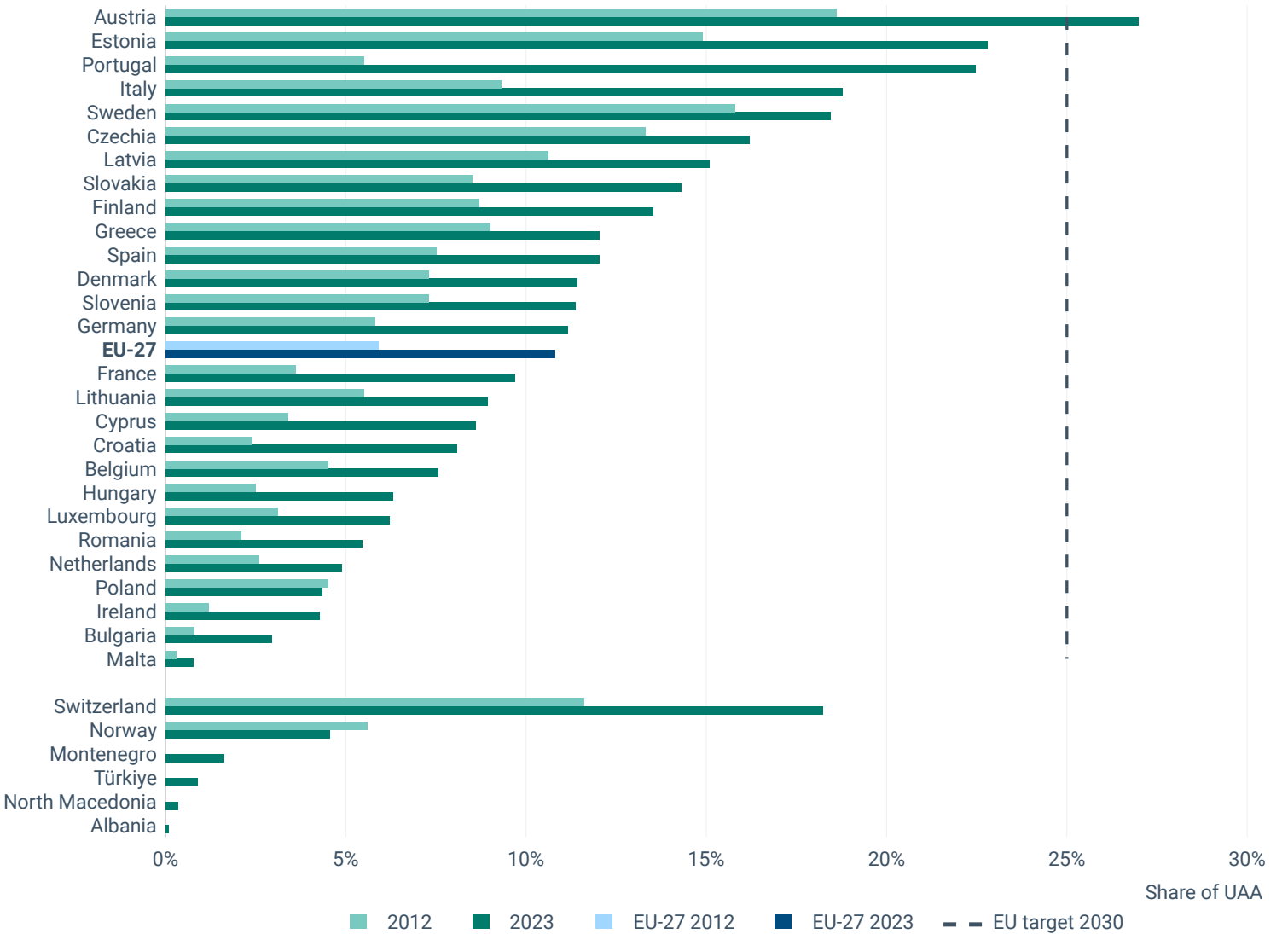
The annual compound **growth rate** from 2012 to 2023 was 5.7%. Meeting the 25% target by 2030 would require a more than doubled annual compound growth rate of 12.7% for the 2023-2030 period. This requires the conversion of 3.26 million hectares of land per year, and of 22.8 million hectares in total from 2023 to 2030.

The **EGD** introduced new initiatives such as the **EU Action Plan for the Development of Organic Production** to increase demand and supply of organic products. In this context, the **Common Agricultural Policy (CAP)** aims to **provide support** to organic farming. The national **CAP strategic plans of Member States** have set expected targets for areas under organic farming receiving CAP support, including respective financial allocations. As indicated in the **Agricultural Market Brief "Organic Farming in the EU"**, Member States have planned to increase the area of organic farming receiving CAP support to **about 10%** of the total utilised agricultural area in 2027^[1]. However, in 2024, the Court of Auditors **reported** gaps in both EU and national policies for the organic sector.

Organic farming can support an **inclusive green transition** in agriculture. In most countries, farms fully converted to organic farming or under conversion attract younger farm managers compared to conventional farms. In the EU, **around 21% of organic farms in 2020 had a manager aged under 40**, while this proportion was only 12% in conventional farms.

There is high certainty that the EGD objective will **not be met** by 2030. The evolution of the demand for organic products has become more unstable since 2022, and current policy support alone is not sufficient to reach the target. More strategic and focused measures are required to develop the organic sector and implement the objective. Accelerated development and execution of clear policies with increased ambition levels need to support a fundamental transformation of food production and consumption.

Figure 2. Share of total utilised agricultural area (UAA) under organic farming by country and in the EU-27, in 2012 and 2023



Shares of UAA under organic farming increased between 2012 and 2023 in all EU Member States, except Poland where the share decreased. However, since 2020 it has been increasing in Poland (from 3.45% to 4.35%), while decreasing in Sweden (from 20.31% to 18.44%). In 2023, ten Member States recorded a year-on-year decline compared with 2022 - the highest number since 2012. Austria, Estonia and Portugal had more than 20% of UAA dedicated to organic farming in 2022, the highest shares of all Member States. Italy and Sweden had almost 19% in 2023.

In contrast, five Member States had less than 5% of UAA dedicated to organic farming. Lowest shares were found in Ireland, Bulgaria and Malta. Between 2020 and 2023, there were cases of decreasing shares of UAA under organic farming at country level.

For EEA member and cooperating countries where data are available, less than 5% of their UAA was dedicated to organic farming, except Switzerland (18.2%). The share of organic farming area increased in Switzerland between 2012 and 2023, and decreased in Norway.

▼ Supporting information

Definition

This indicator shows the share of the utilised agricultural area (UAA) used for organic farming in the EU. According to the EU definition, the 'total organic area' includes both the 'certified organic farming area' and the 'area under conversion to organic farming', with farms undergoing a conversion process that typically takes 2-3 years, depending on the crop, before being certified as organic.

Organic farming is an integrated agricultural production system. It combines environment- and climate-friendly practices with benefits for biodiversity, the sustainable use of natural resources and the adoption of high animal welfare standards. This is in line with the demand of a growing number of consumers for products produced using natural substances and processes. Organic production thus plays multiple societal roles. It provides for a specific market, responding to consumer demand for organic products, and it delivers publicly available goods that contribute to benefits for environmental and human health, animal welfare and rural development.

The legal framework for organic farming in the EU is defined by [Council Regulation 2018/848](#), which came into force on 1 January 2022. Organic agriculture is defined by regulated standards (production rules), certification procedures (compulsory inspection schemes) and a specific labelling scheme in the EU.

Utilised agricultural area (UAA): the total area taken up by arable land, permanent grassland, permanent crops and kitchen gardens, regardless of the type of tenure or whether or not it is used as a part of common land. It excludes land used for mushroom cultivation; unutilised agricultural land (NUAA); woodland (WA); other land occupied by, for example, buildings, farmyards, tracks or ponds; UAA that is the property of the owner but is leased or rented to someone else; and common land that is not used (NUAA).

See: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Utilised_agricultural_area_\(UAA\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Utilised_agricultural_area_(UAA))

Methodology

The total organic agricultural area is reported by countries in accordance with [Regulation \(EU\) 2018/848](#). The data from non-EU EEA member countries and cooperating countries are transmitted annually to Eurostat on a voluntary basis, based on the [European Statistical System Agreement](#).

The EU's total organic agricultural area is calculated by Eurostat as the sum of the areas reported by the EU Member States. The total organic agricultural area as a share of the UAA is calculated as a percentage by Eurostat. The data set is updated annually by Eurostat, as soon as the underlying data become available and have been validated by Eurostat.

Data for organic area (in hectares) for Austria have been obtained from the Grüner Bericht 2024, as published on the website of the [Austrian Federal Ministry of Agriculture, Forestry, Regions and Water management](#). The share of organic area in UAA was calculated using the UAA reported to Eurostat.

Switzerland provides the percentage of the organic area calculated from the national UAA excluding summer pastures and from the national data on the organic farming area.

Methodology for gap filling

EU aggregates were calculated from available national data except in a few cases for which national data were not yet available and the data reported for the previous year by a country were taken into account in the calculation of the EU aggregate. Data for Greece for 2023 have not been published, and the 2022 data are under investigation. Data gap for Greece in 2023 were filled by using data from 2021.

Methodology references

https://ec.europa.eu/eurostat/cache/metadata/en/org_esms.htm

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards achieving objectives of the 8th Environment Action Programme (8th EAP)^{[2][3]}. It mainly contributes to monitoring food system aspects of the 8th EAP priority objective under Article 2(f), to be met by 2030: 'promoting environmental aspects of sustainability and significantly reducing key environmental and climate pressures related to the Union's production and consumption, in particular in the areas of energy, industry, buildings and infrastructure, mobility, tourism, international trade and the food system^[3].' The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor whether the EU will reach '25% of EU agricultural land organically farmed by 2030'^[2].

The indicator is also used for several monitoring frameworks such as for [EU monitoring](#) related to the United Nations Sustainable Development Goals.

Organic farming is one of the areas covered by the European Green Deal's Farm to Fork strategy, which sets a target that: 'at least 25% of the EU's agricultural land should be under organic farming by 2030'^[4]. To achieve this target and to help the organic farming sector reach its full potential, a comprehensive action plan for organic production in the EU was set out^[5]. It includes 23 actions, some of which follow on from the actions successfully undertaken in the period 2014-2020 and some of which are new, complementing existing actions and mobilising different sources of funding.

The three interlinked axes of the action plan reflect the structure of the food supply chain and the European Green Deal's sustainability objectives:

- Axis 1: stimulate demand and ensure consumer trust;
- Axis 2: stimulate conversion and reinforce the entire value chain;
- Axis 3: organics leading by example – increase the contribution of organic farming to environmental sustainability.

As part of the action plan, the regulation laying down the rules related to organic production in the EU has been revised. Since 1 January 2022, Regulation (EU) 2018/848^[6] of the European Parliament and of the Council of 30 May 2018 has been the applicable legislative act, also known as the 'basic act'. It lays down rules on organic production and the labelling of organic products, and repeals and replaces Council Regulation (EC) No 834/2007 of 28 June 2007^[7]. It aims, among other things, to:

- strengthen the control system to build increased trust in EU organic certification
- make the organic conversion easier for smaller-scale farmers;
- ensure the same standards for imported organic products as for EU organic products;
- increase the range of products that can be marketed as organic.

Related policy documents

· Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007^[6].

· Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an action plan for the development of organic production. COM/2021/141 final^[5].

· Stakeholder Consultation — Synopsis report accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an action plan for the development of organic production. SWD/2021/65 final^[8].

Rationale

Organic farming is a farming system that has been explicitly developed to be environmentally sustainable. It is governed by clear, verifiable rules. In the EU, farming is considered organic only if it complies with Regulation (EU) No 2018/848 (Council Regulation (EC) No 834/2007 of 28 June 2007 before Regulation (EU) No 2018/848 entered into force). In line with this legislation, organic farming is differentiated from other approaches to agricultural production by the application of a monitored conversion period (from conventional farming), regulated standards (production rules), certification procedures (compulsory inspection schemes) and a specific labelling scheme. It is thus more suited to identifying environmentally friendly farming practices than other types of farming that also consider environmental aspects.

Accuracy and uncertainties

The accuracy of the data varies in the reporting countries. In most countries, a large share of the data comes from the responsible national control body. There are only provisional or estimated values for a few countries.

Data sets uncertainty

Geographic coverage:

- Data are presented for all EU Member States.
- Non-EU EEA member countries with available data for 2023: Norway, Switzerland, Türkiye and for 2012: Norway, Switzerland.
- Non-EU EEA cooperating countries with available data for 2023: Albania, Montenegro, North Macedonia. No data for 2012.

Time coverage: 2012-2023. **The data on organic farming reflect the status of the Eurostat database, as present on 18.09.2025.** Data from before 2012 are not used for the indicator assessment, as these data are not comparable with data series from 2012-2023 because of methodological changes in data collection and reporting procedures.

Representativeness of data at the national level:

- The level of representativeness is high.

Comparability:

- The level of comparability is high. An EU-harmonised questionnaire is available for collecting data on organic farming, which guarantees geographical comparability. The actual comparability depends on national practices, left to subsidiarity.
- Length of comparable time series without methodological break is longer than four data points.

Rationale uncertainty

No uncertainty has been specified.

Data sources and providers

- [Organic crop area by agricultural production methods and crops \(ORG_CROPAR\)](#), Statistical Office of the European Union (EUROSTAT)

▼ Metadata

DPSIR

Pressure

Topics

[# Agriculture and food](#) [# Land use](#)

Tags

[# Utilised agricultural area](#) [# AGRI001](#) [# Organic farming](#) [# 8th EAP](#)

Temporal coverage

2012-2023

Geographic coverage

Albania	Austria
Belgium	Bulgaria
Croatia	Cyprus
Czechia	Denmark
Estonia	Finland
France	Germany
Greece	Hungary
Ireland	Italy
Latvia	Lithuania
Luxembourg	Malta
Montenegro	Netherlands
North Macedonia	Norway
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	Switzerland
Türkiye	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG15: Life on land

Unit of measure

Percentage of total utilised agricultural area (UAA)

Frequency of dissemination

▼ References and footnotes

1. Some Member States set organic farming area targets for 2027 some others for 2030. The targets are set only for areas receiving CAP support for organic farming. Areas farmed organically without receiving CAP support are not included. In 2022, 82.4% of organically farmed land received specific organic CAP payment.
[↩](#)
2. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM(2022) 357 final.
[a](#) [b](#)
3. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22–36.
[a](#) [b](#)
4. EC, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A farm to fork strategy for a fair, healthy and environmentally-friendly food system, COM(2020) 381 final.
[↩](#)
5. EC, 2021, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS ON AN ACTION PLAN FOR THE DEVELOPMENT OF ORGANIC PRODUCTION
[a](#) [b](#)
6. EU, 2018, Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007, OJ L 150, 14.6.2018, p. 1-92., 848
[a](#) [b](#)
7. EU, 2007, Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, OJ L 189, 20.7.2007, p. 1-23.
[↩](#)
8. EC, 2021, Stakeholder consultation – synopsis report accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an action plan for the development of organic production, SWD(2021) 65 final.
[↩](#)



8th Environment Action Programme

Share of environmental taxes in total tax revenues

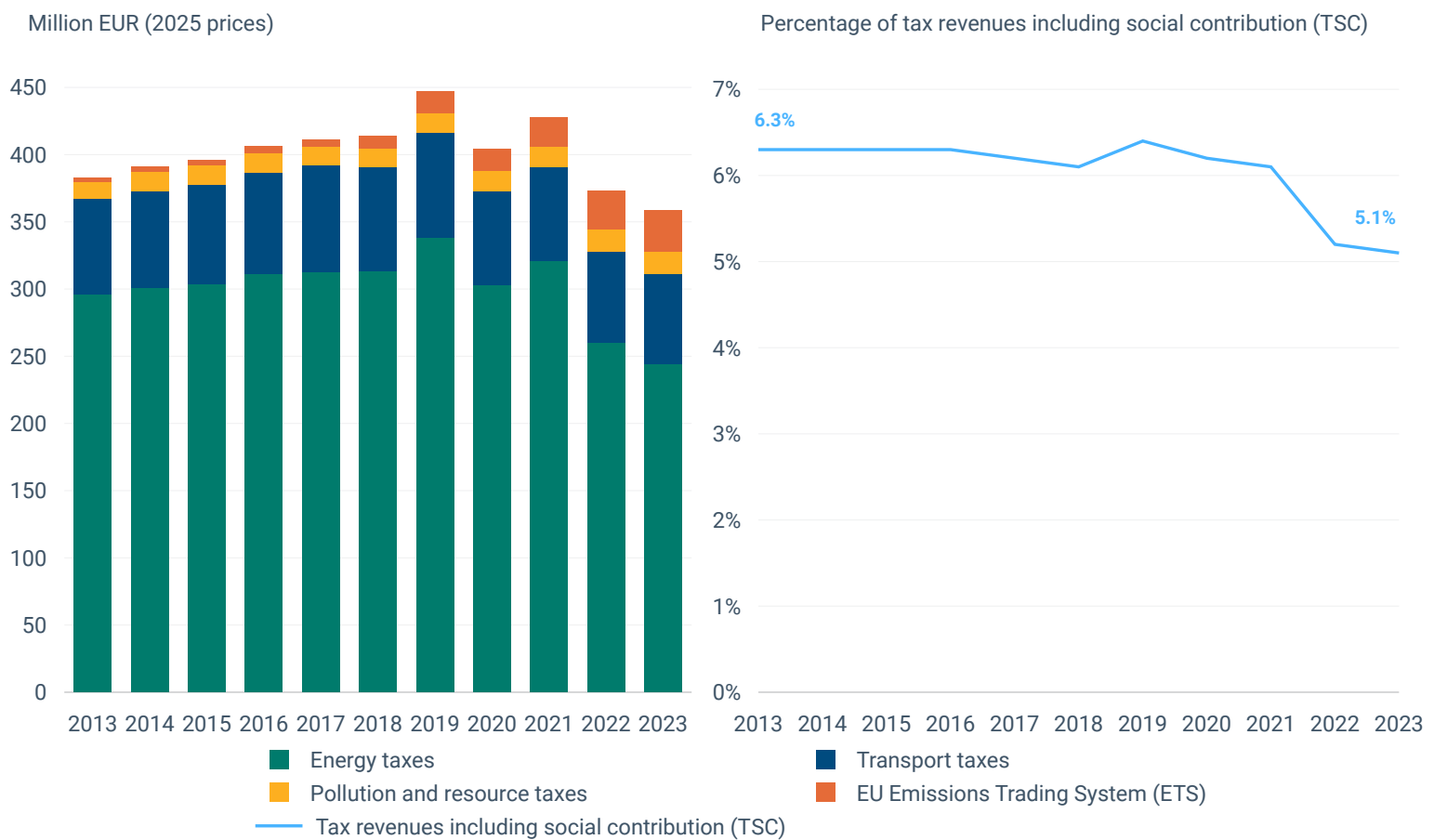


Share of environmental taxes in total tax revenues in Europe

Published 03 Oct 2025

Despite the essential role of environmental taxation for the transition to a greener economy, the share of environmental taxes in total revenues from taxes and social contributions in the European Union decreased. This share has fallen from 6.3% in 2010 to 5.1% in 2023, the lowest level since 2010, setting the indicator outlook towards 2030 to be likely off track. The reasons for a decline vary, including: a shrinking tax base linked to electrification, structural changes in the economy, absence of tax indexations, and resistance to environmental taxes.

Figure 1. Environmental tax revenues in the EU-27: in absolute numbers and as a share of total tax revenues including social contribution (TSC), 2010-2023



Environmental taxes encourage producers and consumers to pollute less and use resources more sustainably. Making **polluters pay** is at the core of EU environmental policy ^[1]. Both the **8th Environment Action Programme** and the **European Green Deal** acknowledge that environmental taxation is crucial for driving the transition to a greener, more sustainable economy.

Many EU Member States reduced excise taxes on petrol and diesel to alleviate the abnormal energy prices caused by the war in Ukraine. Therefore, 2022 was an exceptional year with unprecedented state interventions.

Energy and transport taxes combined accounted for 95% of total **environmental tax revenue** in 2023. Energy taxes, including carbon pricing revenues from the [EU Emissions Trading System \(EU ETS\)^{\[2\]}](#), accounted for 76% of total environmental tax revenue, transport taxes for 19%, and pollution and resource tax revenues for 5%.

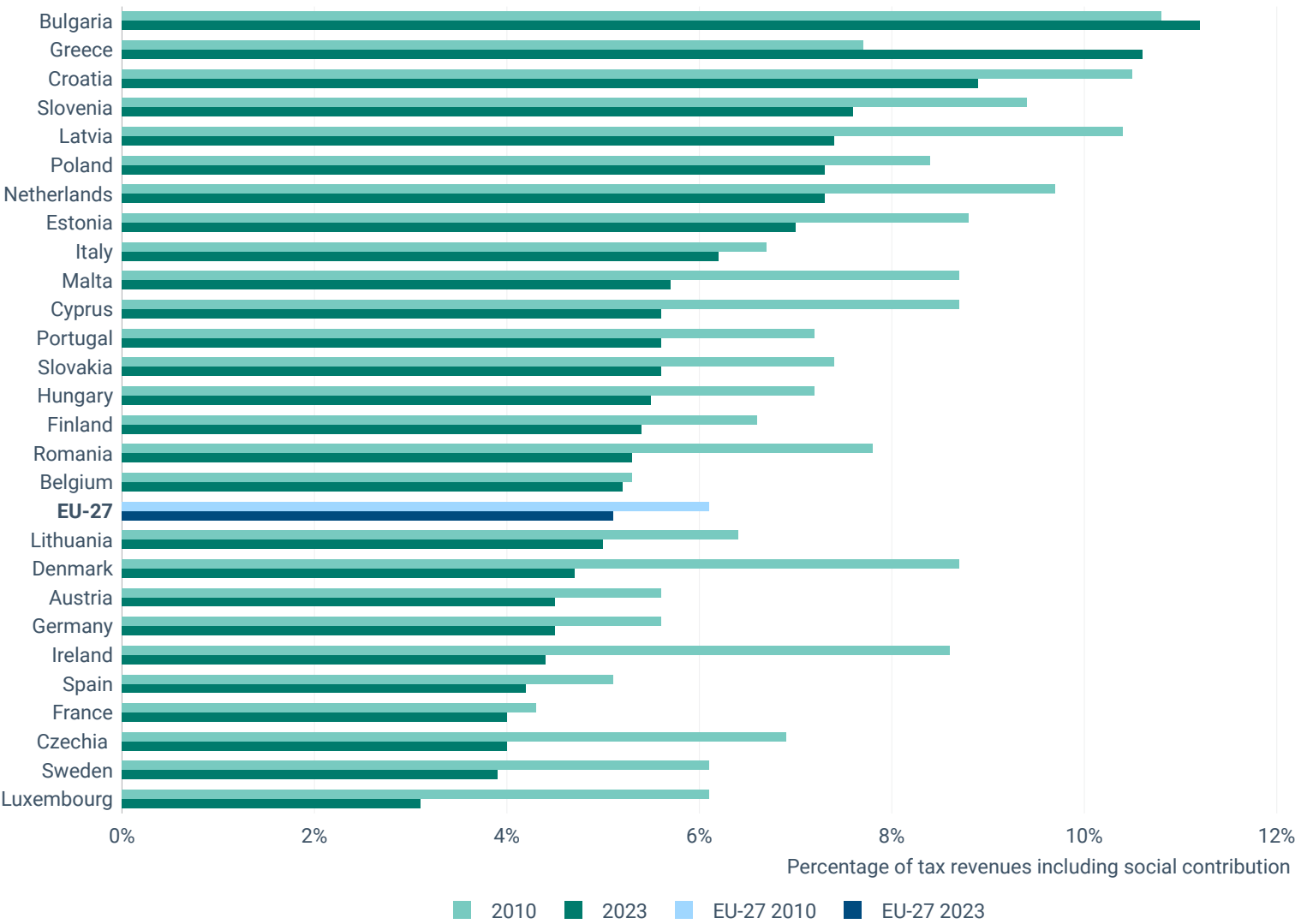
Environmental tax revenues in Europe have **fallen** as the shift to renewables, electrification, energy efficiency gains and structural change have reduced the tax base. In some countries, decades without indexation and temporary energy price relief since 2021 [have added to the decline](#).

The proposed revision of the [Energy Taxation Directive](#) aims to promote electrification, remove fossil fuel subsidies and align taxes with **decarbonisation goals**. The [Clean Industrial Deal](#) stresses that tax policies are vital for competitiveness, resilience and sustainability. Revenues from carbon pricing are expected to increase from 2027 with the start of the [new Emissions Trading System \(ETS2\)](#), but it is uncertain whether this is sufficient to reverse the persistent decline in environmental taxes.

This suggests that the EU could **increase environmental taxes** as a share of total tax revenue by 2030, however this is increasingly uncertain. Environmental taxes as a share of total taxes have persistently declined and fell sharply in 2022 and 2023. It is unclear if and to what extent environmental taxes will rebound, or whether the expected revenue from the EU ETS will be sufficient to offset this drop in future.

The social impact has been exacerbated in recent years as prices have risen sharply due to inflation. In response to these distributional impacts, EU instruments such as the [Social Climate Fund](#) have been established to support vulnerable households and mitigate the social costs of the green transition. Revenues also tend to decline over time as environmental taxes successfully deter spending on unsustainable goods. In the long term, revenue from the EU ETS is also expected to reach a peak and then decline as more stringent GHG emission **reduction requirements** are introduced and drive down emissions. Progress in the EU's transition to a climate neutral and green economy, while positive, will also erode the environmental tax base.

Figure 2. Revenue from environmental taxes as a share (%) of total tax revenue, including social security contributions, by EU Member State, 2010 and 2023



Trends in the share of **total tax revenue** accounted for by environmental taxes vary across the EU 27 Member States. Between 2010 and 2023, this share increased in only two Member States (Bulgaria and Greece). The largest increase, from 7.7% to 10.6%, occurred in Greece. The share declined in the remaining 25 Member States with the largest fall between 2010 and 2023 in Ireland (from 8.6% to 4.4%) followed by the Netherlands (from 9.7% to 7.3%). The lowest share was reported for Luxembourg at 3.1% in 2023.

Supporting information

Definition

‘An environmental tax is a tax whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment, and which is defined in the ESA [European System of Accounts] as a tax’ [3]. This indicator measures environmental tax revenue as a share of total tax revenue, including social contributions, and is calculated by dividing environmental tax revenue by total tax revenue including social contributions.

The EU ETS is not a tax, but a market-based environmental measure designed with the prime objective to reduce carbon emissions and provide a financial incentive to polluters to reduce emissions. The carbon price is not fixed by a government, but determined by the market based on demand and supply fundamentals.

Methodology

This indicator is based directly on data published by Eurostat, and the underpinning methodology can be found in Eurostat [3].

Values are expressed in 2025 prices, estimated by the EEA using the Eurostat GDP pricing index up to 2024 (nama_10_gdp) and the 2% ECB inflation estimate for 2025.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting the objectives of the Eighth Environment Action Programme (8th EAP). It contributes mainly to monitoring progress in relation to aspects of Article 3(v), which requires ‘making the best use of environmental taxation, market-based instruments and green budgeting and financing tools, including those required to ensure a socially fair transition’ [4]. The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the ‘increase in the share of environmental taxes in total revenues from taxes and social contributions’ [4].

Data sources and providers

- Environmental taxes by economic activity (NACE Rev. 2), Eurostat - European statistics
- Gross domestic product (GDP) and main components (output, expenditure and income), Eurostat - European statistics
- Environmental tax revenues [env_ac_tax], EUROSTAT -Statistical Office of the European Union
- Environmental tax statistics, EUROSTAT - Statistical Office of the European Union

Metadata

DPSIR

Response

Topics

Sustainable finance

Tags

environmental tax # SUFI001 # green economy # budget revenue # public budget # 8th EAP # Tax
total tax # Sustainable finance

Temporal coverage

2010
2013-2023

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland

Italy
Lithuania
Malta
Poland
Romania
Slovenia
Sweden

Latvia
Luxembourg
Netherlands
Portugal
Slovakia
Spain

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

Environmental tax revenue as a percentage of total tax revenue including social contributions, and the absolute amount of environmental tax revenue, in million euros, in 2010 prices.

Frequency of dissemination

Once a year

▼ References and footnotes

1. https://environment.ec.europa.eu/economy-and-finance/ensuring-polluters-pay_en
^a
2. The EU ETS is not a tax, but a market-based environmental measure designed with the prime objective to reduce carbon emissions and provide a financial incentive to polluters to reduce emissions. The carbon price is not fixed by a government, but determined by the market based on demand and supply fundamentals. Revenue raising is hence not the primary objective of the ETS. However, in Eurostat's statistics on environmental taxation, government revenues from the auctioning of emissions permits, such as those from the EU ETS, are classified as tax receipts in the national accounts. This is why this indicator accounts for them as tax revenues.
^a
3. Eurostat, 2023, 'Environmental tax statistics — detailed analysis', *Eurostat Statistic Explained* (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_tax_statistics_-_detailed_analysis) accessed January 16, 2023.
^{a b}
4. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
^{a b}



8th Environment Action Programme

Fossil fuel subsidies



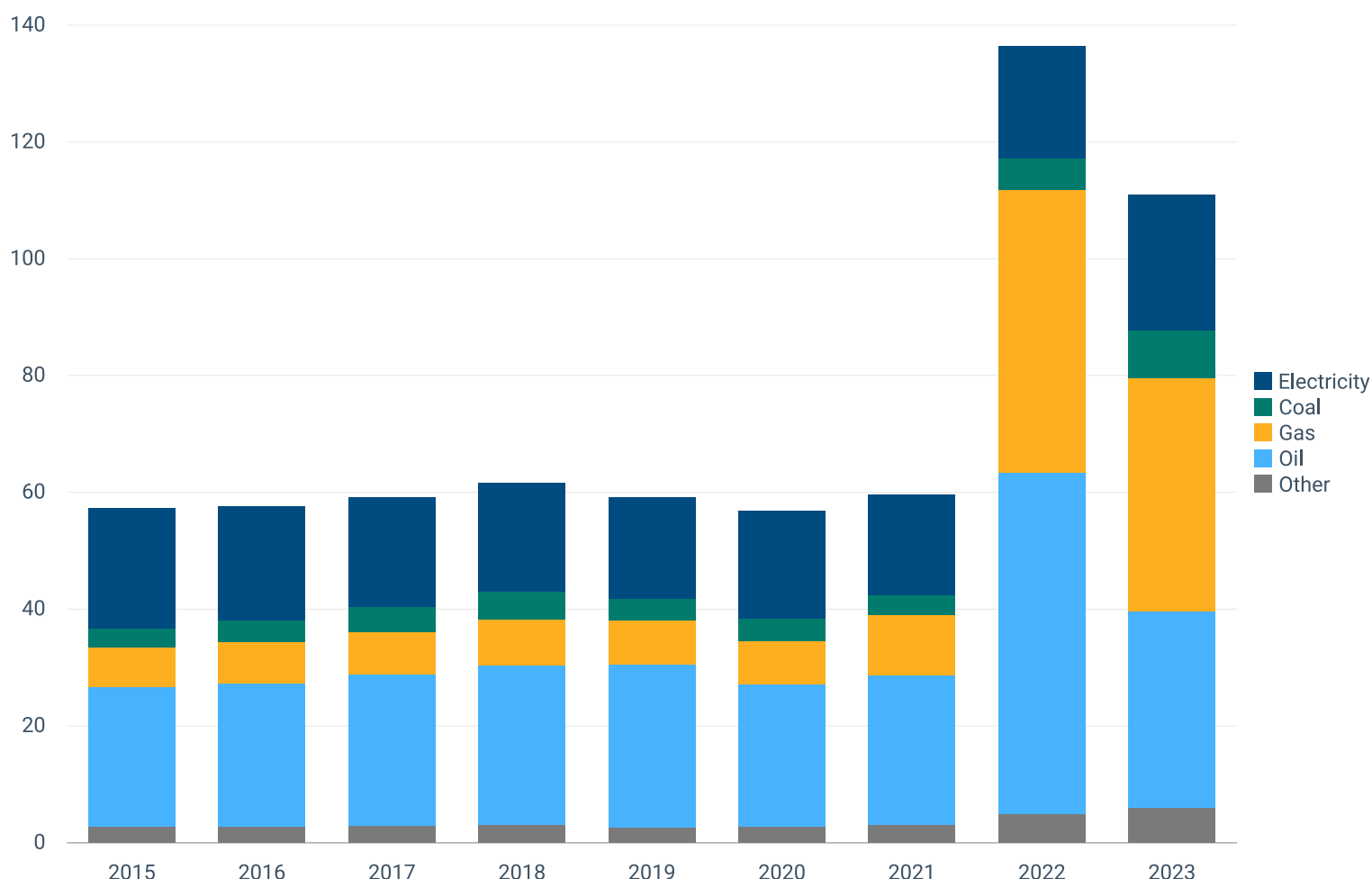
Fossil fuel subsidies in Europe

Published 29 Jan 2025

The 8th Environment Action Programme calls for fossil fuel subsidies to be phased out without delay. Subsidies were stable from 2015-2021, yet more than doubled in 2022 due to high energy prices post-COVID and Russia's invasion of Ukraine, subsequently falling to EUR 111 billion in 2023. While a significant part of fossil fuel subsidies are due to be phased out by 2030, these are largely crisis measures. The EU is likely not on track to make notable progress by 2030, as most Member States lack concrete plans to phase out the significant fossil fuel subsidies that remain.

Figure 1. Fossil fuel subsidies by energy vector in EU Member States, 2015 and 2023 (in 2023 prices)

Billion EUR (2023 prices)



Fossil fuels are non-renewable sources of energy, and their production and use contribute significantly to climate change and pollution. In line with international commitments – such as the G20 Pittsburgh Summit ^[1] and COP26 Glasgow Climate Pact ^[2] – and the **European Green Deal**, the EU's **8th Environment Action Programme (8th EAP)** calls for a **phase out** without delay of subsidies for fossil fuels (such as coal, gas and oil). Progress towards this is monitored as part of the European Commission's commitments under the Governance Regulation ^[3] ^[4].

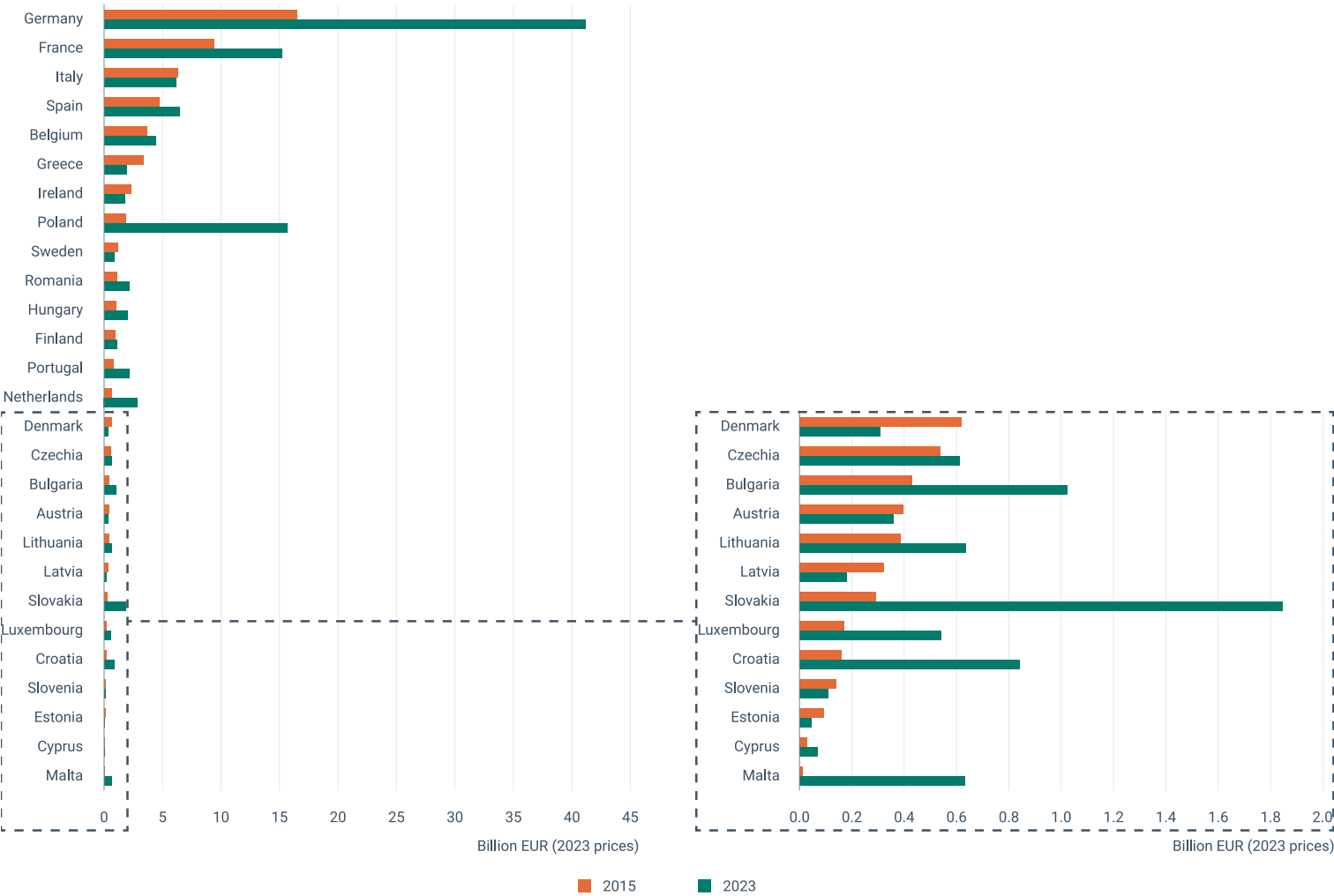
Fossil fuel subsidies remained **stable**, at between EUR 57-62 billion (2023 prices), from 2015 to 2021. A growth of EUR 4 billion occurred during 2015-2018, caused by increases in transport and industry sector subsidies. Followed by a decrease of EUR 5 billion from 2018-2021, mostly due to reductions in the energy sector and subsidies for coal and lignite.

The sudden **significant growth** in 2022 fossil fuel subsidies can be attributed to the energy price crisis, intensified by Russia's invasion of Ukraine. EU Member States implemented at least 270 national measures to protect households and industries (forthcoming EC report on energy subsidies). The strong support continued in 2023, although at a lower level (EUR 111bn), as many crisis measures were prolonged despite the large decrease of fossil energy prices (forthcoming EC report).

Member States must include information in their biennial national energy and climate **progress reports** on phasing out energy subsidies, particularly fossil fuels. According to these reports, many countries have ambitions to move away from fossil fuel use, which would naturally phase out fossil fuel subsidies. However, only Denmark has translated this ambition into law. Other Member States have plans to phase out fossil fuel use in the power sector and for heating in buildings (forthcoming EC report).

The recent steep rise in fossil fuel subsidies is likely an **outlier**. In 2023, 43% (EUR 47.7bn) of total fossil fuel subsidies have a planned end-date before 2025, while a further 9% (EUR 10.1bn) have an end-date by 2030. There is no end-date provided for 48% (EUR 53.1bn) of fossil fuel subsidies (forthcoming EC report).

Figure 2. Fossil fuel subsidies in EU Member States, 2015 and 2023 (in 2023 prices)



Assessing the progress towards phasing out fossil fuel subsidies is difficult in the current political and economic environment. EU Member States responses varied, with most providing generous financial support through fossil fuel subsidies. Fossil fuel subsidies **declined** in 20 EU Member States from 2022 to 2023, yet remained above levels seen in 2021 for most cases. The trend between 2015 and 2023 shows nine EU Member States made progress in phasing out fossil fuel subsidies, with a decrease in real terms over this period.

Notably, more than 60% of all fossil fuel subsidies granted in 2023 were spent in three countries: Germany (EUR 41 billion), Poland (EUR 16 billion), and France (EUR 15 billion).

The extent to which fossil fuel subsidies contribute to national economies also varies considerably across Member States. In 2023, fossil fuel subsidies represented the highest shares of gross domestic product (GDP) in Malta, Poland, and Slovakia (all at or above 1.5%). Countries with the lowest shares were Austria, Denmark, and Estonia (less than 0.2% of GDP).

Additional figure: Fossil fuel subsidies as a share of national GDP, 2023.

▼ Supporting information

Definition

This indicator is based on the concept developed by the World Trade Organization (WTO) through the Agreement on Subsidies and Countervailing Measures (ASCM), which classifies subsidies and government interventions into four main categories:

- 1 direct transfers: direct expenditures by governments to recipients, which could be either consumers or producers;
- 2 tax expenditures: the amounts of tax benefits, or preferences, received by taxpayers and forgone by governments;
- 3 income or price support mechanisms: various types of economic mechanisms, most of which can be considered cross-subsidies, i.e. involve transferring amounts of money from groups of people/technology/territory to another specific group;
- 4 RD&D budgets: various types of provisions for financial and/or other preferential mechanisms to support innovation.

For more information on the concept and definition of energy subsidies, see Annex 5 to EC.^[5]

Methodology

A recurring obstacle preventing the pledge to phase out fossil fuel subsidies from being realised is the lack of a shared definition internationally^[6]. This repeatedly stressed barrier is addressed by the Commission under the Regulation on the Governance of the Energy Union and Climate Action^[7] through the adoption of 'implementing acts... , including a methodology for the reporting on the phasing out of energy subsidies, in particular for fossil fuels'^[8]. As the European Commission published Implementing Regulation (EU) 2022/2299^[9] in November 2022, the basis of the current assessment for this indicator is the data-gathering exercise performed by external consultants for the European Commission and published in the Commission report on energy subsidies in the EU^[10] accompanying the 2023 State of the Energy Union report. The methodology behind the data collection and validation process is discussed in detail in Annex 5.1 to EC^[5].

The data were deflated to 2022 prices as published in EC^{[10][5]}.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting the objectives of the 8th EAP. It contributes mainly to monitoring progress in relation to aspects of Article 3(h), which requires, inter alia, 'phasing out environmentally harmful subsidies, in particular fossil fuel subsidies, at Union, national, regional and local level, without delay... by... (ii) setting a deadline for the phasing out of fossil fuel subsidies consistent with the ambition of limiting global warming to 1,5°C'^[11]. The

European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the reduction in ‘environmentally harmful subsidies, in particular fossil fuel subsidies, with a view to phasing them out without delay’ ^[12].

Accuracy and uncertainties

Data sources and providers

- Energy subsidies (Forthcoming DG ENER study on energy subsidies in the European Union) (direct link to the datasets is not available), DG ENER, European Commission

▼ Metadata

DPSIR

Response

Topics

Sustainable finance

Tags

SUFI002 # 8th EAP # subsidies # Fossil fuel

Temporal coverage

2015-2023

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

Absolute subsidy amounts are measured in billion euros (EUR) and the contributions of fossil fuel subsidies to GDPs are given as percentages (%).

Frequency of dissemination

Once a year

▼ References and footnotes

1. OECD, 2009, *Leaders' statement: the Pittsburgh Summit – September 24-25 2009*, Organisation for Economic Co-operation and Development.
[↩](#)
2. UK Government, 2022, *COP26: the Glasgow Climate Pact*, United Nations Climate Change Conference UK 2022.
[↩](#)
3. EC, 2023, Report from the Commission to the European Parliament and the Council '2023 report on energy subsidies in the EU' (COM(2023) 651 final of 24 October 2023).
[↩](#)
4. EC, 2023, Study on energy subsidies and other government interventions in the European Union – 2023 edition, Final Report, Directorate-General for Energy (<https://op.europa.eu/en/publication-detail/-/publication/32d284d1-747f-11ee-99ba-01aa75ed71a1/language-en>) doi: 10.2833/571674
[↩](#)
5. EC, 2022, *Study on energy subsidies and other government interventions in the European Union – 2022 edition*, Final Report, Directorate-General for Energy.
[a](#) [b](#) [c](#)

6. OECD and IEA, 2021, *Update on recent progress in reform of inefficient fossil-fuel subsidies that encourage wasteful consumption 2021*, Contribution by the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA) to G20 Environment, Climate and Energy Ministers, in consultation with the Organization of Petroleum Exporting Countries (OPEC), Climate and Energy Joint Ministerial Meeting, Naples, 23 July 2021.
[↩](#)
7. EU, 2018, Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, OJ L 328, 21.12.2018, p. 1-77.
[↩](#)
8. EU, 2021, Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1-17.
[↩](#)
9. EU, 2022, Commission Implementing Regulation (EU) 2022/2299 of 15 November 2022 laying down rules for the application of Regulation (EU) 2018/1999 of the European Parliament and of the Council as regards the structure, format, technical details and process for the integrated national energy and climate progress reports, OJ L 306, 25.11.2022. p. 1-98.
[↩](#)
10. EC, 2022, Report from the Commission to the European Parliament and the Council '2022 report on energy subsidies in the EU', COM(2022) 642 final of 15 November 2022.
[a](#) [b](#)
11. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22-36.
[↩](#)
12. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
[↩](#)



8th Environment Action Programme

Environmental protection expenditure

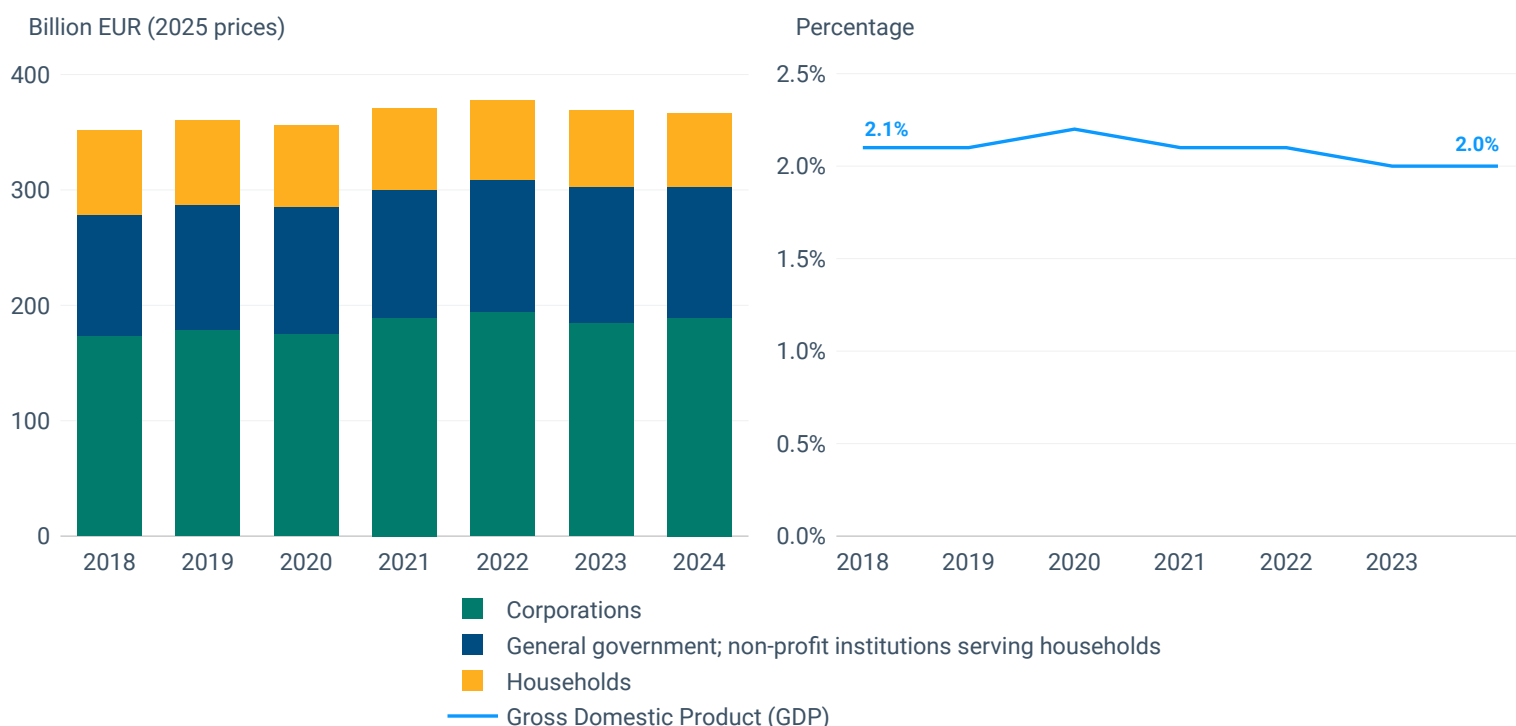


Environmental protection expenditure

Published 02 Oct 2025

Increasing environment- and climate-related expenditure can help meet the objectives of the European Green Deal. Environmental Protection Expenditure Accounts (EPEA) measure the economic resources used for prevention, reduction, and elimination of pollution and any other degradation of the environment. Expenditure increased between 2018 and 2024 from 352 billion to 367 billion euros in the European Union. This represents a modest real term increase of 4.2% after inflation adjustments. EPE as a share of GDP declined to 2.0% in 2024, the lowest level recorded during the assessed period.

Figure 1. Environmental protection expenditure by institutional sector in the period 2018-2024, EU-27



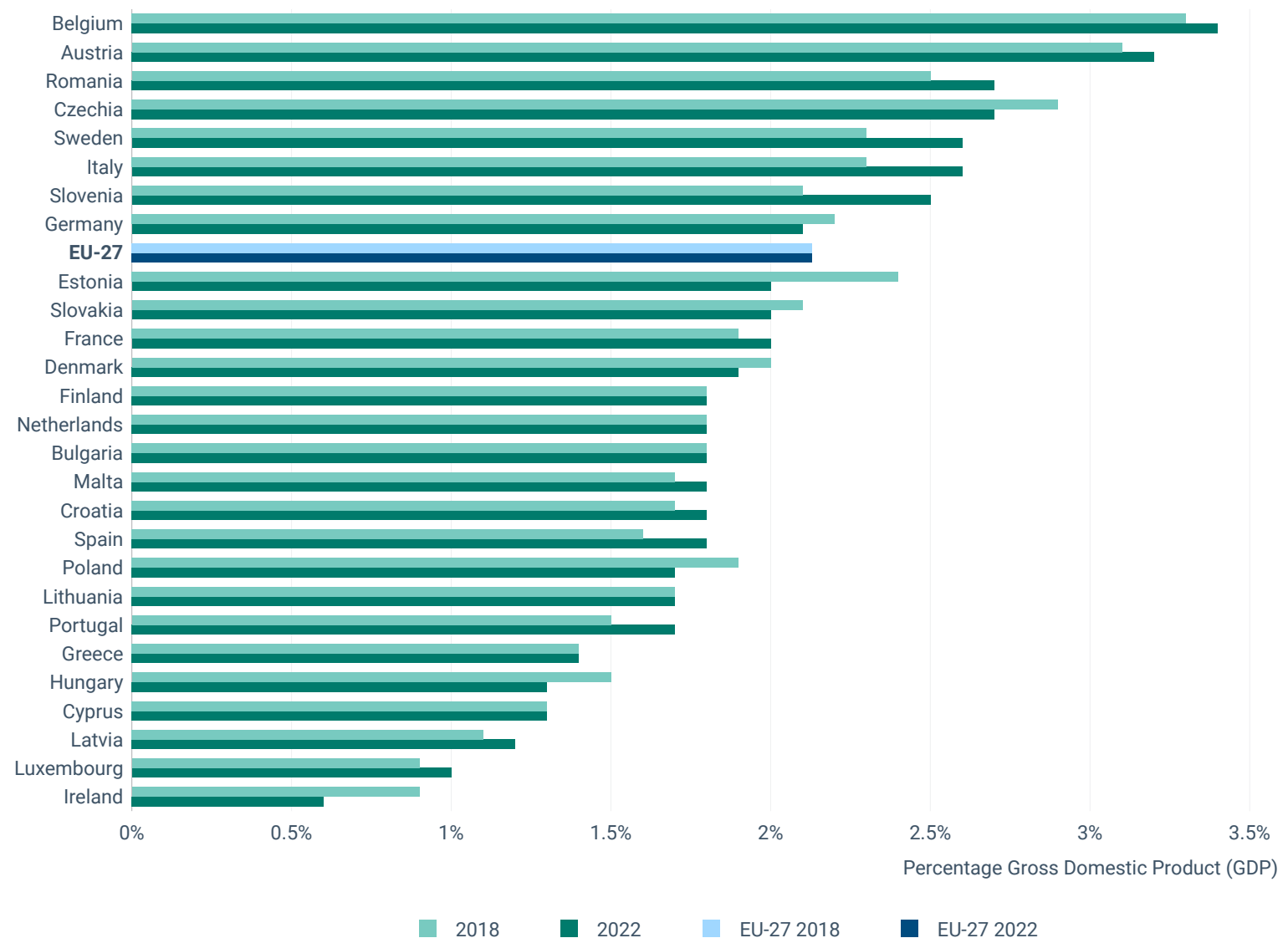
Building on the European Green Deal policy objectives^[1], the [8th Environment Action Programme](#) (8th EAP) aims to accelerate the **green transition**^[2]. Increasing environmental protection expenditure (EPE) in EU Member States and green expenditure directly related to environmental protection can help achieve this. For example, expenditure on renewables, energy and resource efficiency, and the circular economy transition.

EPE covers the **protection** of ambient air, soil and water; wastewater and waste management; noise abatement; biodiversity protection; protection against radiation; and environmental research and development (R&D). EPE only partly captures expenditure related to climate^{[3][4]} and circular economy^{[5][6]}, and includes both operating expenditure and investments. In real terms, growing by 4.2% during 2018-2024 and reaching an estimated EUR 367 billion in 2025 prices by 2024.

Most EPE is spent by corporations and **increased** in real terms by 8.4% from 2018 to 2024. Over the same period, the EPE of general governments and non-profit institutions increased by 8.6%. EPE by households decreased by 12%. Most EPE was spent on waste management and wastewater treatment activities during this period^[7]. Since 2018, the share of overall EPE in gross domestic product (GDP) has remained relatively stable, at around 2%, yet declined from 2.1% (2022) to 2.0% (2023 and 2024), the lowest level recorded during the assessed period.

To achieve EU's objectives on environmental protection by 2030^[8], the additional investment needed for the period 2021-2030 is estimated at EUR 77 billion per year. The slow progress in increasing EPE implies that the EU is likely off track to address this funding gap by 2030.

Figure 2. Expenditure on environmental protection by EU Member State, 2018 and 2023, (% of GDP)



EPE remained stable at 2.1% of GDP between 2018 and 2022 at the EU level. EPE to GDP ratios varied across the Member States. In Austria, Belgium and Czechia, EPE accounted for more than 3% of GDP, while in Ireland and Luxembourg it accounted for less than 1%.

In 14 of the 27 EU Member States, this share increased during the period 2018-2022, with the biggest increase in Slovenia (0.4 percentage point). In contrast, the share **fell** in eight EU Member States, with the biggest reduction in Estonia (0.4 percentage point) and remained constant in the other five EU Member States.

▼ Supporting information

Definition

‘Environmental Protection Expenditure Accounts (EPEA) measure the economic resources devoted to prevention, reduction, and elimination of pollution and any other degradation of the environment. They cover the spending by resident units of a country (i.e. by its households, corporations and government) on environmental protection (EP) services, e.g. pollution abatement (air, water, soil and noise), waste and wastewater management, protection of biodiversity as well as related research and development, education and training activities’ ^[7].

The scope of EPEA is defined according to the Classification of Environmental Protection Activities and Expenditure (CEPA 2000). CEPA 2000 is a recognised international standard included in the family of international economic and social classifications.

For further information, see [Eurostat \(2017\)](#).

Methodology

This indicator is directly based on data published by Eurostat and the underpinning methodology can be found in Eurostat ^{[9][7]}. EU-level data are based on Eurostat estimates.

The EUR values were indexed to 2025 price levels using the price component of Eurostat's GDP aggregate (indicator_nama_10_gdp) up to 2024 and the 2% general inflation rate projected by the European Central Bank for 2025.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting one of the targets of the 8th EAP. It contributes mainly to monitoring progress in relation to aspects of the 8th EAP's aim to accelerate the green transition (Article 1) and Article 3(u), which requires ‘mobilising resources and ensuring sufficient sustainable investments from public and private sources... consistent with the Union's sustainable finance policy agenda’ ^[2]. The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the ‘increase [in] spending by households, corporations and governments on preventing, reducing and eliminating pollution and other environmental degradation’ ^[10].

Data sources and providers

- [National expenditure on environmental protection by institutional sector](#), Eurostat - European statistics
- [Gross domestic product \(GDP\) and main components \(output, expenditure and income\)](#), Eurostat - European statistics

▼ Metadata

DPSIR

Response

Topics

[# Sustainable finance](#)

Tags

[# GDP](#) [# SUFI003](#) [# climate](#) [# 8th EAP](#) [# Environmental protection expenditure](#) [# environment](#) [# expenditure](#)

Temporal coverage

2018-2024

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

EPE is measured in billion euros (EUR in 2010 prices) and as a share of GDP (%)

Frequency of dissemination

Once a year

References and footnotes

1. EC, 2019, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'The European Green Deal', COM (2019) 640 final of 11 December 2019.
[↩](#)
2. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36.
[a](#) [b](#)

3. It does not capture expenditure on the production of renewable energies, energy efficiency in general or climate adaptation. However, it now includes expenditure on clean transport (vehicles and charging systems) as directly contributing to reducing air pollution. See CEPA and EPEA explanatory notes (Eurostat, 2020).
[↗](#)
4. <https://ec.europa.eu/eurostat/documents/1798247/12177560/CEPA+and+CRReMA+explanatory+notes+-+technical+note.pdf/b3517fb9-1cb3-7cd9-85bd-4e3a3807e28a?t=1609863934103>
[↗](#)
5. Information on circular economy private investments in Member States is available in a data set published by Eurostat, under the circular economy indicators on competitiveness and innovation (see data set 'Private investment and gross value added related to circular economy sectors')
[↗](#)
6. https://ec.europa.eu/eurostat/web/products-datasets/-/cei_cie010
[↗](#)
7. Environmental protection expenditure accounts, 2023b, (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_protection_expenditure_accounts) accessed August 28, 2023.
[a](#) [b](#) [c](#)
8. EC, 2020, Commission staff working document 'Identifying Europe's recovery needs' accompanying the document Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'Europe's moment: repair and prepare for the next generation', SWD(2020) 98 final of 27 May 2020.
[↗](#)
9. Eurostat, 2023, 'National expenditure on environmental protection by institutional sector', *Eurostat Data Browser* (https://ec.europa.eu/eurostat/databrowser/view/env_ac_epneis/default/table?lang=en) accessed March 24, 2023.
[↗](#)
10. EC, 2022, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'REPowerEU plan', COM (2022) 230 final of 18 May 2022
[↗](#)



8th Environment Action Programme

Green bonds



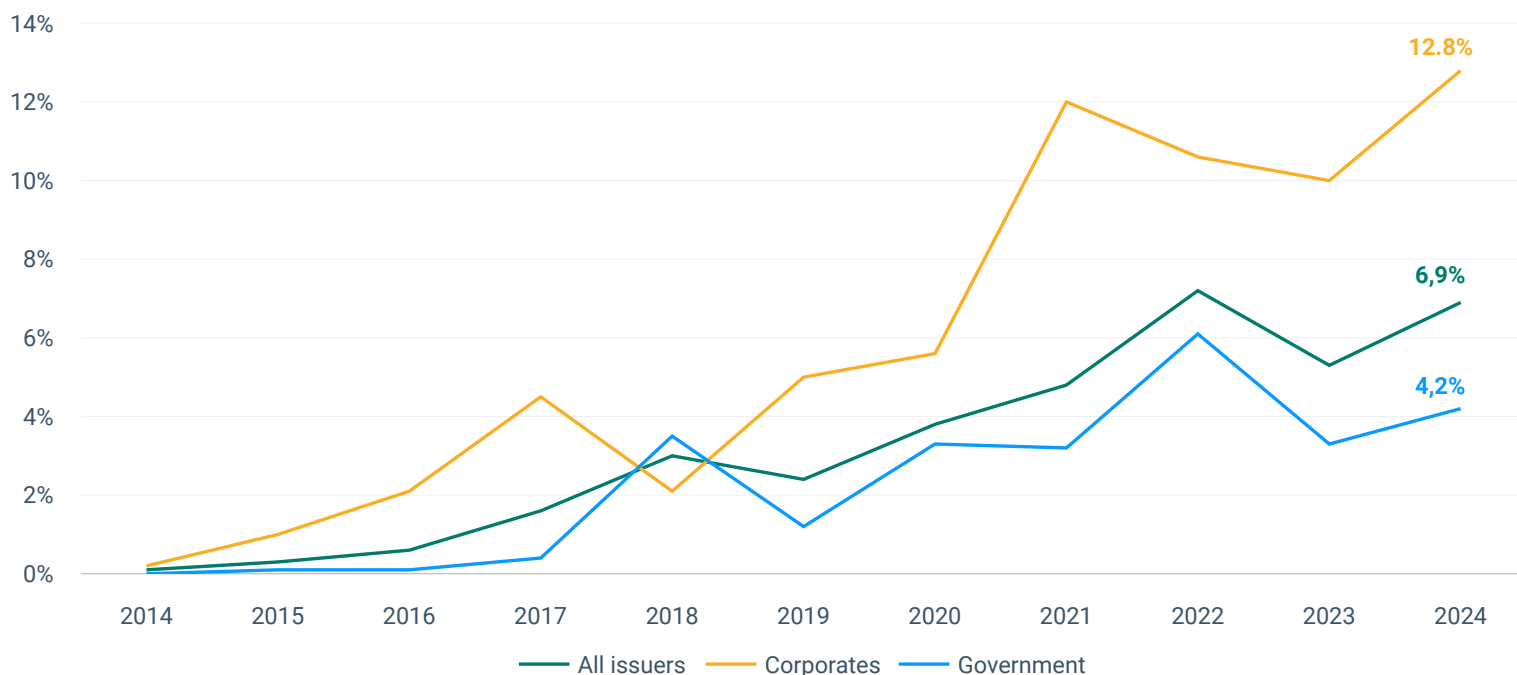
Green bonds in Europe

Published 01 Jul 2025

Green bonds are used to finance activities that support climate and environmental objectives. Green bonds reached 6.9% of all bonds issued by corporations and governments across the European Union in 2024, an improvement from the 5.3% noted in 2023. This trend reflects a higher demand for financial products that support sustainability objectives. The issuance of green bonds is likely to increase, given the ambitious decarbonisation goals of the Competitiveness Compass and the European Green Deal.

Figure 1. Green bonds as a percentage of total bonds issued by corporations, by governments, and by both corporations and governments in the EU-27, 2014-2024.

Green bond issuance as a share of total bond issuance



The [European Green Deal](#) emphasises the need to direct capital flows to **green investments**. One way to achieve this is by issuing green bonds, which, supported by the EU [Sustainable Finance Framework](#), raise finance for projects that help achieve environmental and climate objectives. Additionally, the [Competitiveness Compass](#) emphasises the need to better mobilise investments for a more competitive, innovative and decarbonised Europe.

Green bond **issuance** increased significantly in the EU between 2014 and 2024, from 0.1% to 6.9% of total bonds issued. This indicates an increasing demand to finance sustainable investments, driven in part by the European Green Deal and the need to fund the transition to a low-carbon, green economy.

Green bonds can be issued by various types of entities under multiple standards, each following different levels of ambition. The rates at which these entities have increased green bond issuance vary. In recent years, green bond issuance by **corporations** increased rapidly, from 5.6% of total corporate bonds issued in 2020 to a new high of 12.8% in 2024. A

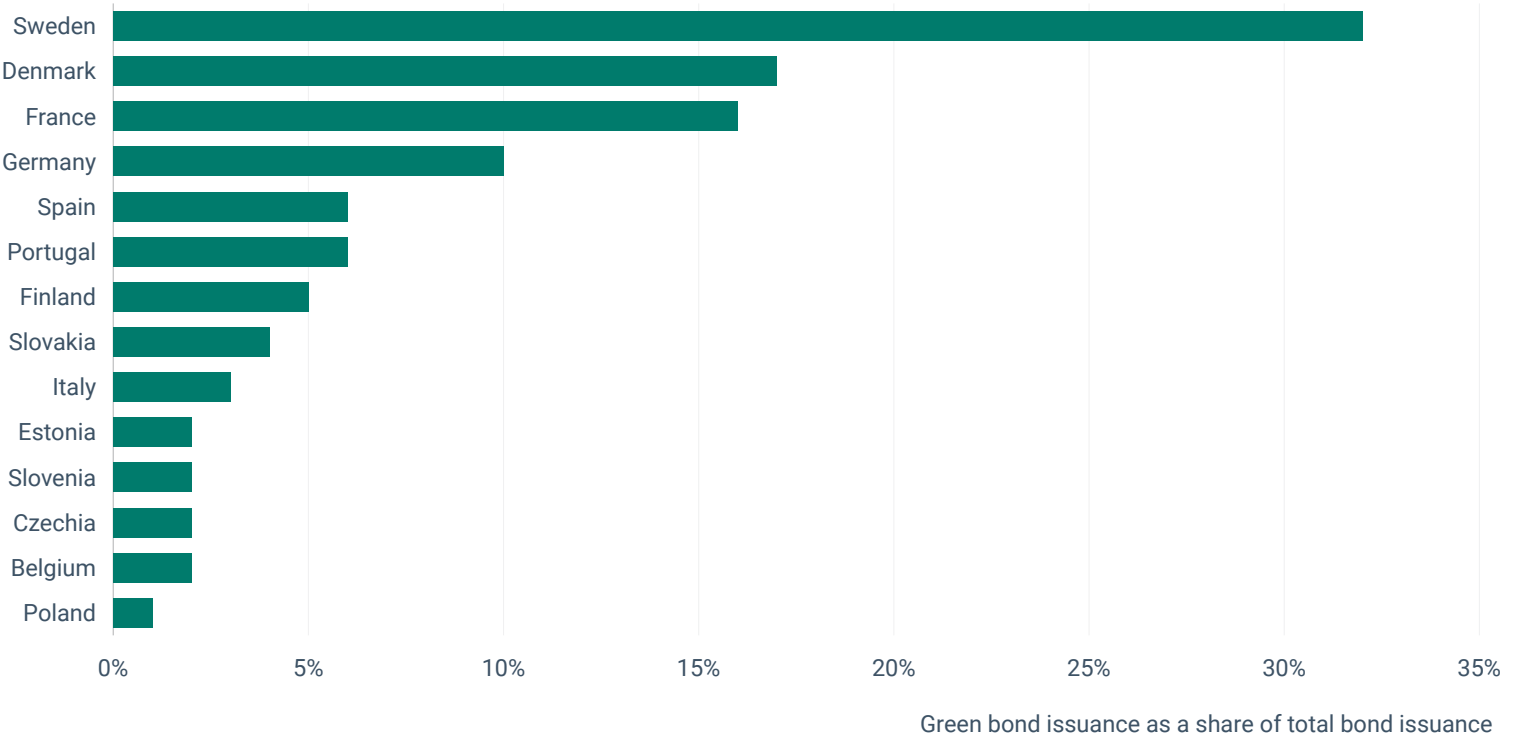
recovery from the recent fall to 10% in 2023.

The share of green bonds issued by **governments** (sovereign bonds) increased from 3.3% in 2020 to 4.2% in 2024, which is lower than the peak 6.1% noted in 2022. Corporations accounted for 58.8% of the total value of corporate and government green bonds issued in the EU during 2024, reaching €33.55 billion^[1].

Green bonds are increasingly used by companies to finance sustainable investments, indicating a broader **greening** of the EU economy. The **European green bond standard (EuGBs)**, entered into force in December 2023, strengthens this trend by enhancing transparency and ensuring that financed projects align with **EU Taxonomy**. The benign financial environment assisted the green bond **market recovery** after the **dip noted in 2023 by the LSEG**, which was driven by **tighter financing** conditions.

The **European Investment Bank** issued its first bond aligned with the EuGBs, raising €3 billion with strong market demand. This **Climate Awareness Bond**, the largest of its kind to date, will finance activities aligned with EU Taxonomy with a primary focus on climate change mitigation.

Figure 2. Shares of green bonds issued by corporations and by governments in 2024, by EU Member State



Green bond issuance as a share of total bond issuance varies across the EU Member States. In 2024, the share of green bonds was **highest** in Sweden, Denmark and France, where green bonds represented more than 16% of bonds issued. In contrast, thirteen Member States did not issue any green bonds in 2024.

The speed at which national green bond markets develop and mature depends on many variables, including policy and regulatory factors, market conditions and financing trends. Further growth in the issuance of green bonds across the EU faces a range of **challenges**, including **fragmented capital markets in Europe**, insufficient pipelines of standardised green projects ready for green bond funding, and a lack of domestic investors.

Differences in investment needs and a lack of commonly accepted green bond standards and definitions add to the challenges and lead to green bond markets of different scales across the EU. The **EuGBs** aims to overcome some of these barriers and boost the share of green bonds in domestic (i.e., national) markets, but its application remains voluntary.

▼ Supporting information

Definition

Bonds

According to the European Securities and Markets Authority (ESMA), a [bond](#) is defined as a form of debt security. Bonds are loans provided by an investor to a borrower that are widely used to fund activities. The borrower agrees to pay back the loan with interest at a specified future date. Bonds can be used to finance a wide range of projects, and the proceeds are not necessarily earmarked for any particular purpose. In practical terms, bonds are financial instruments issued by entities such as corporations or governments to raise capital. Investors purchase these bonds, effectively lending money to the issuer, who in return agrees to pay periodic interest and repay the principal amount at a specified maturity date. Within the European Union, bonds play a significant role in financial markets by providing companies and governments with access to funding, while offering investors opportunities for portfolio diversification and income generation.

Green bonds

Green bonds are types of bonds committed to financing or re-financing investments, projects, expenditure or assets helping to address climate and environmental issues. Both governments and companies use them to finance the transition to a more sustainable and low-carbon economy.

Green bond frameworks and standards

This indicator only includes those green bonds that are either aligned with the four core components of the **International Capital Market Association (ICMA)** green bond principles or are certified by the **Climate Bond Initiative (CBI)**, i.e. follow the climate bond standard or are CBI aligned (i.e. unlabelled (conventional) bonds issued by a climate-aligned issuer or self-labelled green bonds that do not need to be aligned with ICMA principles or certified by the CBI).

EU Green Bond Standard

[The EU Green Bond Standard establishes](#) a new and clear gold standard for green bonds. Eighty-five percent of the bond's proceeds must be aligned with the EU Taxonomy technical screening criteria. The standard will be accessible to all issuers, including non-EU issuers, on a voluntary basis.

Types of green bond issuers

Green bonds can be differentiated by the entity that issues them. For instance, corporate green bonds are issued by a corporate entity, such as a company or financial corporation. Sovereign green bonds are issued by a national government. Supranational green bonds are issued by an international body such as the EU, which started to issue green bonds in 2021 under the **NextGenerationEU Green Bonds programme**, or by international financial institutions (IFIs) such as the European Investment Bank, the lending arm of the EU. Data providers also differentiate green bonds issued by subnational entities such as municipalities or agencies from other types of green bond. Green bonds issued by agencies are usually securitised by a government-sponsored enterprise or a government department.

EU taxonomy for sustainable activities

The EU taxonomy for sustainable activities is a classification system that defines sustainable activities, e.g. activities for climate change mitigation and adaptation.

Methodology

This indicator is calculated based on data on the issuance of green bonds by companies, including financial institutions, and governments in the EU. The indicator shows green bond issuance as a percentage of all bonds issued and by type of green bond issuer. Data on corporate and government bonds were provided by Refinitiv. Green bond indicators such as this

may contain discrepancies, as they rely on data provided by various commercial data providers, which report on issuances at different dates and rely on different green bond standards or frameworks. Moreover, numbers from the same data provider can vary depending on the date of data download and the currency exchange rate used, impacting comparability.

The 2025 update of the indicator refines the calculation of green bonds as a share of the total EU bond market. The denominator now excludes short-term debt instruments, such as loan notes with maturities under one year, as these are not typically used to finance long-term sustainable projects. Similarly, the numerator excludes financial instruments that fall outside the scope of the **EU Green Bond Standard (EuGBs)**, including SUKUs and comparable structures.

It is important to note that the indicator does not provide information on the environmental impact, or the sustainability of the projects financed by green bonds. In addition, the indicator does not capture the varying ‘greenness’ levels of the projects financed by different bonds or the contribution of financed projects to achieving the **Paris Agreement** goals, which are increasingly important factors for investors and regulators. Finally, fixed-income instruments cover only parts of the financial system, and this green bond indicator therefore only partially reflects trends in financing green assets. Those trends might be different for different environmental objectives depending on the financial preferences and the ‘bankability’ of the projects and activities funded.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting targets of the Eighth Environment Action Programme (8th EAP). It contributes mainly to monitoring in relation to aspects of 8th EAP Article 3(u), which requires ‘mobilising resources and ensuring sufficient sustainable investments from public and private sources... consistent with the [Union’s sustainable finance policy agenda](#)’. The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the ‘increase [in] the issuance of green bonds to boost public and private financing for green investments’ ^[2].

Data sources and providers

- [LSEG Data & Analytics formerly Refinitiv \(copyright-protected and direct link to the dataset is not available\)](#), LSEG

▼ **Metadata**

DPSIR

Response

Topics

[# Sustainable finance](#)

Tags

[# green bond issuances](#) [# European Green Deal](#) [# SUFI004](#) [# sustainable finance](#) [# 8th EAP](#) [# green bonds](#)

Temporal coverage

2014-2024

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia

Finland
Germany
Hungary
Italy
Lithuania
Malta
Poland
Romania
Slovenia
Sweden

France
Greece
Ireland
Latvia
Luxembourg
Netherlands
Portugal
Slovakia
Spain

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

Green bond issuance is measured as a share (%) of total bond issuance.

Frequency of dissemination

Once a year

▼ References and footnotes

1. EEA calculations based on data provided by ESMA. Data for the European Economic Area is published in ESMA's 2024 report: TRV Risk Monitor ESMA Report on Trends, Risks and Vulnerabilities No. 1.
[↗](#)
2. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
[↗](#)



8th Environment Action Programme

Eco-innovation index

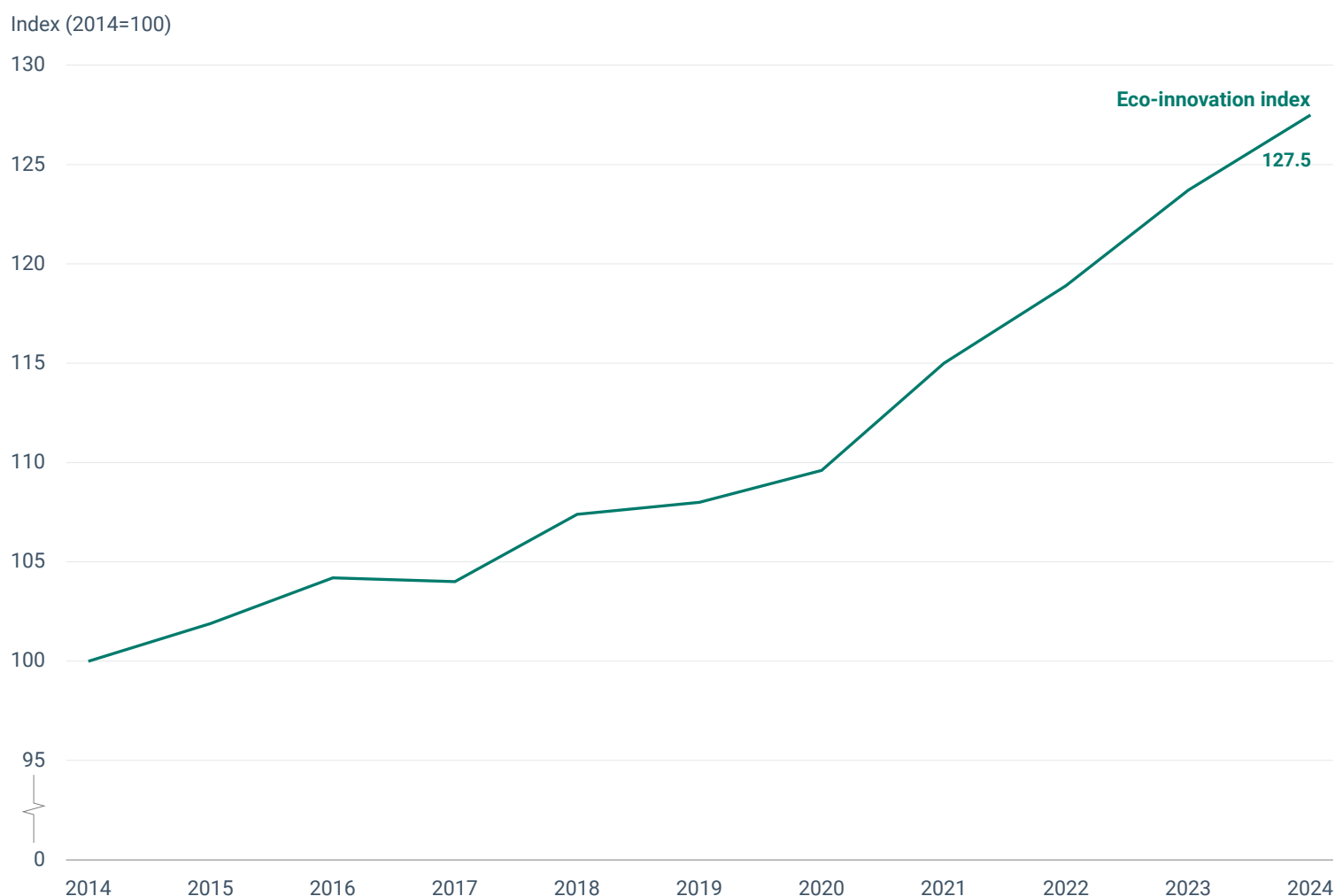


Eco-innovation index in Europe

Published 11 Dec 2024

Eco-innovation, which is crucial for achieving the European Green Deal objective of transitioning to a carbon-neutral and sustainable economy, has increased in the European Union. The European Commission's eco-innovation index increased by 27.5% from 2014 to 2024, mainly driven by improvements in resource efficiency. This steady increase in recent years is expected to continue, as the European Green Deal has set ambitious environment- and climate-related objectives. Its associated initiatives are very likely to create favourable conditions for more eco-innovation.

Figure 1. Eco-innovation index, EU-27, 2014-2024 (EU-27=100 in 2014)



Eco-innovation refers to any innovation that **reduces impacts** on the environment, increases resilience to environmental pressures or uses natural resources more efficiently^[1]. Eco-innovation is essential for achieving the objectives of the [European Green Deal](#), such as the transition to a climate-neutral, circular economy.

The European Commission's [eco-innovation index](#) ^[2] is a composite indicator based on **five dimensions**:

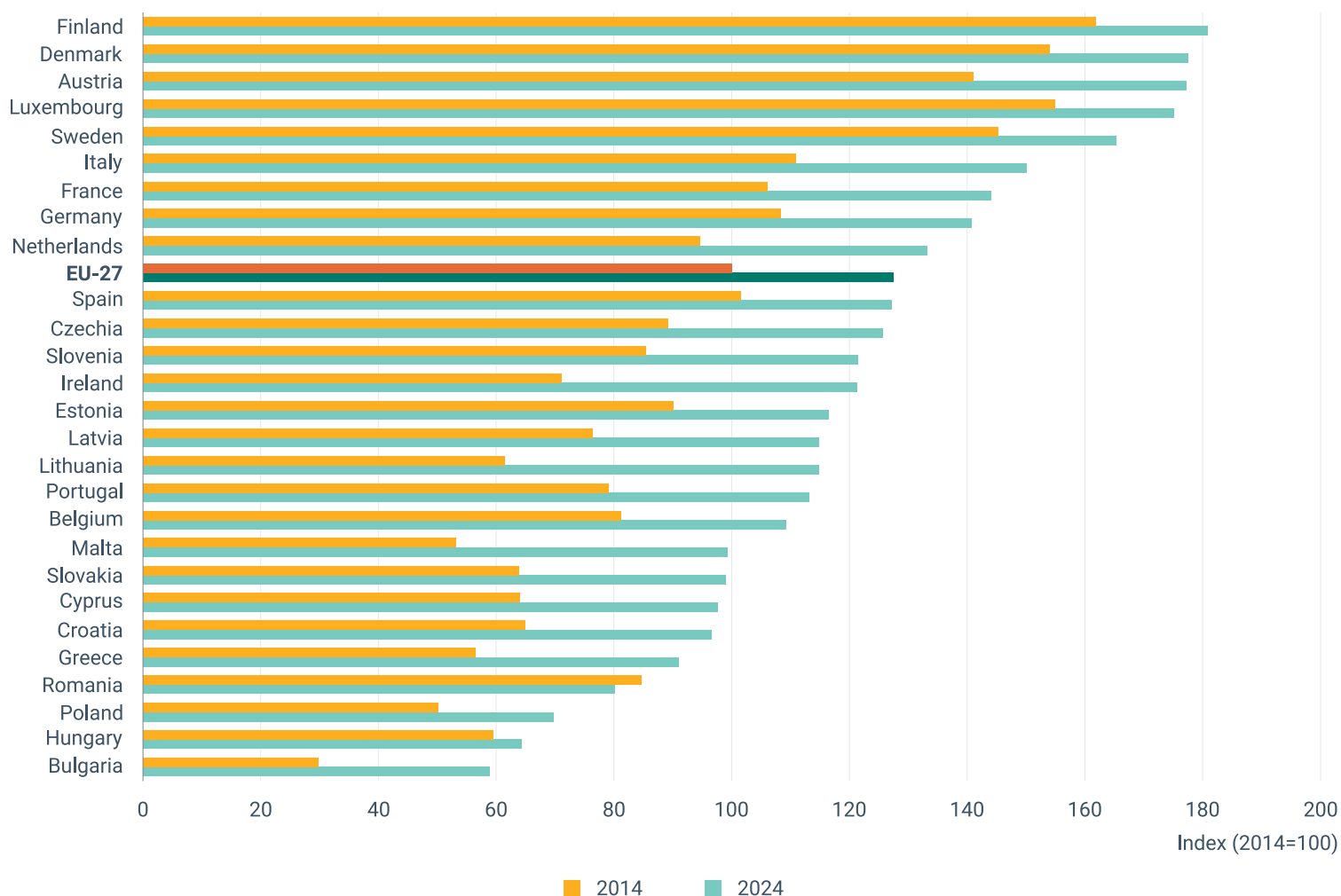
- 1 eco-innovation inputs;
- 2 eco-innovation activities;
- 3 eco-innovation outputs;
- 4 resource efficiency outcomes, and;
- 5 socio-economic outcomes.

Performance in each of these dimensions is measured using relevant indicators, which are published by, for instance, [Eurostat](#), the European Environment Agency and the [Organisation for Economic Co-operation and Development \(OECD\)](#).

The EU's performance between 2014 and 2024 **improved** markedly, as shown by the by steady 27.5% increase in the [eco-innovation index score](#). Increases were seen in all of the five themes, however the increasing eco-innovation index score can mostly be attributed to improvements in resource efficiency outcomes. This theme increased by 62% during the period, particularly in greenhouse gas (GHG) emission productivity (i.e. decreases in GHG emissions generated per unit of gross domestic product (GDP)). At the indicator level, the greatest improvement was seen in the number of eco-innovation publications, while the worst performance was in eco-innovation related patents.

The steady increase in the eco-innovation index score between 2014 and 2024 is expected to continue in the future. This is because the improvements in resource efficiency and other contributing indicators are likely to continue due to the highly ambitious environment- and climate-related objectives of the European Green Deal and its associated initiatives^[3].

Figure 2. Eco-innovation index by EU Member State, 2014-2024 (relative to EU-27=100 in 2014)



The Nordic countries, Luxembourg and Austria were the **best performers** of eco-innovation from all individual EU Member States in 2014 and 2024^[4]. Apart from Finland, all of these countries performed well in resource efficiency outcomes. Finland and Austria **scored** particularly highly on socio-economic outcomes.

Index scores improved between 2014 and 2024 for all Member States except Romania. Eighteen Member States achieved increases of above the EU-27 average. Lithuania achieved the **largest growth**, followed by Ireland and Malta. Lithuania’s improvement is largely driven by strong growth in eco-innovation related academic publications, water productivity (GDP/total freshwater abstraction), the number of ISO 14001 certificates, and indicators included in socio-economic outcomes.

Some countries showed substantial progress over the period, reflecting concerted efforts to foster eco-innovation activities. For example, Greece experienced a steady improvement in its eco-innovation, increasing from 56 in 2014 to 91 in 2024. However, there remains a gap between the top performers and those still in need of further progress. The top-performing member state, Finland, **scored three times higher** than the lowest-performing member state, Bulgaria.

▼ Supporting information

Definition

'Eco-innovation is any innovation that make progress towards a more green and sustainable economy by reducing environmental pressures, increasing resilience or using natural resources more efficiently' ^[5].

The eco-innovation index is based on the eco-innovation scoreboard, which has 12 indicators in five thematic areas^[3]:

- 1 'Eco-innovation inputs, which includes financial and human capital investment in eco-innovative activities;
- 2 Eco-innovation activities, which defines the extent to which companies in a given country are active in eco-innovation;
- 3 Eco-innovation outputs, which measures the output of eco-innovation activities concerning the number of patents and academic literature;
- 4 Resource efficiency outcomes, which pinpoint a country's efficiency of resources and GHG emission intensity;
- 5 Socio-economic outcomes, which aims to measure the positive societal as well as economic outcomes of eco-innovation'.

Methodology

Eco-innovation index scores are currently calculated on the basis of 12 indicators belonging to the following five thematic areas:

- 1 Eco-innovation inputs: governments' environmental and energy R&D appropriations and outlays (governments' environmental and energy R&D appropriations and outlays as a proportion of GDP); total R&D personnel and researchers (total R&D personnel and researchers as a proportion of total employment).
- 2 Eco-innovation activities: number of ISO 14001 certificates (number of ISO 14001 certificates/population in millions).
- 3 Eco-innovation outputs: eco-innovation-related patents (number of patent applications filed under the Patent Cooperation Treaty (PCT) in the fields of environment-related technologies, climate change adaptation technologies and sustainable ocean economy inventions/population in millions); eco-innovation-related academic publications (number of publications with any the following list of English keywords in the title and/or abstract: eco-innovation, energy efficient/efficiency, material efficient/efficiency, resource efficient/efficiency, energy productivity, material productivity, resource productivity)population in millions;

- 4 Resource efficiency outcomes: material productivity (GDP/domestic material consumption (DMC)); water productivity (GDP/total fresh water abstraction); energy productivity (GDP/gross available energy for a given year); GHG emission productivity (GDP/GHG (CO₂, N₂O in CO₂ equivalent, CH₄ in CO₂ equivalent, hydrofluorocarbons (HFCs) in CO₂ equivalent, perfluorocarbons (PFCs) in CO₂ equivalent, SF₆ in CO₂ equivalent, NF₃ in CO₂ equivalent)).
- 5 Socio-economic outcomes: exports of environmental goods and service sector (export of goods and services in the field of environmental protection and resource management activities/total exports); employment in environmental protection and resource management activities (employment in environmental protection and resource management activities/total employment); value added in environmental protection and resource management activities (value added in the environmental goods and service sector/GDP).

Policy/environmental relevance

The Eighth Environment Action Programme (8th EAP) should, among other things, accelerate the transition to a green economy in the context of a well-being economy through, inter alia, 'continuous... innovation' (EU, 2022). This indicator is a headline indicator for monitoring progress towards meeting one of the 8th EAP and contributes mainly to monitoring progress in relation to aspects of Article 3(w), which requires 'strengthening the environmental knowledge base... and its uptake..., including through... innovation' (EU, 2022). The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the increase in 'eco-innovation as a driver for the green transition' ^[6].

Data sources and providers

- [Eco-innovation index](#), Research and Innovation (DG)

▼ Metadata

DPSIR

Response

Topics

[# Sustainability solutions](#)

Tags

[# impacts](#) [# 8th EAP](#) [# Transition](#) [# Eco-innovation](#) [# environment](#) [# resource efficiency](#)
[# SUS0001](#) [# environmental pressures](#)

Temporal coverage

2014-2024

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG11: Sustainable cities and communities

Unit of measure

This is a composite indicator and therefore no units are used.

Frequency of dissemination

Once a year

✓ References and footnotes

1. EC, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Innovation for a sustainable future – the eco-innovation action plan (Eco-AP)', COM(2011) 899 final of 15 December 2011.

↩

2. Al-Ajlani, H., Cvijanović, V., Es-Sadki, N. and Müller, N., 2022, *EU eco-innovation index 2022 – policy brief*, European Commission.
[↵](#)
3. Mohamedaly, Al-Ajlani, H., Kuuliala, V., McKinnon, D. and Johansen, M., 2022, *Eco-innovation for circular industrial transformation – a report on the best practices, drivers, and challenges in key sectors*, European Commission.
[a](#) [b](#)
4. The progress made by EU Member States over time is presented relative to an eco-innovation score for the EU-27 in 2014 of 100.
[↵](#)
5. EC, 2022, *Eco-index 2022 – indicators and methodology*, European Commission.
[↵](#)
6. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
[↵](#)



8th Environment Action Programme

Land take: net land take in cities and commuting zones in Europe

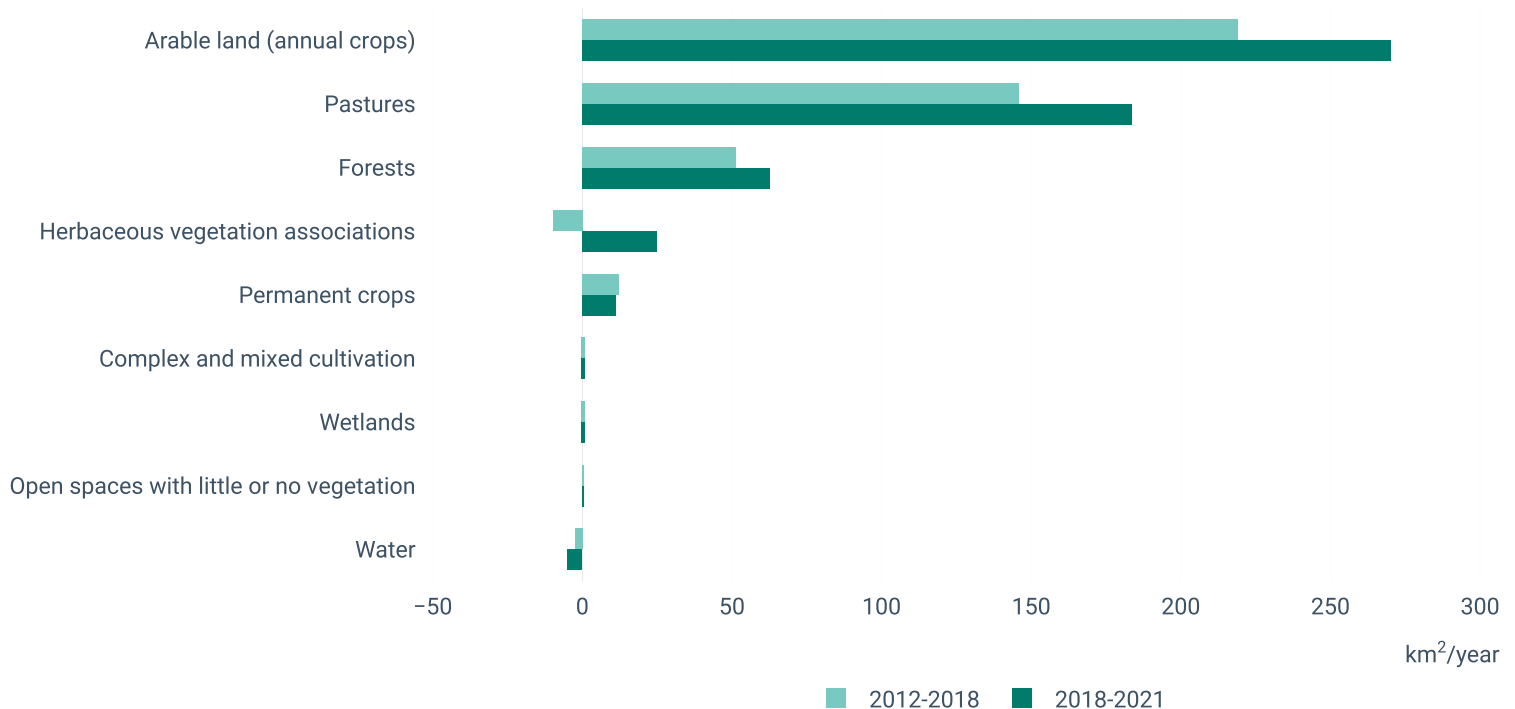


Net land take in cities and commuting zones in Europe

Published 28 Nov 2025

Conversion of natural land to artificial surfaces continues to undermine ecological functions and weaken ecosystem resilience. The EU Member State average net land take increased by about 32% in cities and their commuting zones, from 410km²/year during 2012-2018 to 540km²/year in 2018-2021. Most conversions affected cropland and pastures, followed by forests. Achieving the EU's goal of no net land take by 2050 will require major reductions amid ongoing urban expansion. However, given the upward trend observed between 2012 and 2021, Europe is currently likely off track to meet this target.

Figure 1. Yearly net land take in cities and commuting zones by land cover class, 2012-2018 and 2018-2021, EU-27 Member States (in km²/year)



This indicator defines land take as the **conversion of natural and semi-natural land** to artificial surfaces. This process reduces ecosystem resilience by fragmenting landscapes, decreasing carbon storage and biodiversity capacity, increasing flood risk through higher surface run-off, and intensifying heatwave impacts in urban areas. Additionally, it might in some cases have a negative impact on quality of life through the [loss of natural areas for relaxation, regeneration, and outdoor activities](#).

The **reduction and mitigation of land take** is a cross-cutting objective linked to several major policy frameworks. The [EU Biodiversity Strategy for 2030](#) and the [Nature Restoration Regulation](#) aim to halt ecosystem degradation and loss through protection and restoration, such as reconnecting fragmented landscapes. Similarly, the adopted [Soil Monitoring Law](#) strives to reduce and mitigate the impacts of soil sealing and soil removal on soil health and resilience in terms of ecosystem services.

In the context of climate-related policies, countries aim to enhance their carbon sinks by **preventing and mitigating carbon losses** resulting from the sealing of land covers with high carbon sequestration and storage capacities, such as forests. Together these initiatives support the overarching [EU goal to achieve 'No Net Land Take by 2050'](#), which requires that climate, biodiversity, and soil protection objectives are considered in spatial and urban planning across all spatial scales.

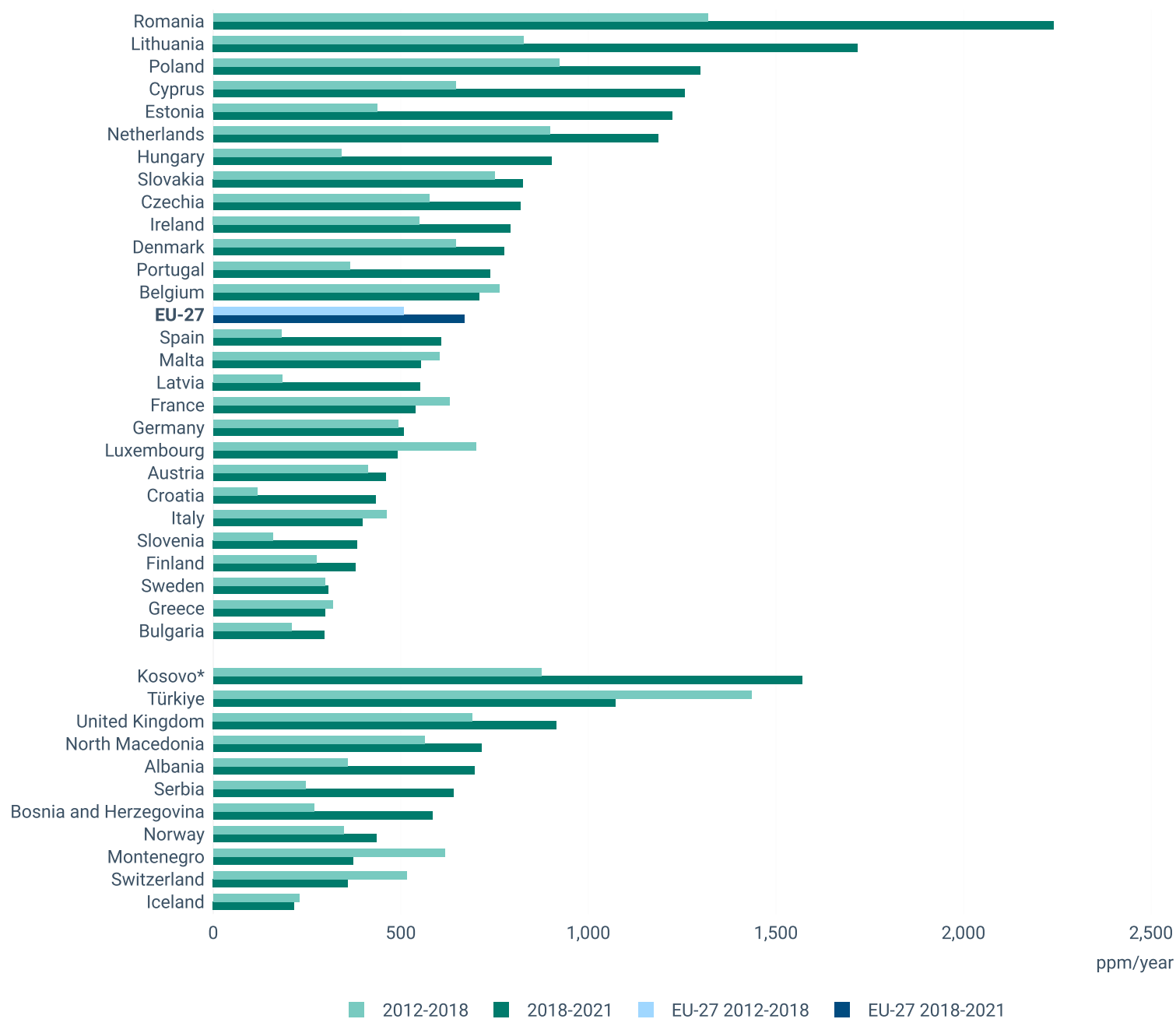
Monitoring land take within cities and their commuting zones serves a valuable insight into urban sprawl and the land conversion rate present in and around urban areas. The total net land take estimated within cities and commuting zones during 2012-2018 was 2,459km² (annual rate: 409km²/year) and 1,622km² in 2018-2021 (annual rate: 540km²/year). This represents an increase of about 32% in the average yearly rate between the two periods.

In cities and their commuting zones, most of the **new land take** occurred on arable land, being lost at a pace rising from 216 to 268km² per year, which heightens concerns for food security and biodiversity. Losses of pastures also grew, from 144 to 182km² per year. Forest losses rose from 49 to 59km² annually, affecting carbon stocks and biodiversity.

Although wetland conversion represents only a small fraction of the total, it increased slightly from 0.6 to 0.7km²/year and continues to pose a threat to these crucial ecosystems, which provides important carbon sink capacities and habitats for rare species. Overall, the data indicate an upwards trend in net land take within cities and commuting zones, adding pressure on Europe's ecosystems and complicating efforts to reach the 2050 **no net land take goal**.

Assuming a linear trend for simplicity, the EU would need to reduce its net land take in cities and commuting zones by approximately 27km² annually from 2022 onwards to achieve zero net land take by 2050. This implies that by 2030, the annual net land take would need to be lowered to around 324km²/year, from 540km²/year recorded in 2018-2021. However, given the upward trend observed between 2012-2018 and 2018-2021, Europe is currently likely **off track** to meet this target.

Figure 2. Yearly net land take by country, 2012-2018 and 2018-2021, EEA-38 member and cooperating countries (in ppm of total urban surface per country)



During 2012-2018 and 2018-2021, most EU-27 countries saw **notable increases** in yearly net land take in cities and commuting zones relative to their total area. Countries in Figure 2 are ordered according to the highest average yearly net land take in 2018-2021. The most dramatic increases of average yearly net land take were seen in Croatia, Spain and Latvia who more than tripled their rates (267%, 233%, 202% respectively), followed by Estonia (179%), Hungary (164%) and Slovenia (142%). Note that country size plays an important role when interpreting these percentages, as a tripling of the rate in Spain contributes more to the total EU area converted than a similar increase in Latvia.

However, several countries experienced **reductions**. Luxembourg stands out for achieving the most significant decrease in yearly net land take rate, dropping by 30% over the periods. France (15%), Italy (14%), Malta (8%), and Belgium (7%) also achieved modest decreases. Results for Germany and Austria remained nearly stable, with minimal changes. View the [dashboards](#) offering **tools for exploring the data** derived on net land take in cities and commuting zones.

Despite reductions in a few countries, most of Europe continues to drift away from the no net land take goal, with increasing land conversion making it unlikely for policy targets to be met. **Immediate action** and stronger implementation are needed for the EU to reverse this negative trend and protect its natural land for future generations.

▼ Supporting information

Definition

This net land take indicator tracks changes in agricultural, forest, and semi-natural land converted to urban or uses considered as artificial, such as buildings, infrastructure, urban green areas, sport and leisure facilities. It covers both land taken for housing, industry, transport, or extractive activities and, on the inverse, land restored from artificial to natural states. Calculated as the difference between land taken and land re-naturalised, it measures the net loss of natural and semi-natural land more accurately. Definition of how EEA measures land take is further described the [Land take and land degradation in functional urban areas report](#). The definition is dependent on the mapping methodology and nomenclature structure of the Urban Atlas dataset. Table 1 presents the division of urban and semi-/natural classes used for the land take calculations. Additional information on the land use included in these classes is available in the [Urban Atlas mapping guidelines](#).

Table 1. CLMS Urban Atlas nomenclature separated into *Urban classes* and *Semi-natural and natural classes*. Land take considers conversion of classes from right to left, and inverse land take considers conversion from left to right.

Urban classes	Semi-natural and natural classes
11100: Continuous Urban Fabric (S.L. > 80%)	21000: Arable land (annual crops)
11210: Discontinuous Dense Urban Fabric (S.L. 50% - 80%)	22000: Permanent crops
11220: Discontinuous Medium Density Urban Fabric (S.L. 30% - 50%)	23000: Pastures
11230: Discontinuous Low Density Urban Fabric (S.L. 10% - 30%)	24000: Complex and mixed cultivation
11240: Discontinuous Very Low Density Urban Fabric (S.L. < 10%)	25000: Orchards
11300: Isolated structures	31000: Forests
12100: Industrial, commercial, public, military and private units	32000: Herbaceous vegetation associations
12210: Fast transit roads and associated land	33000: Open spaces with little or no vegetations
12220: Other roads and associated land	40000: Wetlands
12230: Railways and associated land	50000: Water

12300: Port areas	
12400: Airports	
13100: Mineral extraction and dump sites	
13300: Construction sites	
13400: Land without current use	
14100: Green urban areas	
14200: Sports and leisure facilities	

Methodology

Methodology for indicator calculation

The indicator tracks net land take in urban areas, specifically within cities and commuting zones across the EEA-38 member and cooperating countries using Functional Urban Areas (FUAs) as the reporting unit. The indicator covers two periods, 2012-2018 and 2018-2021, relying strictly on the overlap areas available in both Urban Atlas change datasets (more information below in the Caveats and Notes section). Net land take is calculated by also considering the 'reverse land take' process, i.e. when urban areas are converted to semi-natural land. For example, this may occur when a former mineral extraction site becomes forested. Thus, net land take is the result of subtracting the total land taken with the land restored, expressed in km².

Key Methodological Steps:

1. Preparation: Creation of reference geospatial boundaries for 2012-2018 and 2018-2021, incorporating FUA and city boundaries.
2. Creation of a data cube for analysis: Urban Atlas change data and reference boundaries (FUA and city) are rasterised at 10-metre spatial resolution and integrated into a data cube ready for analysis.
3. Aggregation: The aggregated cube data are exported to a SQL Server for indicator calculation.
4. Indicator Calculation: Indicator figures (e.g., km²/year of net land take by land cover class, country-level and yearly ppm over total FUA overlap area) are derived via SQL queries and stored in views.
5. Visualisation: Data views are linked to Tableau for production of charts and dashboards.

Classification and Charts: Net land take figures are reported at land cover level 2 of the Urban Atlas classification, ensuring comparability between the two change periods. Only the overlap area is considered for calculating the share of total FUA area, and all absolute figures are based on yearly averages.

Caveats and Notes:

- The delineation of Functional Urban Areas (FUAs) is a process led by Eurostat in collaboration with the national statistical authorities of the Member States, who regularly update these to accurately reflect the extents of cities and commuting zones. The Urban Atlas production adhere to these updates which results in slightly different mapping

extents each reference year due to either shrinkages or expansions of some FUAs. Hence, when producing change layers, i.e. comparing two reference years (e.g. 2021 vs. 2018), it is only possible for where the two FUA-extents overlap. Consequently, the net land take calculation is confined to these overlap areas, which leads to a slight underestimation.

- Underestimation may vary by country depending on the extent of areas not covered in both periods.
- The indicator is restricted to the classification depth of the Urban Atlas nomenclature (table 1). Therefore, separate handling of water between artificial and natural is not possible. For example, an artificial lake established in previously agricultural land use is thus not measured as land take.
- The methodology ensures robust time-series comparability and supports analysis across countries and land cover classes. However, users should note that some recent or marginal expansions may not be fully captured.

This structured methodological approach ensures comparability and clarity in indicator reporting while leveraging advanced data processing and integration of tools for robust, reproducible outputs.

Methodology for gap filling

Not applicable.

Policy/environmental relevance

The net land take indicator is a key measure of land conversion pressure and ecosystem degradation in Europe. Land take drives habitat loss, biodiversity decline, soil sealing, and reduced ecosystem resilience, undermining climate mitigation, food security, and, in some cases, human well-being.

It is central to several key EU policy frameworks: the [Biodiversity Strategy 2030](#) identifies it as a core threat; the Soil Strategy 2030 recalls the existing “no net land take” goal by 2050 set in the 7th EAP; and the Nature Restoration Regulation mandates restoring 20% of EU land and sea by 2030 and halting green space loss in cities. These strategies further align with the [UN global sustainable development goals](#) on land degradation neutrality (SDG 15.3) and sustainable cities (SDG 11). The net land take indicator thus provides a critical metric for monitoring progress towards these international targets and for evaluating the effectiveness of EU-wide and national policies. By tracking conversion of natural to artificial surfaces, the indicator informs policy on unsustainable urban expansion and hence supports evidence-based decision-making, promoting urban densification, planning, zoning, and land recycling. However, despite these policy efforts, current trends show a rise in net land take, underscoring the need for stronger land-use action across Europe.

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme \(8th EAP\)](#). It contributes mainly to monitoring aspects of the 8th EAP Article 2.1. that requires that ‘by 2050 at the latest, people live well, within the planetary boundaries in a well-being economy where nothing is wasted, growth is regenerative, climate neutrality in the Union has been achieved and inequalities have been significantly reduced. A healthy environment underpins the well-being of all people and is an environment in which biodiversity is conserved, ecosystems thrive, and nature is protected and restored, leading to increased resilience to climate change, weather- and climate-related disasters and other environmental risks. The Union sets the pace for ensuring the [‘prosperity of present and future generations globally, guided by intergenerational responsibility’](#). The European Commission [8th EAP monitoring Communication](#) specifies that this indicator should monitor whether the EU is on track to meet the ‘no land take by 2050’ target.

‘No net land take’ is also addressed in the land degradation neutrality (LDN) target of the United Nations Convention to Combat Desertification (UNCCD), which aims to maintain the amount and quality of land resources. LDN is promoted by target 15.3 of the UN Sustainable Development Goals (SDGs), which, by 2030, strives to combat desertification and to restore degraded land and soil. Land and soil are also linked to goals that address sustainable agriculture and food security (SDG 2), access to clean water and sanitation (SDG 6), the environmental impact of urban sprawl (SDG 11), climate change (SDG 13) and life on land (SDG 15). [The EU biodiversity strategy to 2030](#) calls for the restoration of at least 15% of degraded ecosystems in the EU and the expansion of the use of green infrastructure, e.g. to help overcome land fragmentation.

Accuracy and uncertainties

While the Urban Atlas data benefit from rigorous photointerpretation and have a thematic accuracy generally above 80%, several sources of uncertainty remain:

- **Minimum Mapping Unit and Spatial Resolution:** The Minimum Mapping Unit (MMU) differs between urban and rural contexts. For urban areas, the MMU for detecting changes is 0.1 hectares, allowing identification of relatively small changes common in densely built environments. For rural and semi-natural areas, the MMU for detecting changes is 0.25 hectares, reflecting coarser granularity in less developed landscapes. Changes smaller than these thresholds are excluded or aggregated, potentially underestimating very fine-scale land take.
- **Change Detection and Classification Errors:** While the Urban Atlas accounts for conversions from artificial to agricultural or natural land, i.e. re-naturalisation, such changes may be underestimated due to classification limitations and interpretation challenges.
- **Temporal Gaps and Data Processing:** The datasets are generated for discrete years (for example, 2012 and 2018), so actual land cover changes occurring between these intervals can be temporally imprecise. Differences in methodologies or data availability across years can introduce inconsistencies.
- **Underrepresentation of Rural Large-scale Processes:** This indicator addresses the net land take in cities and commuting zones. Some extensive land conversion activities outside these areas are therefore missed, leading to underestimation of total net land take.
- **Regional Variability:** Classification accuracy can vary by geographic context due to differences in landscape complexity and heterogeneity.

The Urban Atlas 2018 dataset demonstrates high thematic accuracy, with [observed accuracy rates exceeding specification thresholds for both urban and rural land classes after plausibility checks](#). However, uncertainties remain due to unclear class definitions and the challenges of distinguishing certain land types. Particularly when only mono-temporal imagery is available. Additionally, positional accuracy could not be conclusively evaluated for the 2018 reference year due to a lack of assessment of the underlying very high resolution imagery. While logical, domain, and topological consistency criteria were met, continuous enhancements in class definitions, temporal data coverage, and validation completeness are being assessed to further strengthen the dataset's reliability and reduce remaining uncertainties. The validation of Urban Atlas 2018-2021 dataset is starting in Q4 2025 and will be published during 2026, and therefore the data might be a subject to revisions.

Despite these uncertainties, Urban Atlas remains the most detailed and harmonised pan-European land cover product available for urban areas, providing robust trend and spatial pattern information. The calculated net land take values should be regarded as conservative estimates of true land conversion.

Ongoing efforts to improve spatial and temporal resolution, classification algorithms, and to validate datasets will continually enhance indicator accuracy. The current data support reliable monitoring and policy assessment for sustainable land management.

Data sources and providers

- [Urban Atlas Land Cover/Land Use Change 2012-2018 \(vector\)](#), [Europe, 6-yearly](#), Copernicus Land Monitoring Service (CLMS)
- [Urban Atlas Land Cover/Land Use Change 2018-2021 \(vector\)](#), [Europe, 3-yearly \(Dataset URL not available\)](#), Copernicus Land Monitoring Service (CLMS), Copernicus Land Monitoring Service (CLMS)

▼ Metadata

DPSIR

Pressure

Topics

[# Land use](#)

Tags

[# Communting zones](#) [# 8th EAP](#) [# LSI001](#) [# Artifical surfaces](#) [# Fnctional urban areas](#) [# Urban sprawl](#) [# urban](#)
[# cities](#) [# Land take](#)

Temporal coverage

2012-2021

Geographic coverage

Albania	Austria
Belgium	Bosnia and Herzegovina
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Kosovo (UNSCR 1244/99)	Latvia
Liechtenstein	Lithuania
Luxembourg	Malta
Montenegro	Netherlands
North Macedonia	Norway
Poland	Portugal
Romania	Serbia
Slovakia	Slovenia
Spain	Sweden
Switzerland	Türkiye
United Kingdom	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG15: Life on land, SDG11: Sustainable cities and communities

Unit of measure

km² and percentage

Frequency of dissemination

Every 3 years

 References and footnotes



8th Environment Action Programme

Water scarcity conditions in Europe
(Water exploitation index plus)

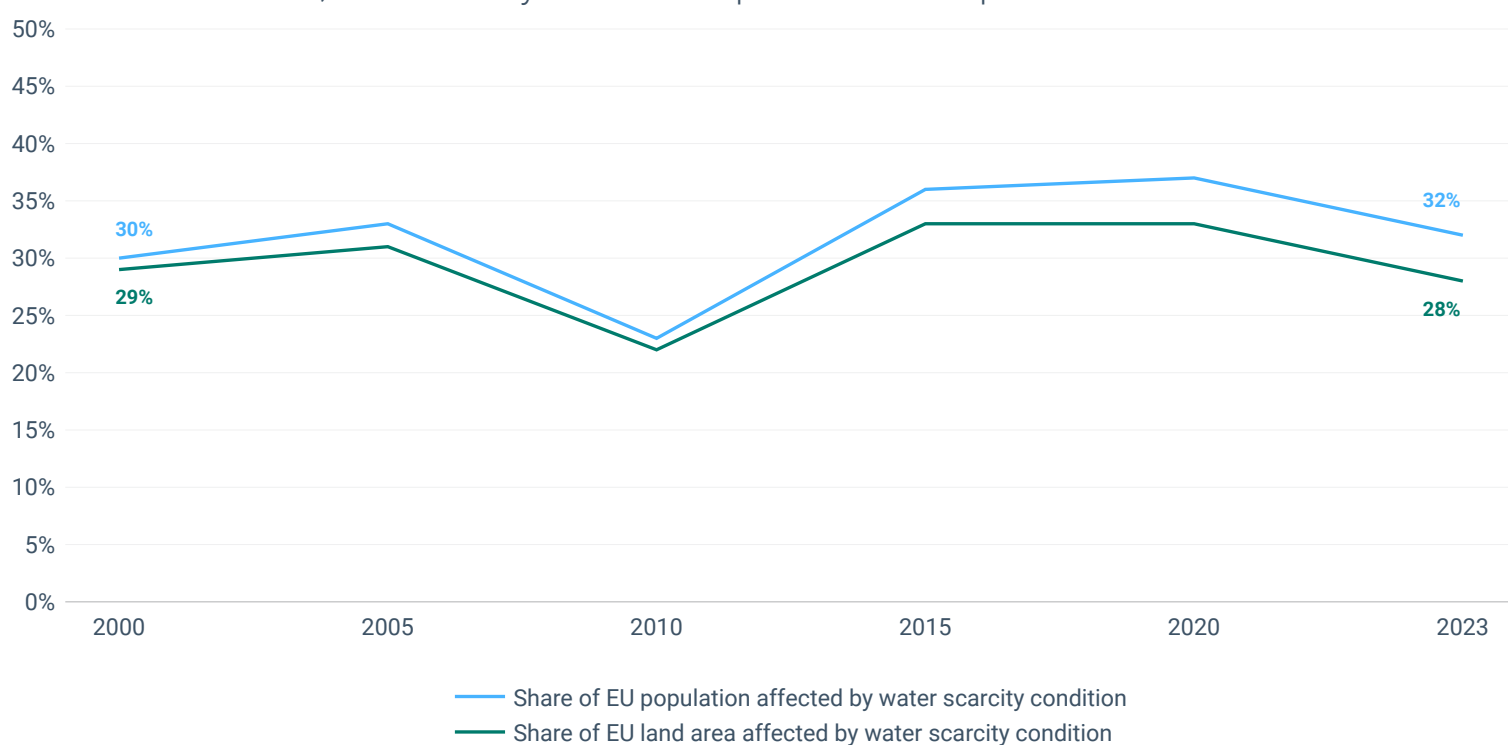


Water scarcity conditions in Europe

Published 28 Nov 2025

Water scarcity affected 28% of the European Union territory during at least one season in 2023. Although water abstraction declined by 14% in the EU between 2000 and 2023, there has been no overall reduction in the area affected by water scarcity conditions, despite the annual fluctuations. This, compounded with the fact that climate change is expected to further increase the frequency, intensity and impacts of drought events, makes it somewhat unlikely that water scarcity will reduce by 2030.

Figure 1. Area and population affected during at least one quarter of the year by water scarcity conditions in the EU, measured by the water exploitation index plus



Freshwater resources are essential for human health, nature and the functioning of economies and societies. However, across the EU, these **resources are threatened** by multiple pressures. To address this, the [Water Framework Directive](#) requires Member States to promote the sustainable use and the long-term protection of available water resources ^[1].

The [Water exploitation index plus \(WEI+\)](#) measures **water consumption** as a percentage of renewable freshwater resources at river basin or subunit levels, across each quarter of the year. This detailed approach reveals local water scarcity conditions that broader annual WEI estimates at European or country levels may not reveal. WEI+ values above 20% indicate that water resources are under stress and therefore water scarcity conditions prevail. Values above 40% signal water stress is severe, and the level of freshwater use may be unsustainable ^{[2][3]}.

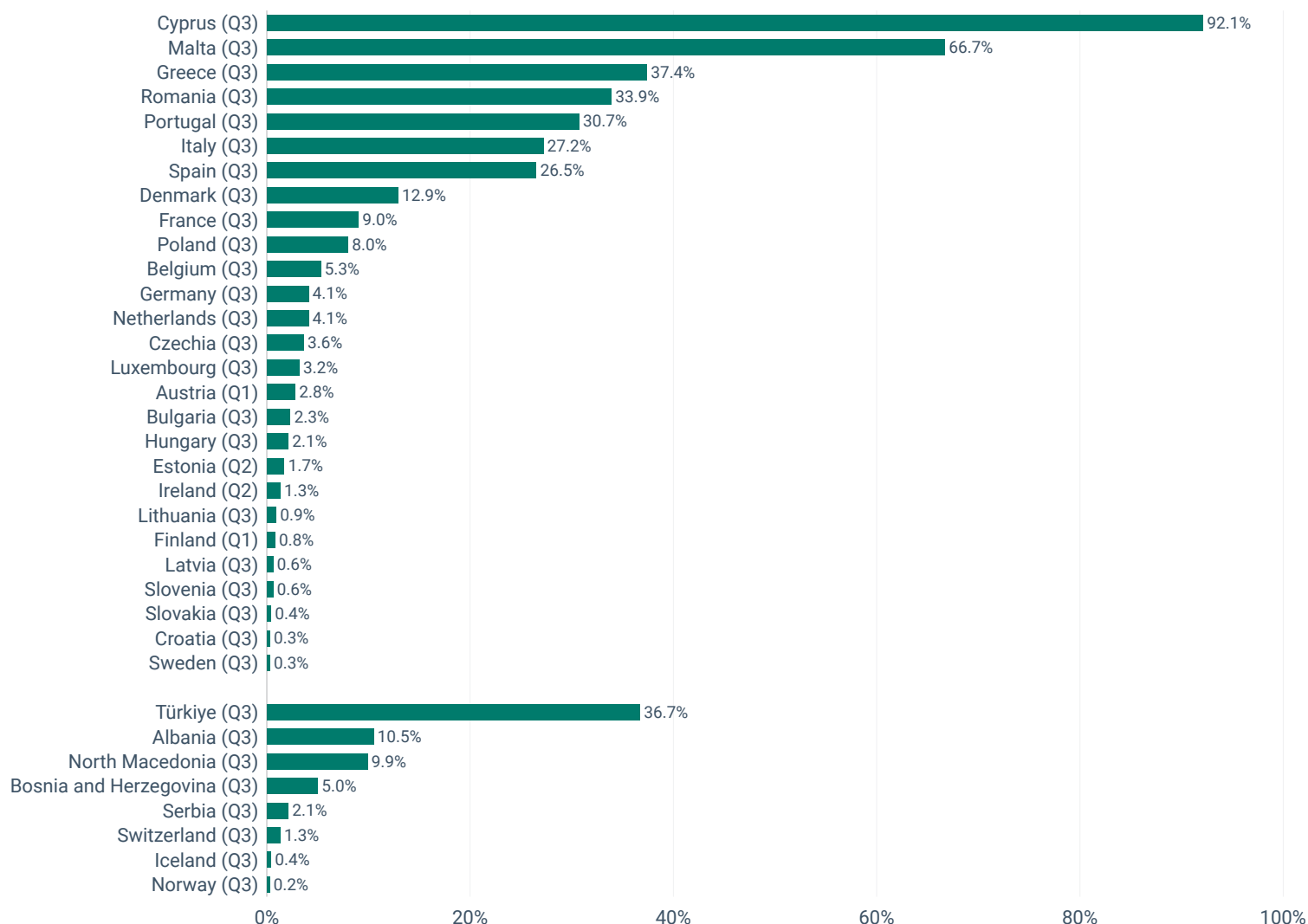
The percentage of EU territory and population affected in at least one quarter of the year by water scarcity conditions (Seasonal WEI+ above 20%) is displayed in Figure 1. On average, about 30% of EU territory and 33% of the population are **affected** each year. Water scarcity conditions affected 28% of EU land area and 32% of EU population in 2023. The share of the

area affected by **water scarcity in 2023 was relatively lower than the average during 2000-2023**, because of a relative increase of rainfall during that year.

Water scarcity is prevalent all-year-round in southern Europe, with around 30% of the population in areas with permanent **water stress** and up to 70% in areas with seasonal **summer stress**. Agriculture, public water supply, and tourism place **significant pressure** on **freshwater resources** in this region. However, water **scarcity** extends beyond southern Europe, affecting various river basins across the EU, where urban population density and water abstraction for public supply, energy, and industry are **significant factors**. Over the last decade, droughts have also increased in **frequency and severity**, impacting seasonal water availability.

Climate change is expected to intensify seasonal fluctuations of freshwater availability in Europe. Drought events are expected to further **increase in frequency, intensity, and impact**. Given these factors and a worsening trend since 2010, a reduction in water scarcity by 2030 appears unlikely (Figure 1).

Figure 2. Worst seasonal water scarcity conditions for European countries in 2023, measured by the water exploitation index plus (WEI+)



Cyprus and Malta faced the most significant water scarcity conditions of all EU Member States on the seasonal scale (seasonal WEI+ >40%). Greece, Romania, Portugal, Italy and Spain experienced water scarcity particularly during spring and summer. Malta is experiencing the permanent water scarcity conditions partly due to its natural hydro-climatic conditions. Among EEA member countries, Türkiye is the most severely challenged (Figure 2).

In general, water scarcity conditions intensify between April and September in most countries. This is caused by a combination of dry weather, reduced flows and increased abstractions for irrigated agriculture, tourism and recreation, and other socio-economic activities during these periods.

Certain river sub-basins were affected by seasonal water scarcity in 2023. Belgium, Bulgaria, Cyprus, Denmark, France, Germany, Greece, Italy, Malta, the Netherlands, Portugal, Romania and Spain ([seasonal WEI+ >20%](#); [see more information on seasonal WEI+ at Subunit scale](#)) were all effected.

▼ Supporting information

Definition

The WEI+ provides a measure of total water consumption as a percentage of the renewable freshwater resources available for a given territory and period. The difference between water abstractions and the water returned to the environment by economic sectors before or after use is referred to as 'water consumption'.

The WEI+ is an advanced geo-referenced version of the WEI, endorsed by the Water Directors in 2012 as part of the overall indicator set for water scarcity and drought.

Methodology

In 2011, a technical working group established under the Water Framework Directive's Common Implementation Strategy proposed the implementation of a regional 'WEI+'. This would use two different optional formulas based on the landscape conditions of river basins, i.e., no human intervention or human intervention with hydrological cycle ^[4].

EEA implement the formula for renewable freshwater resources in river basins with human intervention, considering that the landscape characteristics of most river basins in Europe are not pristine. Using one formula of RWR aims also to make the WEI results comparable across all European river basins (see the [EEA's updated conceptual model of WEI+ computation](#)).

The regional WEI+ is calculated according to the following formula:

$$\text{WEI+} = (\text{abstractions} - \text{returns}) / \text{renewable freshwater resources}.$$

Renewable freshwater resources are calculated as 'ExIn+P-Eta±ΔS' for natural and semi-natural areas (free of human intervention), and as 'OUTFL+(abstraction-return)±ΔS' for densely populated areas, where:

ExIn=external inflow

P=precipitation

Eta=actual evapotranspiration

ΔS=change in water storage (lakes and reservoirs)

OUTFL=outflow to downstream/sea.

Change water storage in lakes and reservoirs is computed as $\Delta S = (P + \text{INFL}) - (\text{Eta} + \text{OUTFL})$,

where:

INFL=Inflow in lakes and reservoir from upstream area

For further clarification on the methodological implementation together with the data sources, see the [WAT001_Conceptual model of WEI+ computation.pdf](#).

The WEI+ results are classified into 10% intervals for mapping purposes, ranking between 0 and 40, with a 20% WEI threshold is used to estimate the area and population affected by water scarcity at subunit scale for the EU-27. It is important to note that there is no formally agreed-upon threshold for identifying areas experiencing water scarcity in the EU.

Following the computation and classification of the WEI values, bar and pie charts are produced, together with static and dynamic maps to illustrate the extension of the WEI values over Europe.

Climate data and streamflow data have been integrated from Waterbase – Water Quantity database, Eurostat database (env_wat_res and env_watres_rbd) with the gap filling from the European Flood Awareness System (EFAS) and ERA-5 (C3S) covering hydro-climatic variables for Europe in a homogeneous way for the years 2000-2023.

Once the data series are complete, changes in water storage (ΔS) and outflow are computed for each spatial scale, including WFD subunit, river basin district, country level for Eionet Member countries, and EU-27 level.

The spatial reference data is RBD and SubUnit reported under the WISE Spatial data flow. The European Catchments and Rivers Network System (Ecrins) at a 250-meter resolution is used for processing the indicator variables to fill the gaps where the data is not available. Ecrins provides topological hydrology information and hierarchical relationships between catchments, river basins, and sub-basins, which has been adapted to align with river basin districts and subunits reported by EU Member States under the WISE Spatial data flow.

The primary data source for observed variables of the WEI formula is WISE SoE Water Quantity, which are reported annually by Eionet member countries at various spatial and temporal scales. Additionally, Eurostat data on annual water resources and abstraction is included in the indicator's computation.

If data is missing at the subunit scale but available at the country level, annual country-level data is disaggregated to the catchment scale of Ecrins to ensure a homogeneous monthly baseline, while reported data on monthly resolution from the subunit or river basin scale is included directly in the computation of the WEI+.

Methodology for gap filling

The purpose of developing the WAT001 indicator is to provide a European overview of seasonal water scarcity in river basins. However, gaps in the database significantly hinder this objective, as WISE SoE and Eurostat datasets show large gaps in both temporal and spatial coverage across Europe. To address these gaps, both water abstraction and renewable water resources components are supplemented with gap-filling methods.

If the reported data is not available for renewable water resources, [Copernicus CEMS EFAS](#) data is used to compute total outflow at the subunit, river basin, or country level, and [Copernicus ERA-5](#) together with EFAS data are used to estimate changes in water storage of lakes and reservoirs.

For water abstraction from agriculture, industry, cooling water, and public water supply, gap filling follows the statistical method outlined in the [WAT001_Conceptual model of WEI+ computation_10 10 2024.pdf](#).

In terms of water returns from the economy, if available, data from the Water Use table of the WISE SoE is integrated in the computation. However, this data is largely missing. To address these gaps, surrogate data is used, which includes sources of water supply, transfer and irrigation methods for agriculture, urban water use, and wastewater discharges from households and services. Additionally, data on fuel types, return coefficients, and the energy mix for cooling water in electricity generation are considered, along with water abstraction for other sectors. Due to data limitations, return coefficients are estimated nationally and applied uniformly across river basins and subunits within the countries. The return coefficients are estimated based on the [WAT001_Conceptual model of WEI+ computation.pdf](#).

Uncertainties

Methodology uncertainty

Monitoring data on lakes and reservoirs are incomplete. Using the modelled data may mask the actual volume of water stored in, and water flow in and out from reservoirs. Thus, the impact of the residence time, between water storage and use is unknown.

Water returns are largely based on return coefficients, which are estimated using various surrogate data. Furthermore, the return coefficients could not be estimated at finer spatial scales than the country. This creates uncertainty in the quantification and distribution of water returns from economic sectors, thus also leading to uncertainty with regard to the 'water consumption component'.

Data set uncertainty

Quantifying water exchanges between the environment and the economy is, conceptually, very complex. A complete quantification of the water flows from the environment to the economy and, at a later stage, back to the environment, requires detailed data collection and processing, which have not been done at the European level. Thus, reported data must be used in combination with modelling to obtain data that can be used to quantify such water exchanges, with the purpose of developing a good approximation of 'ground truth'. However, the most challenging issue is related to water abstraction and water use data, as the water flow within the economy is quite difficult to monitor and assess given the current lack of data availability. Therefore, several interpolation, aggregation or disaggregation procedures have to be implemented at finer scales, with both reported and modelled data.

Due to inconsistencies in the data for OUTFL and ΔS , the change in water storage variable could not be included in the WEI+ computation for some subunits and RBDs e.g. Romania. Subunits and River Basin Districts (RBDs) where ΔS is excluded are marked as 'changeInWaterStorageNOTINCLUDED' in the final dataset.

There is a significant break in the time series of water abstraction data for Kosovo, which causes spikes in the Water Exploitation Index (WEI) values for this country.

Spatial data for subunits and river basins are not available for Türkiye and the Western Balkan countries. Therefore, the WEI+ could only be computed at the country level for these Eionet countries.

Countries may report historical data during the current reporting period to WISE SoE or Eurostat. In such cases, previously gap-filled data are replaced with the reported data, which may change the country-specific or European-level overview. As a result, some differences may appear in parts of the indicator assessment.

Rationale uncertainty

Due to the aggregation procedure used, slight differences exist in some cases between subunit, river basin district, and country levels for total renewable water resources and water use.

Policy/environmental relevance

Justification for indicator selection

The WEI+ is a water scarcity indicator that measures the pressure human activities exert on renewable water resources, helping to identify areas prone to water stress. WEI+ values for countries and annual scales align with the [UN SDG indicator 6.4.2](#) ('Level of water stress'), which tracks progress toward target 6.4 on water scarcity and resource efficiency (note that ecological flows are not yet included). Assessing the WEI+ at finer spatial (e.g., river basin and subunit) and temporal (e.g., seasonal) scales enhances the monitoring of water scarcity issues, as country-level annual averages may obscure significant regional differences. Calculating the proportional area affected by water scarcity, either seasonally or annually, using the WEI+ gives a better European overview than computing the WEI+ at the continental level.

Policy context and targets

Context description

The WEI is part of the set of water indicators published by several international organisations, such as the Food and Agricultural Organization of the United Nations (FAO), the Organisation for Economic Co-operation and Development (OECD), Eurostat and the Mediterranean Blue Plan. An indicator similar to WEI is also used to measure progress towards [UN SDG target 6.4.2](#) at the global level^[5]. Therefore, the WEI is an internationally accepted indicator for assessing the pressure of the economy on water resources, i.e. water scarcity.

This indicator is a headline indicator for monitoring progress towards the [8th Environment Action Programme](#) (8th EAP). It contributes mainly to monitoring aspects of the 8th EAP Article 2.1. that requires that 'by 2050 at the latest, people live well, within the planetary boundaries in a well-being economy where nothing is wasted, growth is regenerative, climate neutrality in the Union has been achieved and inequalities have been significantly reduced. A healthy environment underpins the well-being of all people and is an environment in which biodiversity is conserved, ecosystems thrive, and nature is protected and restored, leading to increased resilience to climate change, weather- and climate-related disasters and other environmental risks. The Union sets the pace for ensuring the prosperity of present and future generations globally, guided by intergenerational responsibility'. The European Commission 8th EAP monitoring communication specifies that this indicator should monitor whether there is a reduction in water scarcity.

The purpose of the EU [Water Framework Directive \(2000/60/EC\)](#) is – inter alia – to promote sustainable water use based on the long-term protection of available water resources. Ensuring a balance between water abstraction and recharge of groundwater, supports the aim of achieving good groundwater quantitative status. Good groundwater quantitative status also ensures that associated surface waters and dependent terrestrial ecosystems are not significantly harmed, and changes in groundwater flow do not cause salination or other types of intrusion.

The [EU's Circular Economy Action Plan](#) explicitly addresses water stress and contains provisions for improving resource efficiency in the context of water resource management.

The [Water Reuse Regulation](#) aims at enhancing the use of reclaimed water in agriculture by setting out minimum requirements for water reuse. The replacement of freshwater abstractions with reclaimed water may decrease the pressure to surface water and groundwater.

The [Common Agricultural Policy](#) (CAP) promotes sustainable farming that ensures affordable, safe, and high-quality food, while protecting natural resources, enhancing biodiversity, and supporting rural communities. It also supports investments in water conservation, irrigation upgrades, and farmer training.

The [Farm to Fork Strategy](#), which focuses on making food systems more sustainable, is an integral part of the European Green Deal.

In addition, the Commission sets out a specific target in the [European Water Resilience Strategy](#) to enhance water efficiency by at least 10% by 2030, considering the potential water savings by focusing on restoring and protecting the water cycle, building a water-smart economy, ensuring access to clean and affordable water for all.

The [European Green Deal](#) aims to decouple economic growth from resource use by promoting a clean, circular economy with reduced environmental impact, while the Farm to Fork Strategy, as part of the Green Deal, targets sustainable food systems, where clean and sufficient water is an essential natural resource.

The [Climate Adaptation Strategy](#) focuses on faster and more systemic climate adaptation and international cooperation for climate resilience. One of its main objectives is to support the reduction of water use and by promoting the wider use of drought management plans as well as sustainable soil management and land-use.

The [recast Drinking Water Directive](#) requires the assessment of the current level of leakages in water infrastructure and the implementation of measures for their reduction. The requirement covers at least water suppliers supplying more than 10,000m³ per day or serving more than 50,000 people.

The [EU Biodiversity Strategy for 2030](#) aims at restoring freshwater ecosystems (“at least 25,000km of free-flowing rivers”). In this regard, the EU Biodiversity Strategy emphasises the WFD requirement to review water abstraction and impoundment permits to implement ecological flows and achieve good status or potential of all surface waters and good status of all groundwater by 2027 at the latest.

Targets

There are no specific quantitative targets directly related to this indicator. However, the [Water Framework Directive](#) (Directive 2000/60/EC) requires Member States to promote the sustainable use of water resources based on the long-term protection of available water resources, and to ensure a balance between abstraction and the recharge of groundwater, with the aim of achieving good groundwater status and good ecological status or potential for surface waters.

Furthermore, the European Water Resilience Strategy targets at enhancing water efficiency by 10% by 2030.

Regarding WEI+ thresholds, it is important that agreement is reached on how to delineate non-stressed and stressed areas. [Raskin et al.](#)^[2] suggested that a WEI value of more than 20% should be used to indicate water scarcity, whereas a value of more than 40% would indicate severe water scarcity. These thresholds are commonly used in scientific studies^[6]. [Smakhtin et al.](#)^[7] suggested that a 60% reduction in annual total run-off would cause environmental water stress. The FAO uses a water abstraction value of above 25% to indicate water stress and of above 75% to indicate serious water scarcity^[8]. Since no formally agreed thresholds are available for assessing water stress conditions across Europe, in the current assessment, the 20% WEI+ threshold is considered to distinguish stressed from non-stressed areas, while a value of 40% is used as the highest threshold for mapping purposes. The previous thresholds were proposed by [Raskin et al.](#)^[2] originally for the WEI which takes water abstraction into account while the WEI+ is involving the net water consumption.

Accuracy and uncertainties

Data sources and providers

- [Waterbase - Water Quality ICM, 2024](#), European Environment Agency (EEA)
- [Annual freshwater abstraction by source and sector](#), Eurostat - European statistics
- [Population on 1 January](#), Eurostat - European statistics
- [River discharge and related historical data from the European Flood Awareness System](#), Joint Research Center (JRC)
- [ERA5-Land monthly averaged data from 1950 to present](#), Joint Research Center (JRC)

▼ Metadata

DPSIR

Pressure

Topics

[# Water](#) [# Climate change adaptation](#) [# Extreme weather](#)

Tags

[# Surface water](#) [# 8th EAP](#) [# Water abstraction](#) [# Groundwater](#) [# WAT001](#)

Temporal coverage

2000-2023

Geographic coverage

Albania	Austria
Belgium	Bosnia and Herzegovina
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Kosovo (UNSCR 1244/99)	Latvia
Liechtenstein	Lithuania
Luxembourg	Malta
Montenegro	Netherlands
North Macedonia	Norway
Poland	Portugal
Romania	Serbia
Slovakia	Slovenia
Spain	Sweden
Switzerland	Türkiye

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG6: Clean water and sanitation

Unit of measure

WEI+ values are given as percentages, i.e. water use as a percentage of renewable water resources.

Frequency of dissemination

Once a year

References and footnotes

1. EU, 2000, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327, 22.12.2000, p. 1-73.
[↩](#)
2. Raskin, P., Gleick, P. H., Kirshen, P., Pontius, R. and Strzepek, K., 1997, *Comprehensive assessment of the freshwater resources of the world – Water futures: assessment of long-range patterns and problems*, Document prepared for the fifth session of the United Nations Commission on Sustainable Development, 1997, Stockholm Environmental Institute, Stockholm.

[a](#) [b](#) [c](#)

3. As there are no agreed threshold values available for the EU assessment of WEI+, we indicatively keep the same threshold values as WEI, until any new thresholds are proposed.
[↩](#)
4. Feargemann, H., 2012, 'Update on water scarcity and droughts indicator development', (<https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/c676bfc6-e1c3-41df-8d31-38ad6341cbf9/details>) accessed December 15, 2020.
[↩](#)
5. UN, 2021, 'Indicator 6.4.2 'Level of water stress: freshwater withdrawal as a proportion of available freshwater resources'', (<https://www.sdg6monitoring.org/indicator-642/>) accessed May 27, 2021.
[↩](#)
6. Alcamo, J., Henrichs, T. and Rösch, T., 2000, *World water in 2025 – Global modelling and scenario analysis for the World Commission on Water for the 21st century*, Report, 2, Centre for Environmental Systems Research, University of Kassel, Germany.
[↩](#)
7. Smakhtin, V., Revenga, C. and Döll, P., 2004, *Taking into account environmental water requirement in global scale water resources assessment*, Research Report, 2, Comprehensive Assessment of Water Management in Agriculture, Colombo.
[↩](#)
8. FAO, 2017, 'Step-by-step monitoring methodology for indicator 6.4.2 level of water stress: freshwater withdrawal in percentage of available freshwater resources', (http://www.fao.org/elearning/course/SDG642/en/story_content/external_files/Step-by-step%20Methodology%20for%20indicator%206%204%202%20V20170719.pdf) accessed May 27, 2021.
[↩](#)



8th Environment Action Programme

Consumption footprint
(based on life cycle assessment)



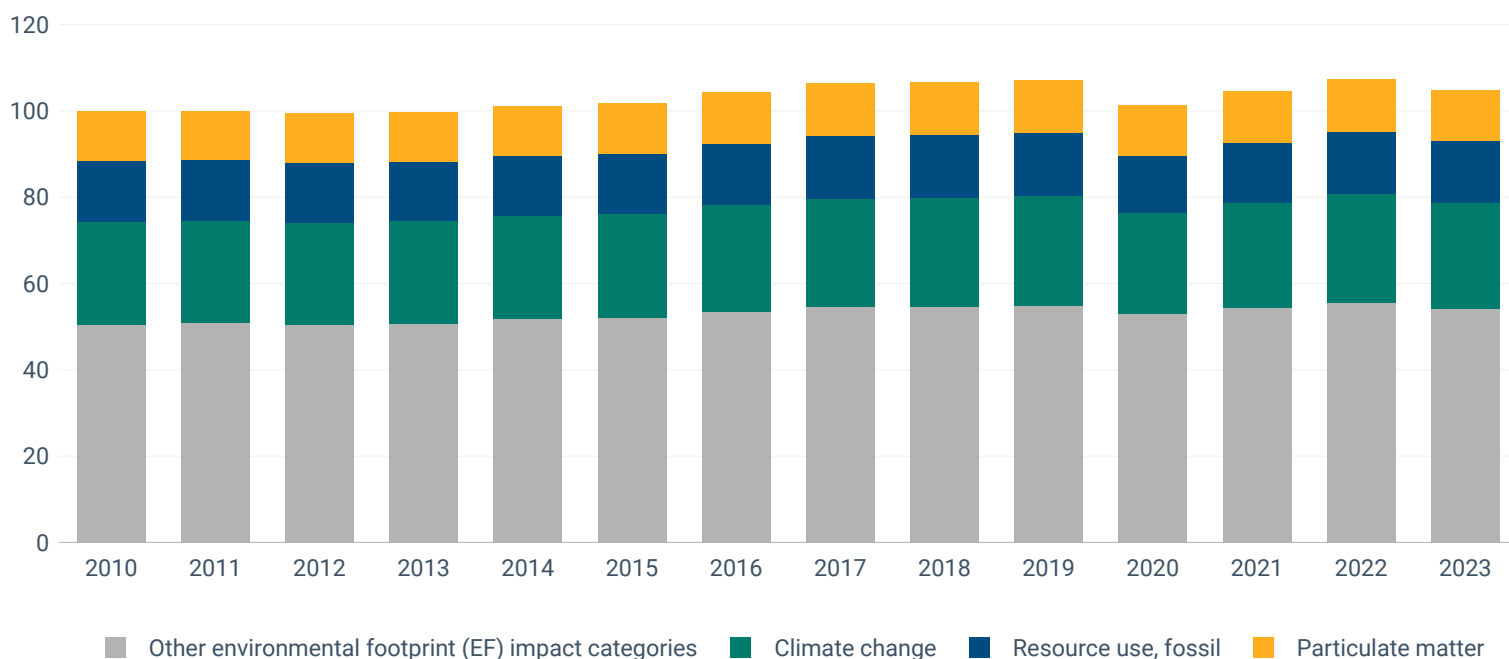
Consumption footprint (based on life cycle assessment) in Europe

Published 16 Sept 2025

The European Union's 8th Environment Action Programme aims to significantly reduce its consumption footprint by 2030, and keep related environmental impacts within planetary boundaries. These impacts stem from our consumption patterns and, depending on production locations, not confined to EU borders. During 2010-2023, the EU consumption footprint increased by around 5% and projections indicate a further increase by 2030, mainly attributed to economic growth and unsustainable consumption patterns. The EU is not presently on track to reduce its consumption footprint sufficiently. Switching to less harmful products and curbing consumption levels are strongly recommended to reach the target.

Figure 1. EU consumption footprint, in a single indexed score (2010=100), broken down into the most significant contributing impact categories of the Environmental Footprint (EF) method, from 2010 to 2023

Index (2010=100)



The [8th Environment Action Programme \(8th EAP\)](#) calls for a rapid, significant reduction in the EU's consumption footprint to align with planetary boundaries. To achieve this, the EU must accelerate its transition to adopting a **regenerative growth model**, to give back to the planet more than it takes, as outlined in the [Circular economy action plan](#).

The [consumption footprint](#) estimates the environmental and climate **impacts** occurring as a result of EU citizens' consumption of products and their use. The EU consumption footprint indicator methodology^[1] is based on life cycle assessment (LCA). It uses the [European Commission's environmental footprint method](#) to assess environmental impacts in 16 different categories, such as climate change, resource depletion, and particulate matter.

LCA data for a set of representative products are used to calculate environmental impacts per product, irrespective of production location, and scaled up to represent impacts from entire EU consumption, based on consumption statistics. The indicator can be aggregated to give a single score, based on a normalisation and weighting system (Figure 1).

The EU's consumption footprint per capita for the average EU citizen **increased**, by around 5% in the period 2010-2023. Gross domestic product (GDP) per capita increased by almost 17% in real terms over the same period. This indicates that the impacts of the EU's consumption are growing at a slower pace than its economy, suggesting a relative decoupling of the consumption footprint from economic growth.

On a per capita basis, the consumption footprint and GDP still appear to be somewhat **correlated** (e.g. both declined in 2020 during the economic slowdown from pandemic-related measures). This means that reducing the impacts of EU consumption in absolute terms in a growing economy will be challenging.

Food consumption **contributed the most** (49%) to the total environmental impact in the EU for 2023, followed by housing (18%) and mobility (17%). The largest contributions to the consumption footprint are those related to climate change (24%), the use of fossil resources (14%) and particulate matter release (11%).

The environmental impact of EU citizens' **consumption** is considered high overall. Evidence increasingly suggests that, based on current consumption footprint levels, **the EU exceeded its fair share of planetary boundaries for five environmental impact categories** in 2023, including: particulate matter, climate change and freshwater ecotoxicity ^[1].

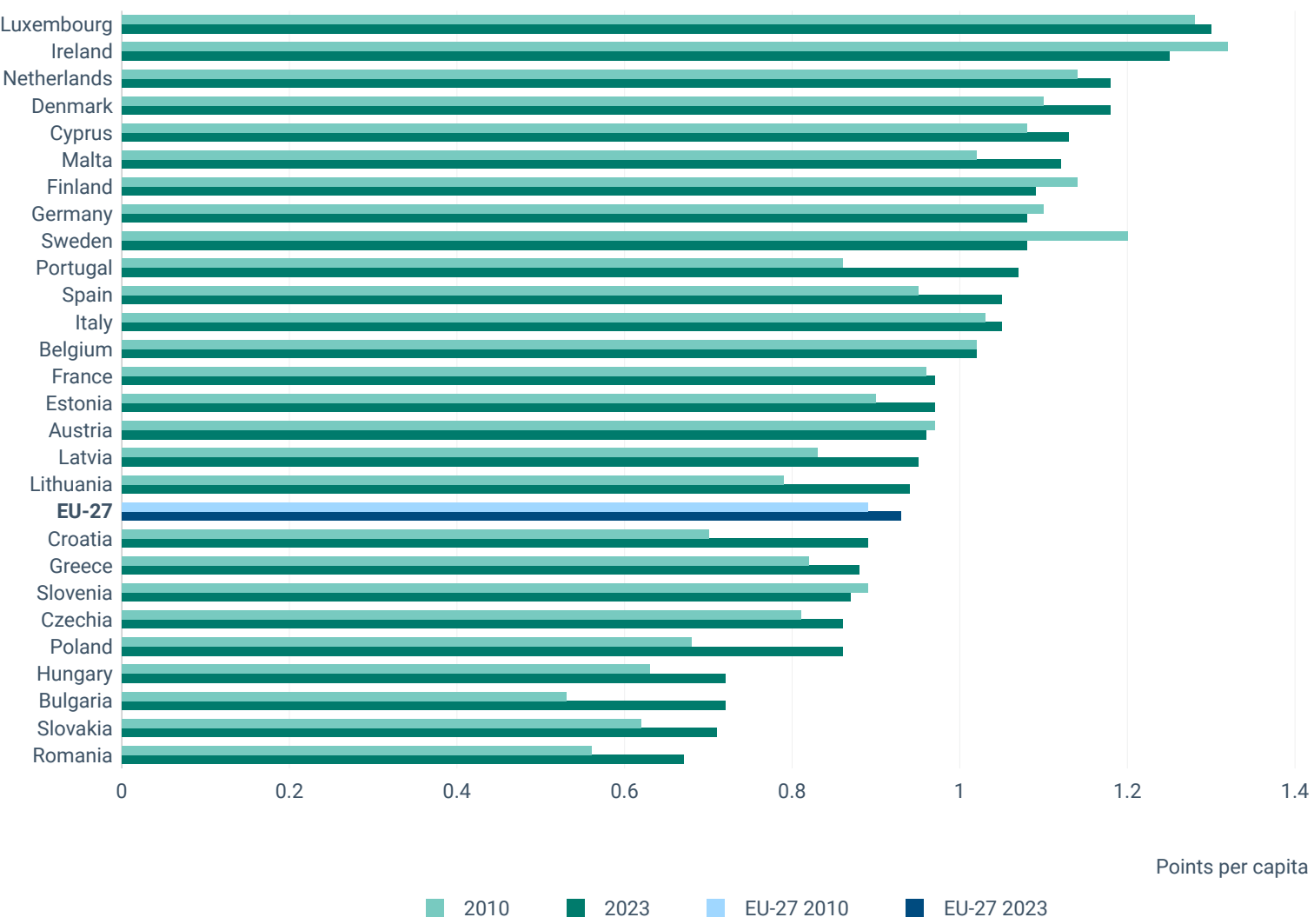
Based on current patterns and expected economic growth, the **EU's consumption footprint is projected to increase again by 2030**. Recent trends show the consumption footprint increased by 3.6% between 2020 and 2023. Therefore, the EU is not on track to meet its aim of significantly reducing this footprint by 2030.

The EU may reduce its consumption footprint by:

- reducing the overall amount of goods and services consumed;
- shifting to the consumption of goods with a lower environmental impact, or;
- a combination of the above.

It is worth noting that service consumption has frequently less of an impact on the environment than the consumption of goods. Adopting circular business models based on sharing or product-as-a-service schemes for example, would be beneficial.

Figure 2. Level of consumption footprint (points per capita) for EU countries in 2022 compared to 2010



In 2023, Luxembourg had the **highest** consumption footprint among the 27 EU Member States, while Romania had the **lowest**, at just over half of Luxembourg's. Nine countries had a footprint lower than the EU average. Between 2010 and 2023, 20 Member States showed increases in their consumption footprints, while only seven showed decreases.

Sweden showed the **highest decrease** of about 10%, followed by Ireland with 5%. However, most countries increased their footprint with Bulgaria, Croatia, Poland and Portugal registering increases higher than 20%. Interpreting these changes in national footprints is challenging. They depend on individual national economic structures and consumption patterns, as well as economic downturns over the 2010-2023 for some Member States. The changes may not be obvious to any concrete measures pursued by the countries to improve, optimise or decrease environmentally-related consumption patterns.

Supporting information

Definition

The EU consumption footprint indicator represents a summary of the environmental and climate impacts associated with the EU's consumption of goods and services, regardless of where in the world these goods and services are produced. The indicator is based on consumption statistics and process-based life cycle assessment (LCA) structured in a basket of

representative product of main areas of consumption. The assessment includes the 16 impact categories of the European Commission's environmental footprint method^[2], which are aggregated into a single weighted score.

Methodology

Different methodological approaches can be taken to calculating consumption footprints. The two most widely used are the 'top-down' and the 'bottom-up' approaches. The former derives environmental impacts of EU consumption from the observed environmental impacts of economic production, using macro-economic (input-output) modelling. The latter is based on combining macro-scale consumption statistics and LCA data to construct the consumption footprint by focusing on a basket of representative products for a number of consumption areas.

The footprint presented in this indicator is based on the latter methodological approach, as this has been developed by the European Commission's Joint Research Centre. The methodology documents available through the [Consumption Footprint Platform](#) explain the precise method and calculations used to derive this consumption footprint ^[3].

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting targets of the 8th EAP. It contributes mainly to monitoring progress in relation to aspects of 8th EAP Article 3(s), which requires the following: 'significantly decreasing the Union's material and consumption footprints to bring them into planetary boundaries as soon as possible, including through the introduction of Union 2030 reduction targets, as appropriate' ^[4]. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the EU's progress towards achieving the target to 'significantly decrease the EU's consumption footprint, i.e. the environmental impact of consumption' ^[5].

Accuracy and uncertainties

Data sources and providers

- [EU consumption footprint weighted score](#), Joint Research Center (JRC)

▼ Metadata

DPSIR

Impact

Topics

[# Sustainability solutions](#)

Tags

[# WST010](#) [# 8th EAP](#) [# service consumption](#) [# Sustainability](#) [# consumption footprint](#) [# EU consumption](#)

Temporal coverage

2010-2023

Geographic coverage

Austria
Bulgaria

Belgium
Croatia

Cyprus
Denmark
Finland
Germany
Hungary
Italy
Lithuania
Malta
Poland
Romania
Slovenia
Sweden

Czechia
Estonia
France
Greece
Ireland
Latvia
Luxembourg
Netherlands
Portugal
Slovakia
Spain

Typology

Performance indicator (Type B - Does it matter?)

UN SDGs

SDG12: Responsible consumption and production

Unit of measure

Figure 1: The EU consumption footprint is shown as a single indexed score (2010=100) and is broken down according to the impact categories of the environmental footprint (EF) method that make the most significant contribution to the consumption footprint – ‘climate change’, ‘resource use, fossil’ and ‘particulate matter’ – and other EF impact categories

Figure 2: Points per capita

Extra figure: Number of times the planetary boundaries are transgressed

Frequency of dissemination

Once a year

▼ References and footnotes

1. SANYE MENGUAL, E., PASQUALINO, R., OMODARA, L., FRANKOWSKA, A., WIERZGALA, P., CHIORRINI, A., BENNETT, M.J., LISTORTI, G. and SALA, S., 2025, *Consumption Footprint and Domestic Footprint Monitoring Report 2024*, JRC Science for Policy Report, Publications Office of the European Union, Luxembourg.
[a](#) [b](#)
2. EU, 2021, Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the environmental footprint methods to measure and communicate the life cycle environmental performance of products and organisations, OJ L 471, 30.12.2021, p. 1-396.
[↩](#)
3. EC, 2023, 'Consumption Footprint Platform – EPLCA', *European Commission* (<https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>) accessed February 1, 2023.
[↩](#)
4. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36.
[↩](#)

5. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.

[↗](#)



8th Environment Action Programme

Employment in the environmental
goods and services sector

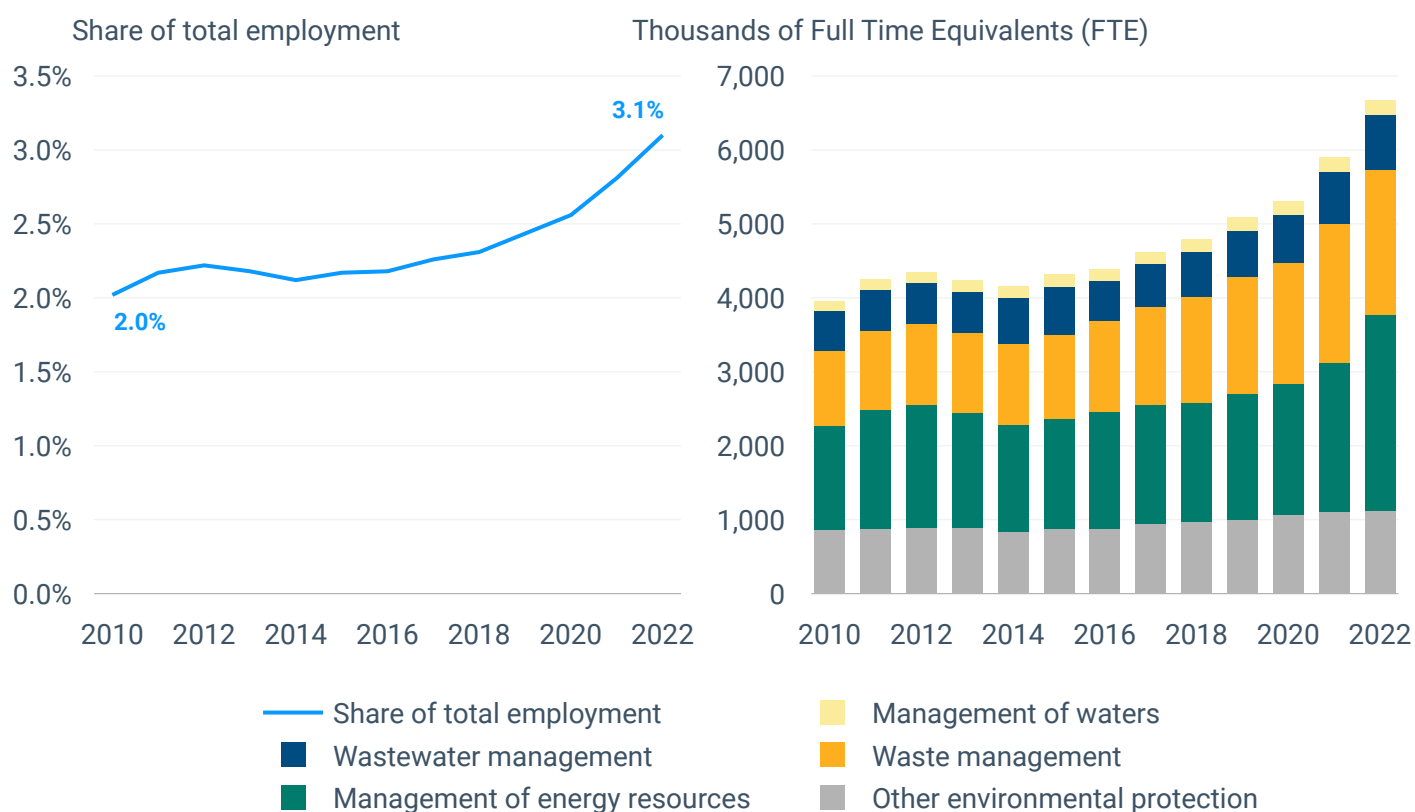


Employment in the environmental goods and services sector in Europe

Published 16 Sept 2025

Employment in the EU's environmental goods and services sector grew at a faster rate than the overall employment rate in the last decade. It increased from 2.02% of total employment in 2010 to 3.1% in 2022, with 6.67 million full-time equivalent employees in the sector. This was mainly due to the creation of jobs related to renewable energy, energy efficiency and waste management. The EU aims to accelerate the green transition of its economy and become carbon neutral by 2050. This is expected to boost jobs in the EU's green economy in the coming years and further increase the share of green employment in the EU economy.

Figure 1. Employment in the EU's environmental goods and services sector by domain, 2010-2022



The [European Green Deal](#) and the [Eighth Environment Action Programme \(8th EAP\)](#) aim to accelerate the green transition of the European Union's (EU) economy. The EU's environmental goods and services sector, also known as **the green economy**, produces goods and provides services that are used for environmental protection and resource management activities.

Employment in the EU's green economy as a share of employment in the EU's whole economy **increased** by 1.1 percentage points (or 2.7 million full-time equivalents (FTEs)) from 2010 to 2022. This represents an increase of 68.9%, compared with an increase of only 9.7% in employment in the EU's overall economy in the same period. This shows that pursuing environmental objectives has the potential to create jobs in the EU.

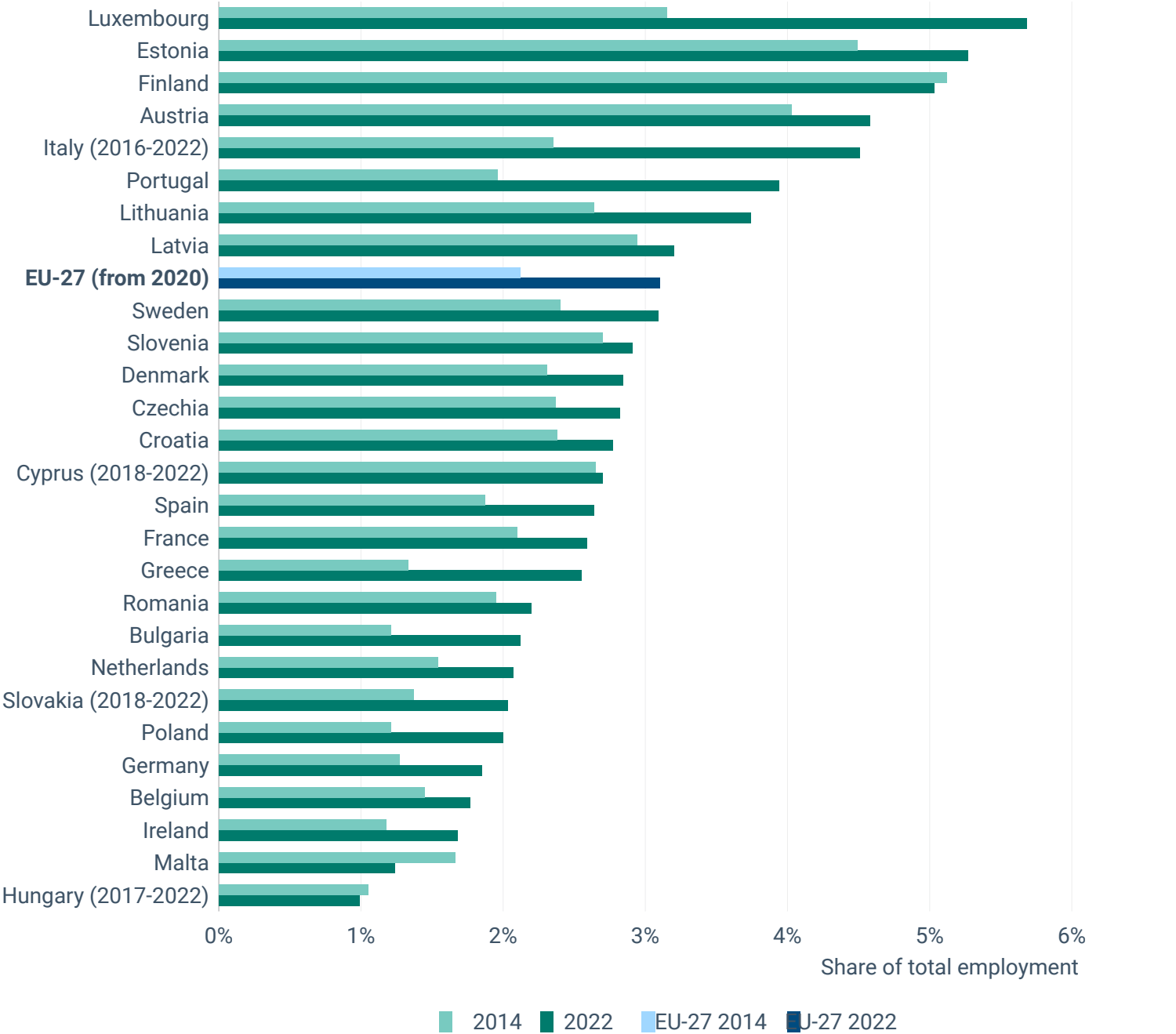
By 2022, the environmental goods and services sector **employed 6.67 million** people (in FTEs) in the EU, accounting for about 3.1% of total EU employment. The increase in green employment between 2010 and 2022 was largely driven by an increase of 1.26 million FTEs in the number of jobs related to the management of energy resources^[1]. For instance jobs related to:

- producing renewable energy;
- manufacturing equipment needed to generate renewable energy, such as wind turbines and photovoltaic cells;
- manufacturing energy-efficient equipment;
- research and development (R&D) activities, and;
- installation, consultancy and management services.

The **second largest contributor** to the increase in green employment was waste management, with the number of jobs in this domain increasing by 938,000 FTEs over the same period. Employment in all other domains increased to varying degrees. Increases were found, from a small base, in the management of water (+49%), wastewater management (+41%), waste management (+41%) and other environment protection domains (+28%).

Steps taken to support the green transition will create more green employment in the EU by 2030, mainly through applying circular economy principles^[2] and moving towards a low-carbon economy^{[3][4][5]}. It is therefore expected that, through policies, measures and investments, green employment will account for a higher share of total employment in the EU by 2030.

Figure 2. Employment in the environmental goods and services sector as a share of total employment, by EU Member States, 2014 and 2022



Shares of green employment in total employment increased in most EU Member States between 2014 and 2022. Exceptions were in Malta (decrease of 0.4%), Hungary (decrease of 0.1% since 2017), Finland (decrease of 0.1%). The largest increases were reported for Luxembourg (2.5%), Italy (2.2%) and Portugal (2%).

The **domains** accounting for most employment in the environmental economy differ between EU Member States. During 2022, employment in resource management activities (i.e. management of energy and of water resources) accounted for most environmental employment in Luxembourg (70%), Sweden (68%), Finland (40%). In contrast, employment in environmental protection activities (e.g. waste and wastewater management activities) accounted for most environmental employment in Malta (58%), and Croatia (52%)^[6].

Highest shares of green employment in total employment for 2022 were in Luxembourg, Finland and Estonia, with green jobs making up more than 5% of all jobs in these countries. Moreover, a share of close to 5% was reported for Finland and Austria. The lowest shares, of 1.5% or less, were reported for Hungary and Malta.

▼ Supporting information

Definition

The indicator 'Employment in the environmental goods and service sector' monitors employment in the EU's environmental (or green) economy. The indicator builds on Eurostat statistics on employment and growth in the [EU's](#) environmental economy, as they are defined in the European environmental goods and service sector (EGSS) accounts. 'The environmental economy encompasses activities and products that serve either of two purposes: "environmental protection" – that is, preventing, reducing and eliminating pollution or any other degradation of the environment, or "resource management" – that is, preserving natural resources and safeguarding them against depletion'^[6].

For further information, see [Eurostat \(2016\)](#).

Methodology

This indicator is directly based on data published by Eurostat, and the underpinning methodology can be found in Eurostat^[6]. EU-level data are based on Eurostat estimates. A detailed discussion of statistics on the environmental goods and services sector can be found in [Eurostat \(2016\)](#).

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting targets of the [8th EAP](#). It contributes mainly to monitoring progress in relation to aspects of Article 2.1, which requires that, 'by 2050 at the latest, people live well, within the planetary boundaries in a well-being economy where nothing is wasted, growth is regenerative, climate neutrality in the Union has been achieved and inequalities have been significantly reduced. A healthy environment underpins the well-being of all people and is an environment in which biodiversity is conserved, ecosystems thrive, and nature is protected and restored, leading to increased resilience to climate change, weather- and climate-related disasters and other environmental risks. The Union sets the pace for ensuring the prosperity of present and future generations globally, guided by intergenerational responsibility'^[7]. The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should monitor the 'increase of the shares... of green employment in the whole economy'^[8].

Data sources and providers

- [Employment in the environmental goods and services sector](#)
[env_ac_egss1__custom_10715540], EUROSTAT -Statistical Office of the European Union
- [Employment by main industry \(NACE Rev.2\) - national accounts](#)
[NAMA_10_A10_E__custom_10717044], EUROSTAT - Statistical Office of the European Union

▼ Metadata

DPSIR

Response

Topics

[# Sustainability solutions](#)

Tags

[# green economy](#) [# 8th EAP](#) [# environmental goods](#) [# environmental economy](#) [# SUS0002](#)

[# Employment](#)

Temporal coverage

2010-2022

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG8: Decent work and economic growth

Unit of measure

Employment in the environmental goods and services sector is measured in thousands of full-time equivalents (total hours worked divided by the average annual hours worked in a full-time job) and as a share (%) of total employment.

Frequency of dissemination

Once a year

▼ References and footnotes

1. Eurostat, 2016, *Environmental goods and services sector accounts handbook: 2016 edition*, Publications Office of the European Union, Luxembourg.
[↩](#)
2. A study estimates that applying circular economy principles across the EU economy has the potential to create around 700,000 new jobs by 2030 (see footnote No. 5)
[↩](#)
3. EC, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'A new circular economy action plan for a cleaner and more competitive Europe', COM(2020) 98 final of 11 March 2020.
[↩](#)
4. EC, 2020, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'A new industrial strategy for Europe', COM(2020) 102 final of 10 March 2020.
[↩](#)
5. IRENA and ILO, 2022, *Renewable energy and jobs: annual review 2022*, International Renewable Energy Agency and International Labour Organization.
[↩](#)
6. Eurostat, 2024, 'Environmental economy – statistics on employment and growth', *Eurostat Statistics Explained* (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_economy_%E2%80%93_statistics_on_employment_and_growth).
[a](#) [b](#) [c](#)
7. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36.

↵

8. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.

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8th Environment Action Programme

Gross value added of the environmental goods and services sector

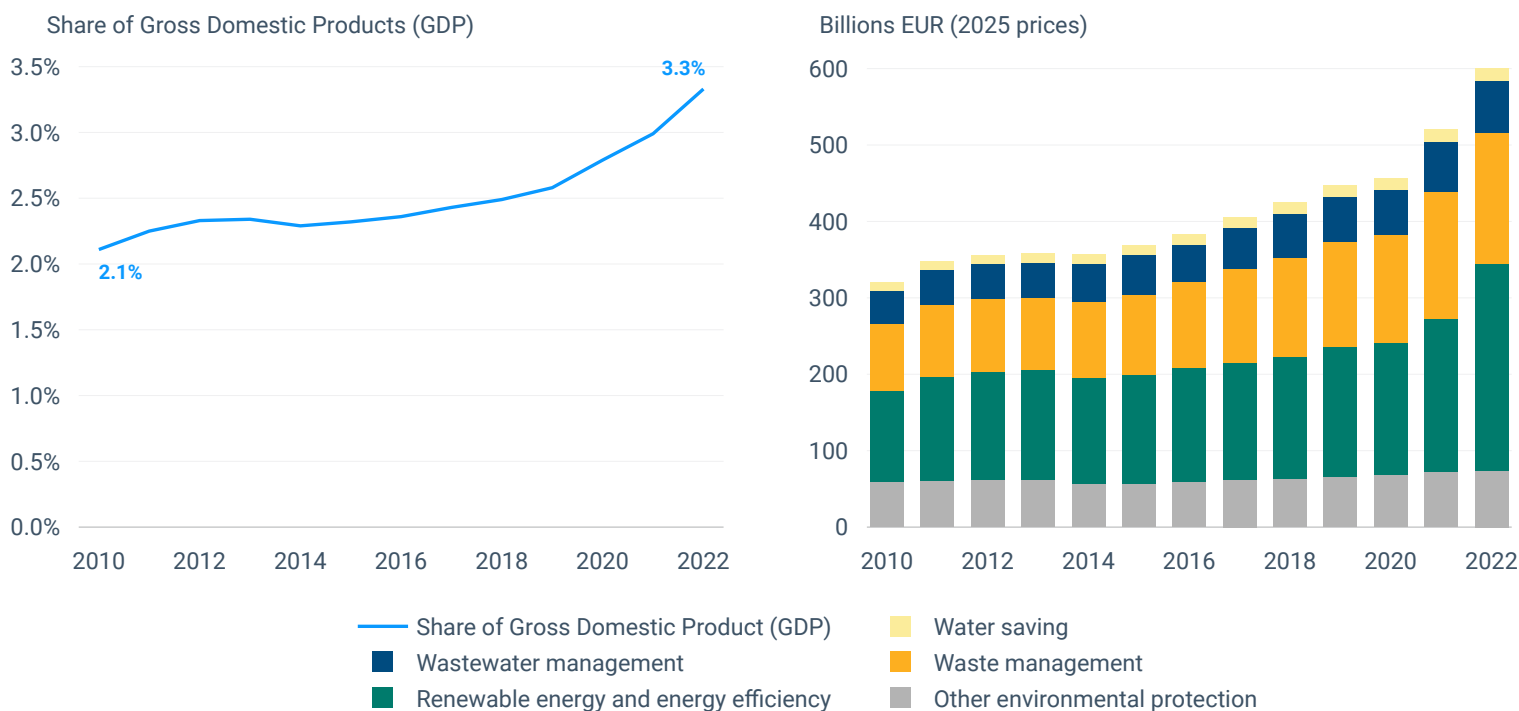


Gross value added of the environmental goods and services sector in Europe

Published 30 Sept 2025

The environmental goods and services sector contribution to the European Union economy, in terms of value added, increased from 2.1% in 2010 to 3.3% in 2022, reaching EUR 601 billion in 2025 prices. This rise was mainly caused by significant increases in environmental economy activities related to renewable energy production, energy efficiency, and waste management. The EU aims to achieve a green transition and carbon-neutral economy by 2050. This requires further significant increases in environmental economy activities.

Figure 1. Gross value added of the EU's environmental goods and services sector by domain, 2010-2022



The **European Green Deal** (EGD) and the **8th Environment Action Programme** (8th EAP) aim to accelerate the green transition of the European Union's (EU) economy. The EU's environmental goods and services sector, also known as the **green economy**, produces goods and provides services that are used in environmental protection and resource management.

The **contribution** of the environmental economy to the overall economy (i.e. to gross domestic product (GDP)) in the EU increased from 2.1% in 2010 to 3.3% in 2022. Over this period, the environmental economy increased by 5.4% annually on average, while EU GDP increased by 3.2%.

The main domains of the green economy increased in the period 2010-2022 for **gross value added** (GVA). Most growth was due to increases in the GVA of renewable energy and energy efficiency activities, followed by waste management activities. In 2022, green economy activities contributed a GVA of EUR 601 billion (2025 prices) to the EU-27 economy.

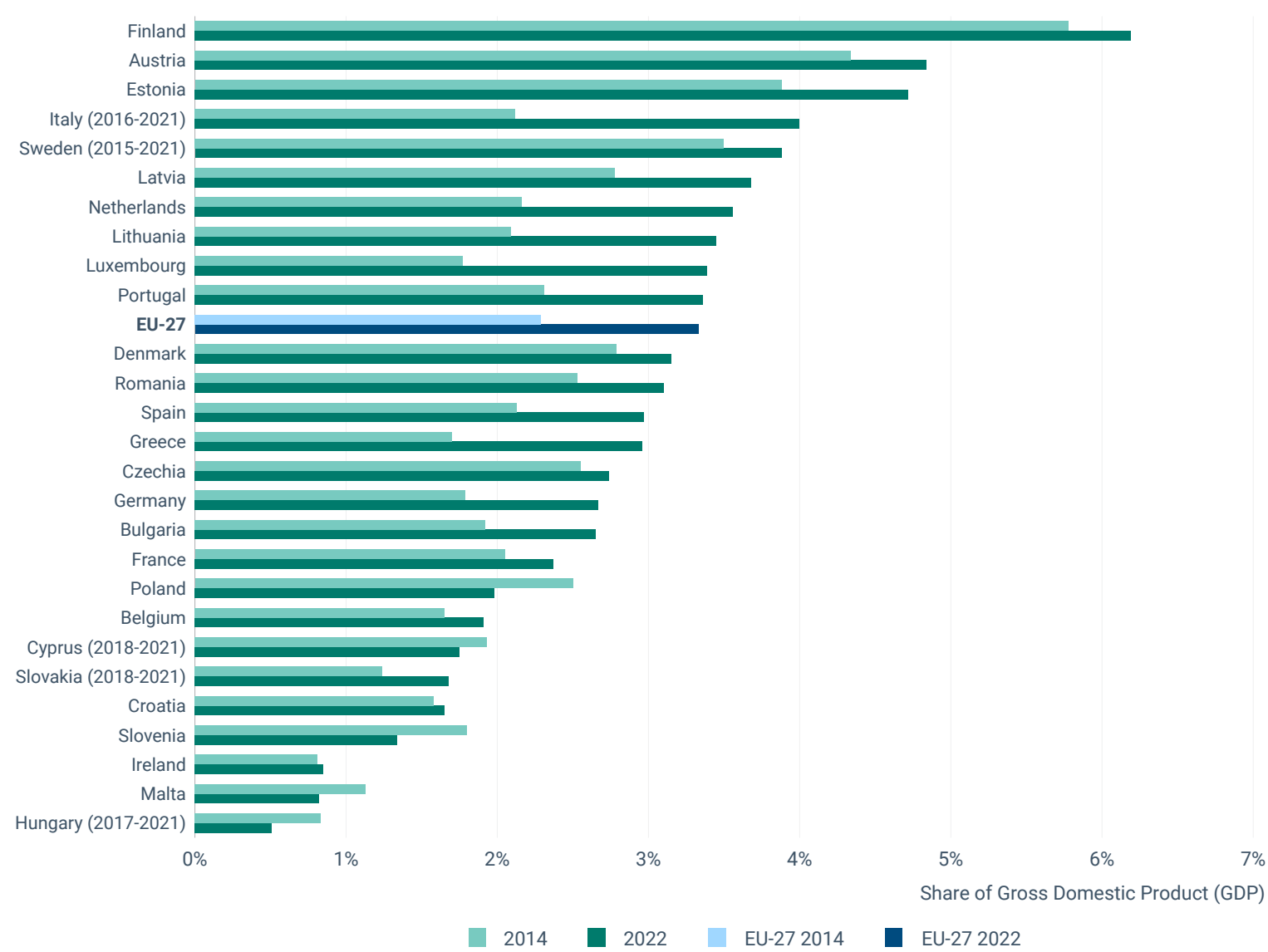
The EGD increases the ambition of EU environment and climate policy, to support the transition to a carbon-neutral, circular, green economy by 2050. It is expected that the contribution of the green economy to EU GDP will increase further in the coming years.

The application of **circular economy principles** across the EU is expected to increase EU GDP by an additional 0.5% by 2030^[1]. Significant additional economic activity will be required to implement the **'Fit for 55' package**, which aims to raise output from renewable energy sources, such as solar energy or offshore wind sources, and improve energy efficiency. The **Net Zero Industry Act**, striving to scale up manufacturing of clean technologies, will also boost the competitiveness of EU industry and increase economic activity within the EU.

Additional resources have been made available to support the **expansion** of the EU's environmental economy. The EU 2021-2027 budget has earmarked additional funding for climate- and biodiversity-related activities^[2]. Grants and loans are available through the 2021-2026 EU Recovery and Resilience Facility (RRF)^[2] for climate-related activities and through the 2022-2027 **REPowerEU plan** for activities related to renewable energy and energy efficiency. The RRF was created to mitigate the social and economic impacts of the COVID-19 pandemic. The REPowerEU plan was devised to rapidly reduce the EU's dependence on Russian fossil fuels following Russia's invasion of Ukraine and accelerate the clean energy transition.

The EU's recently announced **Clean Industrial Deal (CID)** commits €100 billion to **accelerate the clean energy transition**, focusing on decarbonising energy-intensive industries through investment in clean technologies and infrastructure. Building on this foundation, the CID continues to advance decarbonisation while placing additional emphasis on competitiveness.

Figure 2. Gross value added of the environmental goods and services sector as a share of gross domestic product, by EU Member States, 2014 and 2022



Environmental economy activities are expected to increase in importance at global level. A recent report estimates that the **global market volume** for environmental technology and resource efficiency activities will increase by 7.3% per year until 2030^[3]. Increasing opportunities for the environmental economy, particularly for economic sectors that contribute to achieving net-zero emissions, are also highlighted in the International Energy Agency reports 'World energy outlook 2023'^[4] and 'Energy technology perspectives 2023'^[5].

Shares of the environmental economy in the total economy increased in 23 of the EU Member States between 2014 and 2022, with the biggest increases reported for Luxembourg and Italy. Shares varied considerably across Member States in 2022, from approximately 0.5% in Hungary to more than 4% in Finland, Austria and Estonia.

▼ Supporting information

Definition

The indicator 'Gross value added of the environmental goods and services sector' monitors the gross value added of the economic activities of the EU's environmental (or green) economy. The indicator builds on Eurostat statistics on employment and growth in the [EU's](#) environmental economy, as they are defined in the European environmental goods and services sector accounts. 'The environmental economy encompasses activities and products that serve either of two purposes: "environmental protection" – that is, preventing, reducing and eliminating pollution or any other degradation of the environment, or "resource management" – that is, preserving natural resources and safeguarding them against depletion'^[6].

For further information, see [Eurostat \(2016\)](#).

Methodology

This indicator is directly based on data published by Eurostat, and the underpinning methodology can be found in [Eurostat \(2023\)](#). EU-level data are based on Eurostat estimates. A detailed discussion of statistics on the environmental goods and services sector can be found in [Eurostat \(2016\)](#).

Data were adjusted to 2024 price levels using the price component of Eurostat's GDP aggregate (indicator nama_10_gdp). For 2025, a 2 % general inflation rate, based on European Central Bank projections, was applied.

Policy/environmental relevance

This indicator is a headline indicator for monitoring progress towards meeting targets of the [8th EAP](#). It contributes mainly to monitoring progress in relation to aspects of Article 2.1, which requires that, 'by 2050 at the latest, people live well, within the planetary boundaries in a well-being economy where nothing is wasted, growth is regenerative, climate neutrality in the Union has been achieved and inequalities have been significantly reduced. A healthy environment underpins the well-being of all people and is an environment in which biodiversity is conserved, ecosystems thrive, and nature is protected and restored, leading to increased resilience to climate change, weather- and climate-related disasters and other environmental risks. The Union sets the pace for ensuring the prosperity of present and future generations globally, guided by intergenerational responsibility'^[7]. The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should monitor the 'increase of the shares of the green economy... in the whole economy'^[8].

Accuracy and uncertainties

Data sources and providers

- [Production, value added and exports in the environmental goods and services sector](#), Statistical Office of the European Union (Eurostat)
- [Gross domestic product \(GDP\) and main components \(output, expenditure and income\)](#), Statistical Office of the European Union (Eurostat)
- [Production, value added and exports in the environmental goods and services sector \(env_ac_egss2\)](#), Statistical Office of the European Union (Eurostat)

▼ Metadata

DPSIR

Response

Topics

[# Sustainability solutions](#)

Tags

[# GDP](#) [# Gross value added](#) [# green economy](#) [# 8th EAP](#) [# GVA](#) [# goods and services](#) [# environment](#)
[# European Green Deal](#) [# environmental economy](#) [# SUSO003](#) [# green transition](#)

Temporal coverage

2010-2022

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG8: Decent work and economic growth

Unit of measure

The gross value added of the environmental goods and services sector is measured in billion euros (EUR) and as a share (%) of total economy GDP.

Frequency of dissemination

Once a year

▼ References and footnotes

1. EC, 2020, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'A new circular economy action plan for a cleaner and more competitive Europe', COM(2020) 98 final of 11 March 2020.
[↩](#)
2. EC, 2021, *The EU's 2021-2027 long-term budget and NextGenerationEU – facts and figures*, Publications Office of the European Union, Luxembourg.
[a](#) [b](#)
3. BMU, 2021, *GreenTech made in Germany 2021: environmental technology atlas for Germany*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin.
[↩](#)
4. IEA, 2023, *World Energy Outlook 2023*, International Energy Agency.
[↩](#)
5. IEA, 2023, *Energy technology perspectives 2023*, International Energy Agency.
[↩](#)
6. Eurostat, 2023, 'Environmental economy – statistics on employment and growth', *Eurostat Statistics Explained* (http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_economy_%E2%80%93_statistics_on_employment_and_growth) accessed March 7, 2023.
[↩](#)
7. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030, OJ L 114, 12.4.2022, p. 22-36.
[↩](#)
8. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
[↩](#)



8th Environment Action Programme

Environmental inequalities: GDP-related air pollution exposure inequalities between regions in Europe

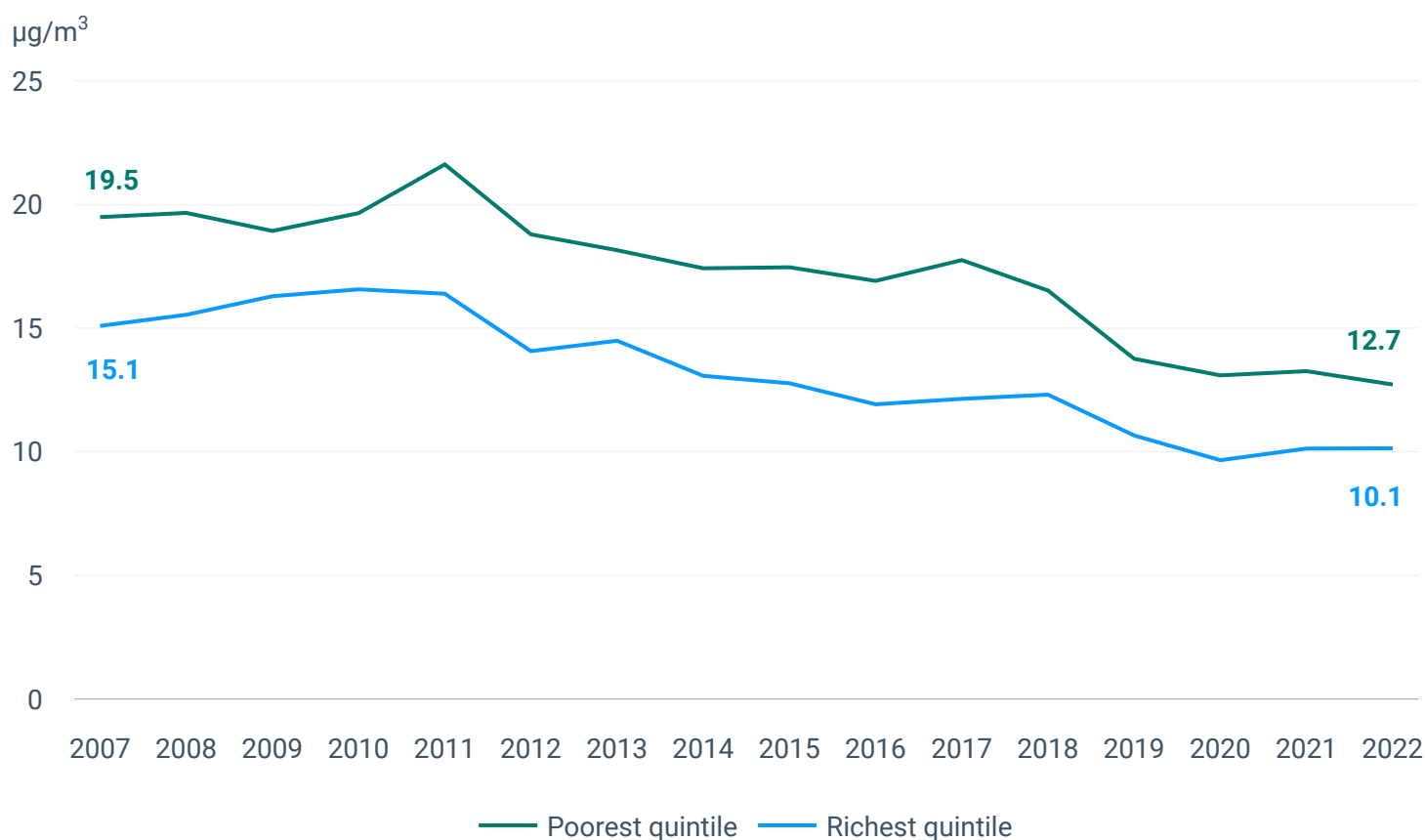


GDP-related air pollution exposure inequalities between regions in Europe

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Air pollution poses the greatest environmental risk to health in Europe. Fine particulate matter (PM_{2.5}) causes more premature deaths in Europe than any other air pollutant. Despite improving trends in air pollution in both the richest and poorest regions of the European Union over the 2007-2022 period, inequalities remain with PM_{2.5} concentrations consistently higher by around one third in the poorest regions.

Figure 1. Population-weighted concentration of PM_{2.5} in the richest and poorest (as measured by GDP per capita, PPS) quintile of NUTS3 regions in the EU-27, 2007-2022



Air pollution poses the greatest environmental risk to health in Europe. Fine particulate matter with a diameter of 2.5µm or less (PM_{2.5}) is the ambient air pollutant associated with the **highest number of premature deaths**, with no threshold below which exposure is considered safe for human health^[1]. PM_{2.5} exposure has also been shown to be a reliable indicator of risk associated with air **pollution** in general^[2]. Monitoring PM_{2.5} levels is thus useful for exploring inequalities in the distribution of exposure to and potential health impacts of air pollution across EU regions.

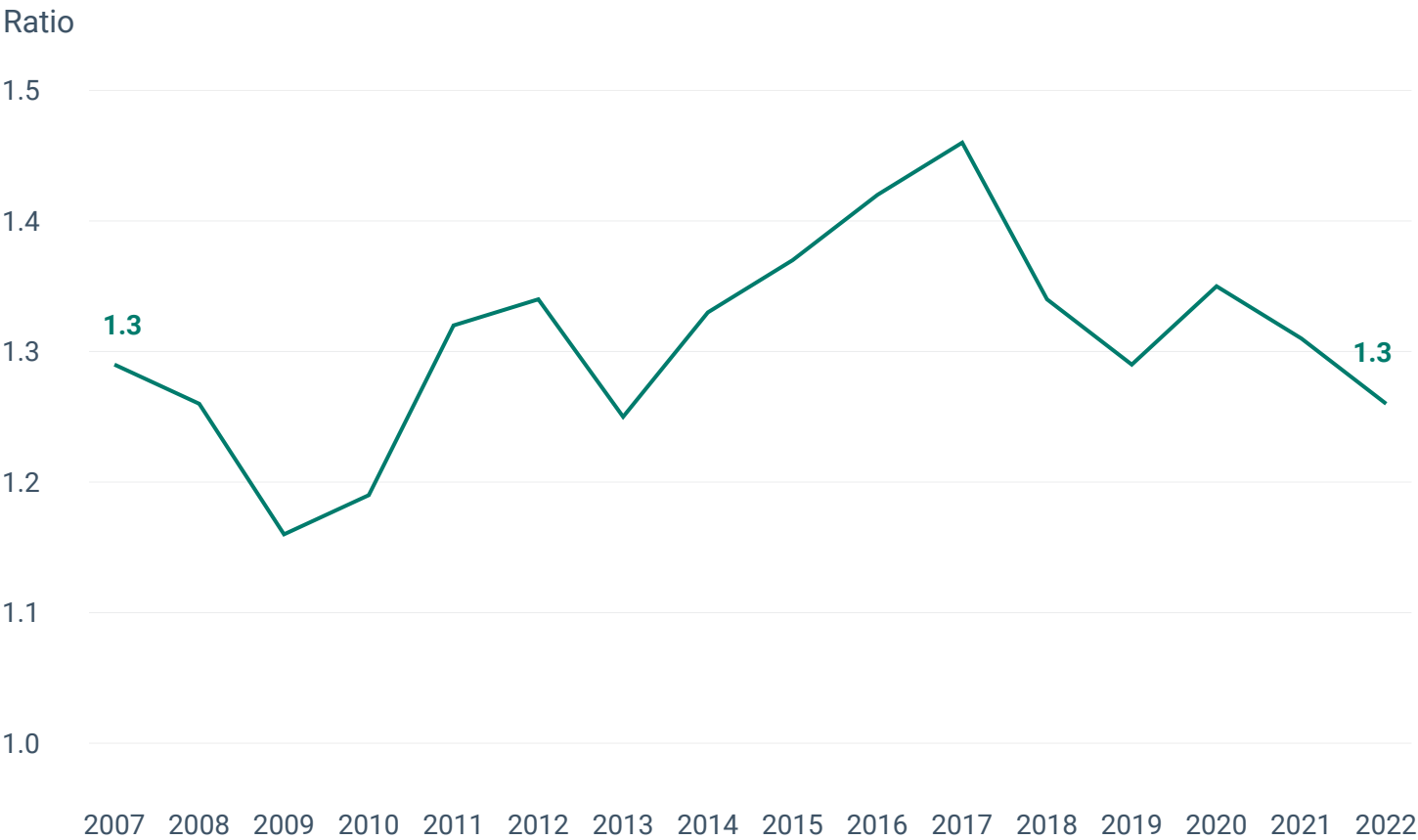
This indicator explores these **inequalities** by comparing the exposure to air pollution from fine particulate matter experienced by the population living in the poorest regions of the EU with that in the richest regions. The analysis uses population-weighted concentrations of PM_{2.5} in the 20% NUTS3 regions (i.e. in small regions similar to a prefecture) with the lowest GDP per capita (in terms of purchasing power) and in the 20% NUTS3 regions with the highest GDP per capita. Exposure at NUTS3 is an imperfect proxy for actual inequalities in air pollution exposure, yet data availability limitations currently preclude a finer analysis^[3].

Between 2007 and 2022, air quality, measured as population-weighted **concentrations** of PM_{2.5}, improved in both the richest and poorest quintiles of the EU-27's NUTS3 regions (Figure 1). However, regions in the richest quintile had lower initial PM_{2.5} levels (around 15µg/m³ in 2007) than those in the poorest quintile (19.5µg/m³ in 2007). Compared with 2021, PM_{2.5} concentrations decreased slightly in 2022 on average in the poorest quintile (an average decrease of 0.54µg/m³) but did not vary greatly in the richest quintile (average increase of 0.01µg/m³).

PM_{2.5} concentrations have **decreased** at relatively similar rates^[4] in regions in the richest quintile (2.40% average annual decrease in the period of analysis)^[5] and poorest quintile (2.58% average annual decrease). However, despite improving trends in air pollution in both the richest and the poorest regions of the EU over the 2007-2022 period, inequalities remained with levels of PM_{2.5} consistently higher by around one third in the poorest regions (Figure 2).

This indicator, defined as the ratio of population weighted concentration of PM_{2.5} in EU NUTS3 regions in the poorest and richest quintiles, remained **overall stable**^[6] over the 2007-2022 period, and well above 1.0. This indicates that there has been no progress in reducing air pollution exposure inequalities in the EU so far.

Figure 2. Ratio of PM_{2.5} population weighted concentrations: poorest quintile/richest quintile (GDP per capita PPS) of NUTS3 regions



Some of the **most polluted** NUTS3 regions spatially coincide with the poorest regions in the eastern part of Europe, yet there are pockets of highly polluted NUTS3 regions elsewhere in Europe with both high and low purchasing power per capita. However, almost no NUTS3 regions in the richest quintile are in the quintile with the most pollution.

The absence of disaggregated projections at the NUTS3 level for both PM_{2.5} concentrations and purchasing power means that **no reasonable outlook can be given** for this indicator based on existing evidence. While there are national level projections in PM_{2.5} emissions and concentrations (including cross-border transfers) by country stemming from the [Fourth Clean Air Outlook](#), these cannot be readily used to derive NUTS3-level extrapolations. Nor would it be reasonable to assume that NUTS3 GDP per capita levels will remain constant or grow linearly. However, the lack of significant progress in the past does not support the expectation of better performance in the near future.

Supporting information

Definition

This indicator monitors concentrations of PM_{2.5} in the richest and poorest NUTS3 regions of the EU-27. More specifically, it measures the ratio of population-weighted PM_{2.5} concentrations of the poorest quintile compared to the ones of the richest quintile (based on GDP per capita at purchasing power standard) at NUTS3-region level. Population-weighting is a statistical technique that assigns greater weight to the air pollution experienced where most people live. Gross Domestic Product (GDP) is a basic measure of the overall size of a country's or region's economy. Per capita (Latin: "per head") indicates the average per person in a group, in this case the population of a given NUTS3 region. NUTS3 is the smallest subdivision of the [NUTS classification](#) (Nomenclature of territorial units for statistics), a hierarchical system for dividing up the economic territory of the EU. PPS, purchasing power standard, is an artificial currency unit with which theoretically, one could buy the same amount of goods and services in each country. PPS is a more accurate way to compare wealth per capita than raw GDP because it reduces the effect of price differences. PM_{2.5} refers to particulate matter with a diameter of 2.5µm or less.

The definitions of GDP, per capita and PPS come from the Eurostat glossary: (<https://ec.europa.eu/eurostat/statistics-explained>).

Methodology

The indicator is formally defined as '[PM_{2.5} exposure ratio between the poorest and the richest quintile \(GDP per capita at purchasing power standard\) of NUTS3 regions](#)'.

The indicator is calculated via the formula:

Exposure ratio = Pop. weighted PM_{2.5} exposure (µg/m³) PQ/Pop.weighted PM_{2.5} exposure (µg/m³) RQ.

Where:

'Pop. weighted PM_{2.5} exposure (µg/m³) PQ' is the annual average population-weighted concentration of PM_{2.5} in ambient air measured in micrograms per cubic meter of the poorest quintile of NUTS3 regions, measured based on GDP per inhabitant at purchasing power standard in euros.

'Pop. weighted PM_{2.5} exposure (µg/m³) RQ' is the annual average population-weighted concentration of PM_{2.5} in ambient air measured in micrograms per cubic meter of the richest quintile of NUTS3 regions, measured based on GDP per inhabitant at purchasing power standard in euros.

Because the numerator and denominator of this indicator are in the same units, the resulting ratio has no units. Both parts of this ratio are easily measurable and based on readily available data. In an "environmentally equal" Europe, in terms of PM_{2.5}, this ratio would be close to one. If the poorer regions were more polluted than the richer regions, the ratio would be greater than one; a ratio of lower than one would indicate the opposite.

Policy/environmental relevance

This indicator provides an objective and comparable estimate over time of the inequalities in PM_{2.5} exposure (and thus of associated health risks) between the poorest and the richest regions in Europe. This indicator is also a proxy headline indicator on environmental inequalities for monitoring progress towards the 8th Environment Action Programme (8th EAP). It contributes mainly to monitoring aspects of the 8th EAP Article 2.1 that requires 'by 2050 at the latest, people live well, within the planetary boundaries in a well-being economy where nothing is wasted, growth is regenerative, climate neutrality in the Union has been achieved and inequalities have been significantly reduced'. It further contributes to monitoring aspects of the Article 3.f which requires 'ensuring that social inequalities resulting from climate- and environmental-related impacts and policies are minimised and that measures taken to protect the environment and climate are carried out in a socially fair and inclusive way'. The European Commission Communication on the 8th EAP monitoring framework specifies that this indicator should monitor whether the EU 'reduces environmental inequalities and ensures a fair transition', (EC, 2022).

EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030, OJL 114, 12.4.2022, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022D0591> accessed October 24, 2022.

Accuracy and uncertainties

GDP per capita at NUTS3 level is an imperfect measure of economic deprivation, but it is a fair proxy that is published regularly and easy to understand for most audiences. The assessment of population weighted concentrations also has uncertainties inherent to the estimation, though those are known and limited. The trend analyses for this indicator is performed via linear regression and a T test for the significance of slope value. The indicator showed from 2007 to 2022 a small but statistically significant ($p < 0.05$) upward linear slope of 0.02. However, with such a small value and a standard error of around 0.01, this trend cannot be assessed as significantly different from stable.

Data sources and providers

- Burden of disease of air pollution (Countries & NUTS), European Environment Agency (EEA)
- Gross domestic product (GDP) at current market prices by NUTS 3 region (nama_10r_3gdp), Statistical Office of the European Union (EUROSTAT)

▼ Metadata

DPSIR

State

Topics

Air pollution # Environmental inequalities # Environmental health impacts

Tags

[# 8th EAP](#) [# income](#) [# AIR009](#) [# inequalities](#) [# air pollution](#)

Temporal coverage

2007-2022

Geographic coverage

Austria	Belgium
Bulgaria	Croatia
Cyprus	Czechia
Denmark	Estonia
Finland	France
Germany	Greece
Hungary	Ireland
Italy	Latvia
Lithuania	Luxembourg
Malta	Netherlands
Poland	Portugal
Romania	Slovakia
Slovenia	Spain
Sweden	

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

SDG3: Good health and well-being

Unit of measure

The population-weighted concentrations of PM_{2.5}

are measured in micrograms per cubic meter and the ratio of population-weighted concentrations of PM_{2.5} has no units, it is expressed as ratio.

Frequency of dissemination

Once a year

▼ References and footnotes

1. WHO global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide, 2021, (<https://www.who.int/publications-detail-redirect/9789240034228>) accessed March 5, 2023.
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2. Lim, S. S., Vos, T., Flaxman, A. D., Danaei, G., Shibuya, K., Adair-Rohani, H., Amann, M., Anderson, H. R., Andrews, K. G., Aryee, M., Atkinson, C., Bacchus, L. J., Bahalim, A. N., Balakrishnan, K., Balmes, J., Barker-Collo, S., Baxter, A., Bell, M. L., Blore, J. D. et al., 2013, 'A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010', *Lancet* 380(9859), pp. 2224–2260.
↵
3. Within a city the inequalities can be much higher than between NUTS3 regions, depending on the local situation (proximity to main roads, industry, etc.). However, while we have data on exposure to fine particles at a very fine scale (down to a 1 by 1 km cell grid), we do not have Europe-wide data on GDP at a level smaller than NUTS3. Therefore, NUTS3 is the smallest scale at which we can calculate the indicator as currently defined.
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4. No statistically significant difference in the trends.
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5. Mean change of three-year moving average.
↵
6. With a small but statistically significant ($p < 0.05$) upward linear slope of around 0.02 and a standard error of around 0.01.
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