



8th Environment Action Programme

Energy consumption: primary and final energy consumption in Europe



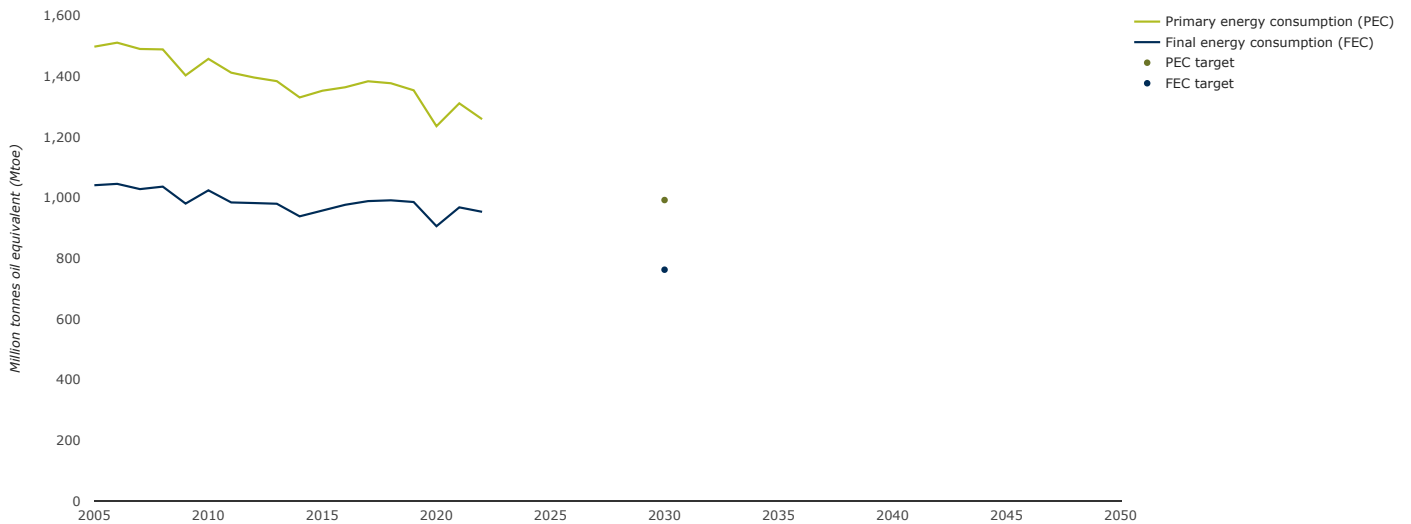
Primary and final energy consumption in Europe

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According to European Environment Agency (EEA) early estimates, in 2022, the EU's final energy consumption by end users fell by 1.5% compared to 2021 levels. Primary energy consumption, which includes all energy uses, also fell by 4% from 2021 to 2022. Despite this recent progress and an overall reduction in energy consumption since 2005, achieving the 2030 targets will require annual reductions in energy consumption at a much faster rate than has been reached over the last decade. It is very unlikely that the EU will meet its energy efficiency targets for 2030 without strong, immediate, and decisive actions to reduce energy consumption in the coming years.

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



Source: Eurostat/EEA.



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

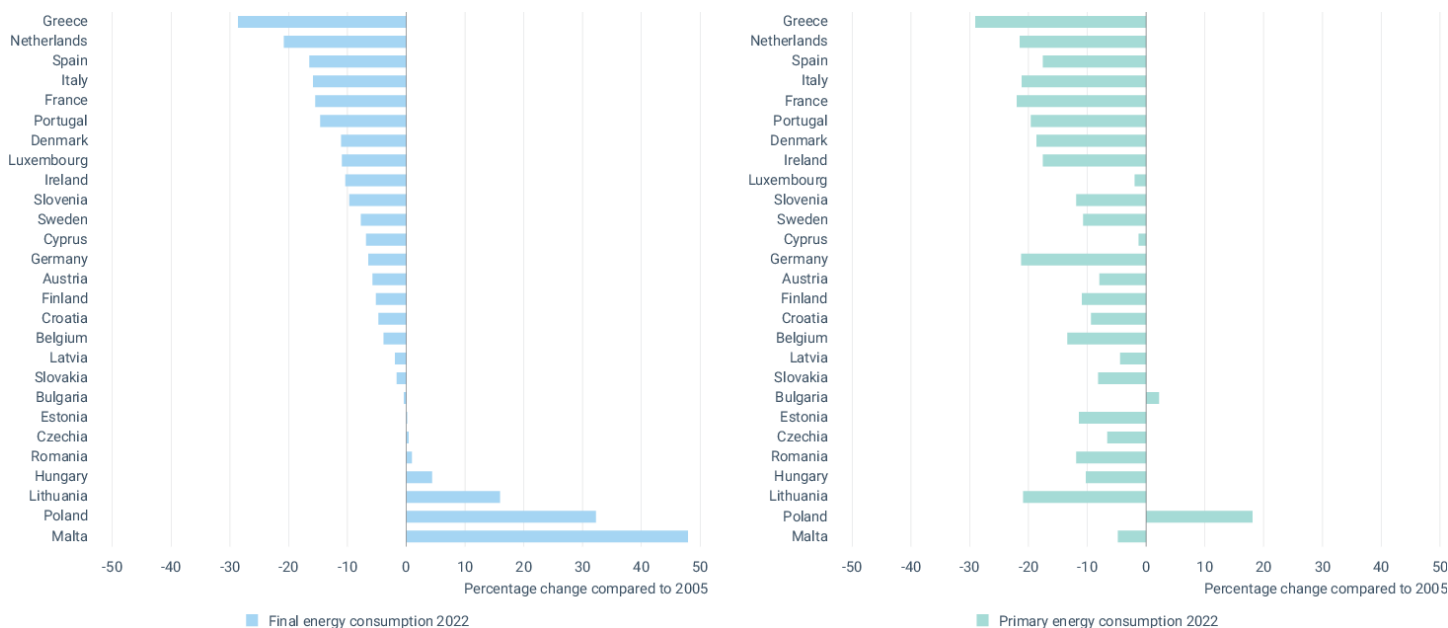
In September 2023, the EU adopted the recast [Energy Efficiency Directive \(EU\) 2023/1791](#), which set a binding target for 2030 of 763 million tonnes of oil equivalent (Mtoe) for final energy consumption (FEC), and an indicative target of 992.5Mtoe for primary energy consumption (PEC). FEC represents the energy used by final consumers. PEC represents the total energy demand within a country, including losses.

According to EEA early estimates for 2022, the EU-wide PEC levels were 1,259Mtoe, while EU-wide FEC levels were 954Mtoe, which represents a decrease of 1.5% and 4% respectively, compared to 2021. The reductions can be largely attributed to high energy prices, especially for gas. These developments occurred mainly as a result of the invasion of Ukraine and the EU's reduction in Russian fossil fuel imports. The EU and its Member States also took active measures to save energy, such as the Council Regulation on coordinated demand reduction measures for gas ([EU/2022/1369](#)), according to which Member States agreed to reduce their gas demand by 15% compared to their average consumption in the past five years. All this led to significant decreases in energy consumption by industry and, to a lesser extent, households. Further, outages in nuclear reactors in France had a significant impact in PEC. On the contrary, energy consumption in transport and of liquid fuels more generally saw an increase during 2022.

Looking at the full time-series of developments in energy efficiency in Europe since 2005, overall reductions been more pronounced for PEC (-16%) than for FEC (-8%). The replacement of fossil fuels and nuclear energy by renewables in electricity generation typically reduces PEC without affecting FEC, and the [share of renewable energy](#) in the EU has more than doubled since 2005. Various other factors have contributed to the reduction of the energy demand in the EU, such as energy saving measures, energy transformation improvements, structural changes towards less energy intensive industries and gradually warmer winters because of climate change.

Compared with the average annual reductions of the last ten years, reaching the PEC target for 2030 would require multiplying the annual reductions by three, and for the FEC target by nine, in each year for the rest of this decade. Based on this trend, the EU is currently not on track to meet the 2030 targets on energy consumption. Deep and fast transformation of the energy sector is necessary during this decade if the targets are to be met. A stronger emphasis on efforts to conserve energy and deploy renewable sources faster are also needed. To maximise benefits, new measures could empower users to operate in response to the system's needs. Member States will develop their policies and measures in updated National Energy and Climate Plans, due to be submitted to the European Commission in June 2024. These may include pathways to address the energy efficiency shortfall.

Figure 2. Change in energy consumption of EU Member States between 2005 and 2022



Source: Eurostat/EEA.



Twenty Member States have decreased their FEC between 2005 and 2022, with Greece, the Netherlands and Spain achieving the highest reductions. Twenty-five Member States have decreased their PEC during the same time period, with Greece as the biggest achiever followed by France, Germany and Italy. Bulgaria’s PEC 2022 remained slightly above their 2005 level, while Poland is the only country to experience a substantial increase in PEC. Poland’s significant decrease in coal consumption was overcompensated by an increase in the consumption of gas, liquid fuels and, especially, by more than tripling the consumption of renewable energy since 2005.

Looking at the short-term trend, 18 Member States saw a decrease in FEC between 2021 and 2022, with the Netherlands, France and Austria reducing FEC the most. Malta saw the highest increase in FEC in the same time period, driven by a revitalisation of international aviation. The Netherlands and France experienced the strongest drop in PEC, with lower consumption of coal, gas and, especially, nuclear being a key factor. Twelve Member States saw an increase in PEC in 2022, with Malta, Ireland, Greece, Cyprus, Bulgaria and Estonia experiencing growth of more than 5%.

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 2022 are approximated and have been estimated using an array of methods and sources. This includes, in order of priority, direct consultation with Member States, official national statistics, unofficial data sets, grey literature and mathematical interpolation. The amount and quality of available data differ by country. More information can be found on the [EEA's datahub on FEC and PEC proxies](#). Values for 2005-2021 are compiled by Eurostat.

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 [Eighth 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' ^[1]. 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 ^[2].

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:

EEA, 2022. Trends and projections in Europe 2022. EEA Report No 10/2022.
<https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2022>

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 2023.

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

- [EEA 2022 proxies on primary and final energy consumption](#), European Environment Agency (EEA)
- [Complete energy balances \(NRG_BAL_C\), PEC \(2020-2030\) and FEC \(2020-2030\)](#), Statistical Office of the European Union (Eurostat)

▼ Metadata

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

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

Contact

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▼ 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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