



8th Environment Action Programme

Share of energy consumption from renewable sources in Europe



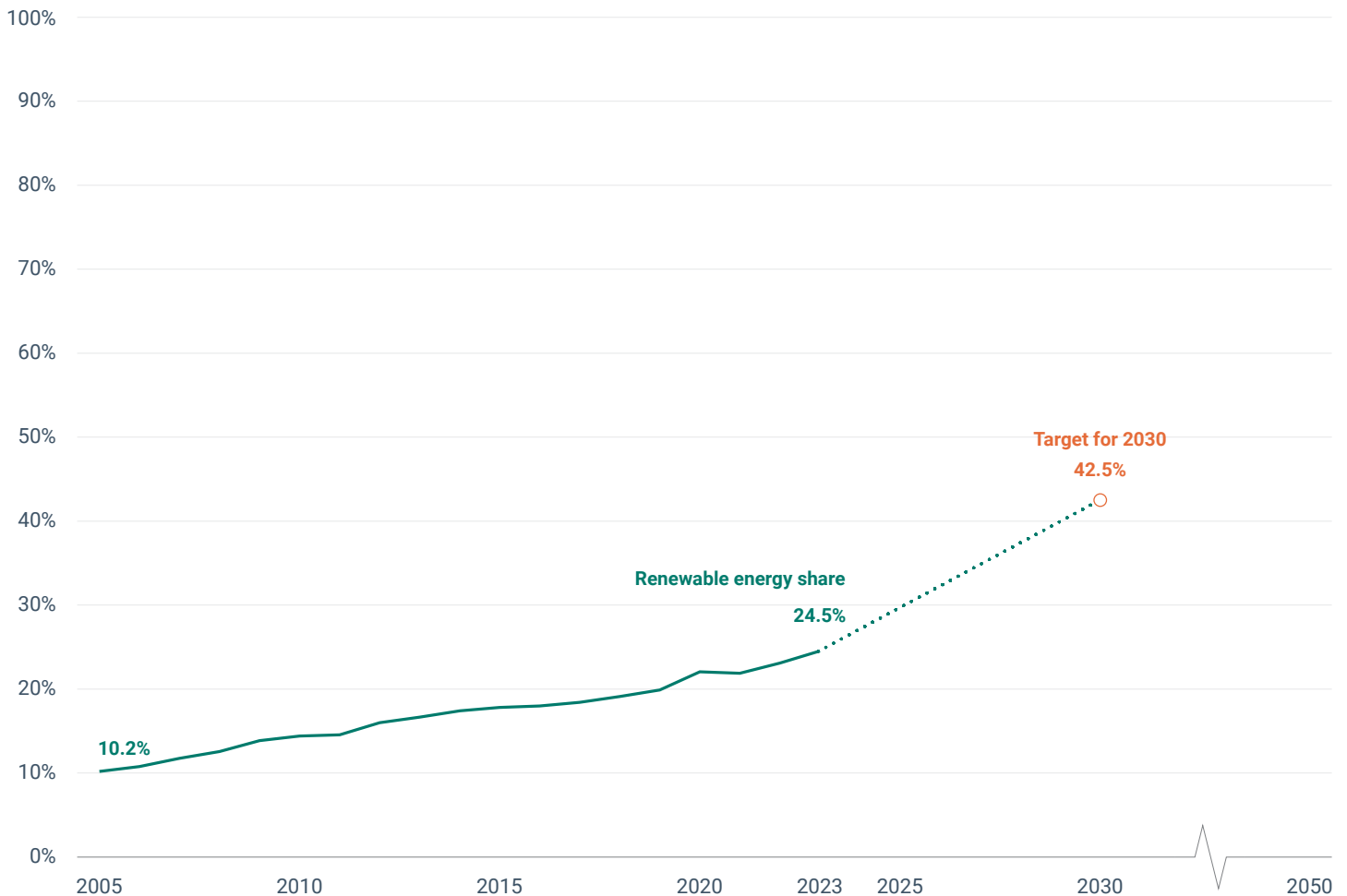
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Renewable energy sources represented 24.5% of the European Union's final energy use in 2023. The share is estimated to have increased by one percentage point since 2022, still largely driven by strong growth in renewable electricity supply. The share is also amplified by a small 2023 reduction in non-renewable energy consumption. Meeting the new minimum EU target of 42.5% for 2030 will demand doubling the rates of renewables deployment seen over the past decade and a deeper 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 security. The revised [Renewable Energy Directive](#) increases the binding target from 32% to a minimum 42.5% share of renewables in EU energy consumption, with the aim of achieving 45%. Each Member State will contribute to this common target. Targets were not introduced for individual countries.

At 24.5% in 2023, the share of renewables in the EU increased by one percentage point from 2022. It represents a **historical high** following the adoption of important EU legal frameworks to speed up the clean energy transition. The [Fit-for-55 EU policy package](#) and the higher EU ambitions introduced by the [RepowerEU plan](#) are especially relevant in response to Russia's invasion of Ukraine.

The 2023 renewable energy share also signals a return to **higher growth rates** of renewables after a dip in 2021 (figure 1). In absolute values, the gross final consumption of renewables grew by almost seven million tonnes oil equivalent (Mtoe) between 2022 and 2023, driven by a substantial increase in solar power generation (by 19.7%) and wind power (by 9.3%).

Non-renewables saw a reduction of 3%, mainly linked to lower utilisation of coal for energy supply. This increased the relative share of renewables in the EU gross final energy consumption.

The electricity system continued to lead decarbonisation efforts in 2023, with 45.3% of all EU power generated from renewable sources. It was followed by heating and cooling (26.2%) and transport (10.8%), where renewable energy from heat pumps (+13%) and renewable electricity consumption in road transport (+53%) increased notably, compared with 2022.

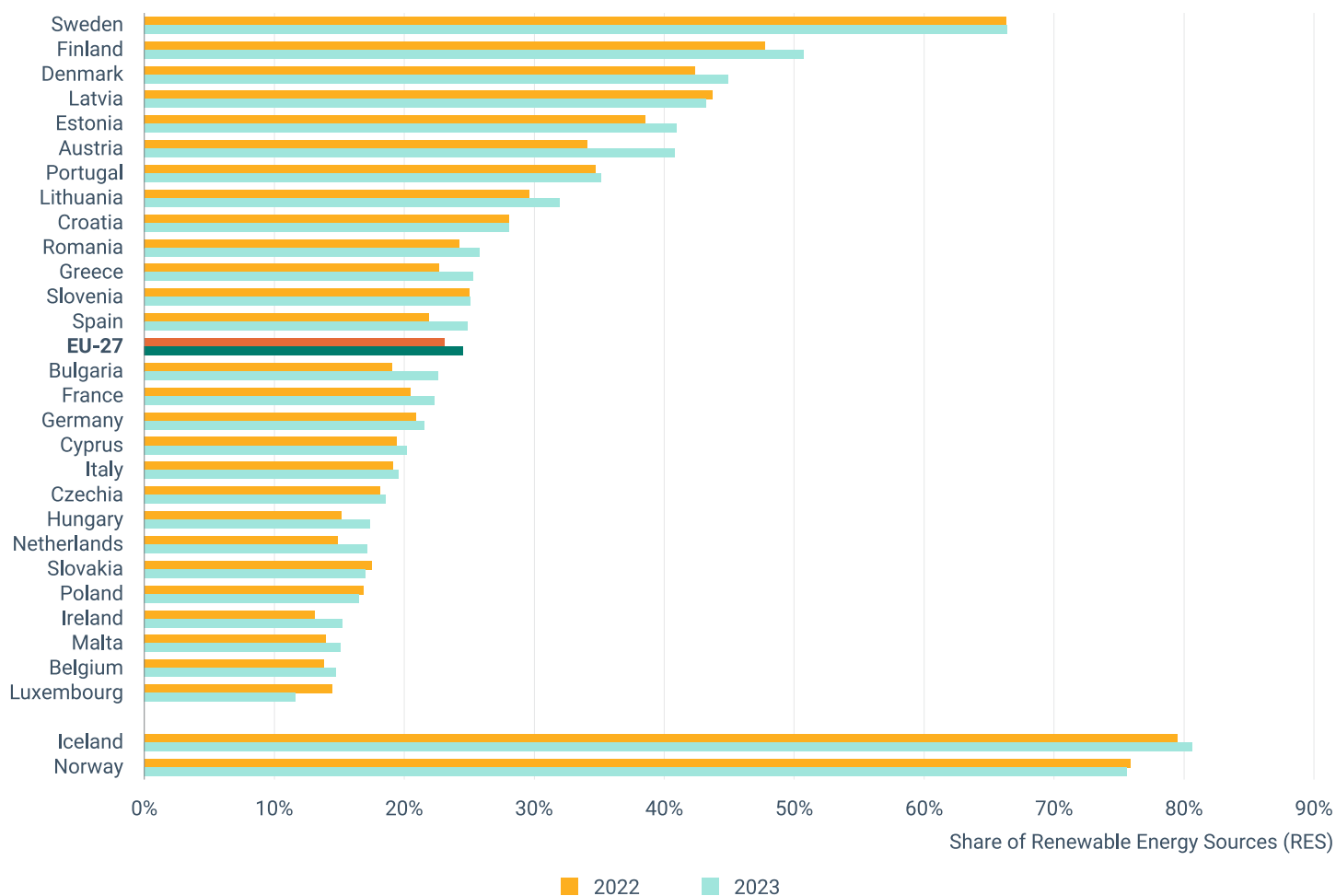
Solid, gaseous and liquid biomass resources together formed the **largest category** in 2023, totalling half of all renewable energy consumption. This may have implications for terrestrial carbon sinks, biodiversity and air pollution if the demand for biomass continues to increase. Solid biomass is most widely used in residential and district heating, electricity generation and industry. Gaseous biomass (biogas) is typically burned to produce heat and power, while liquid biomass fuels (biofuels) are mainly used directly or blended with gasoline and diesel in transport.

Wind (17%), hydro power (13%) and solar photovoltaics (9%) were the other three largest renewable energy sources, followed by heat pumps and liquid biofuels (both with an 8% share of all renewable energy use). Other renewables sources were biogases, renewable waste, geothermal and solar thermal.

Looking at the **longer-term trends**, the RES share more than doubled between 2005 and 2023. 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 3.9% over the last decade (or 5.0% since 2005).

Modelling from the [IEA](#) and [Ember](#) indicate that reaching the **new minimum target** for 2030 of a 42.5% share of renewables might be feasible if fast and decisive action is taken to promote renewables and reduce energy consumption. The trends in the deployment of solar photovoltaics and heat pumps also provides optimism. However, reaching the target will require a challenging CAGR of 8% on the EU renewables share until 2030, which is more than double the observed rate over the past decade. Considering this, the EU is not likely to meet its target, unless it allocates more resources for a deep transformation of the energy system.

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



Sweden, Finland and Denmark had the highest RES shares among Member States in 2023 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, of 12% and 15% in 2023.

Over time, Denmark, Sweden and Estonia have experienced the highest growth in RES shares, with more than 20 percentage points increase since 2005. Croatia, Slovenia and Romania, on the contrary, have seen an increase of less than nine percentage points between 2005 and 2023.

On a shorter timescale, 22 EU Member States saw an increase in their renewable energy shares between 2022 and 2023. Austria, Bulgaria and Finland topped the list, having increased their RES share by three percentage points or more in 2023. In contrast, the RES share of Latvia, Slovakia, Luxembourg and Poland decreased, compared to 2022.

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 the majority of 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 [Eighth 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' ^[1]. 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^[2].

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 \[NRG_IND_REN\]](#), Statistical Office of the European Union (EUROSTAT)
- [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

Energy # Renewable energy # Climate change mitigation

Tags

renewable energy # Energy # 8th EAP # ENER028

Temporal coverage

2005-2030

Geographic coverage

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

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.
[↵](#)
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
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