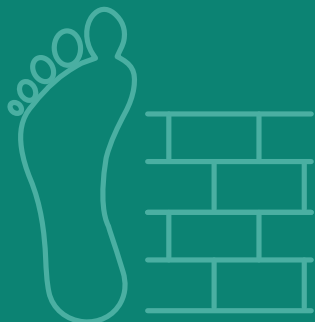




8th Environment Action Programme

Raw material consumption: Europe's material footprint



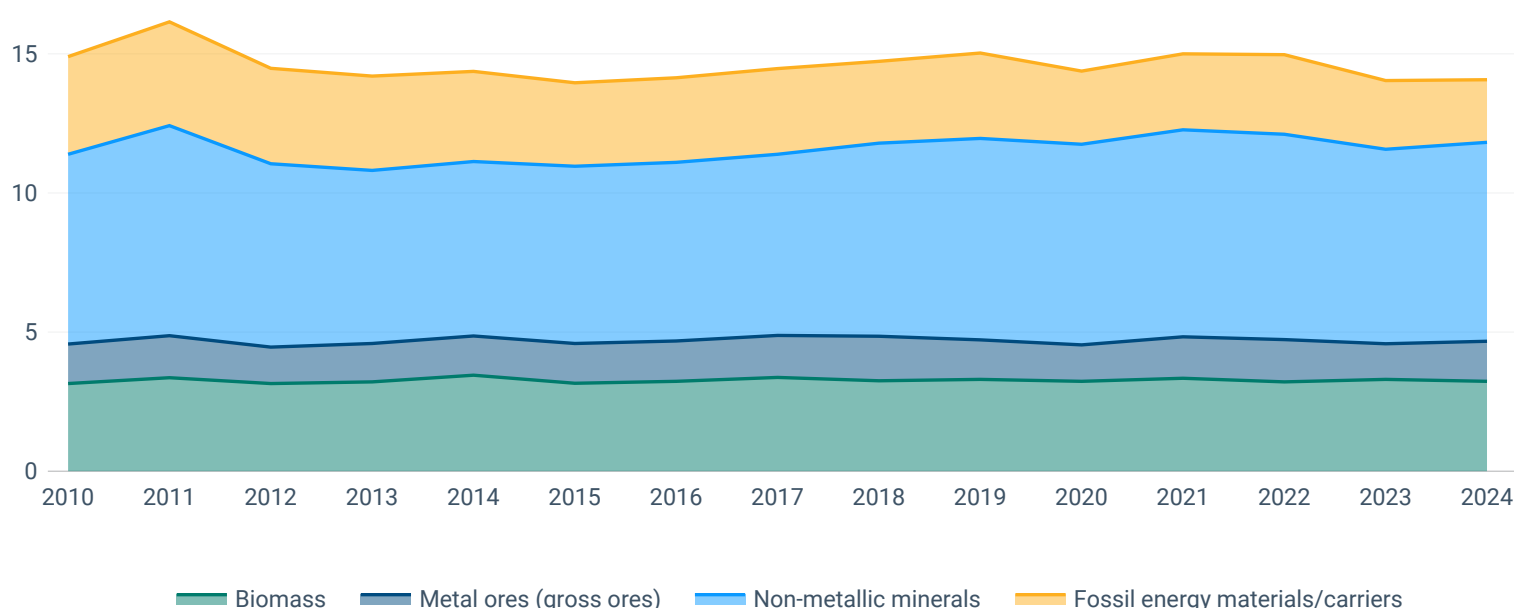
Europe's material footprint

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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.

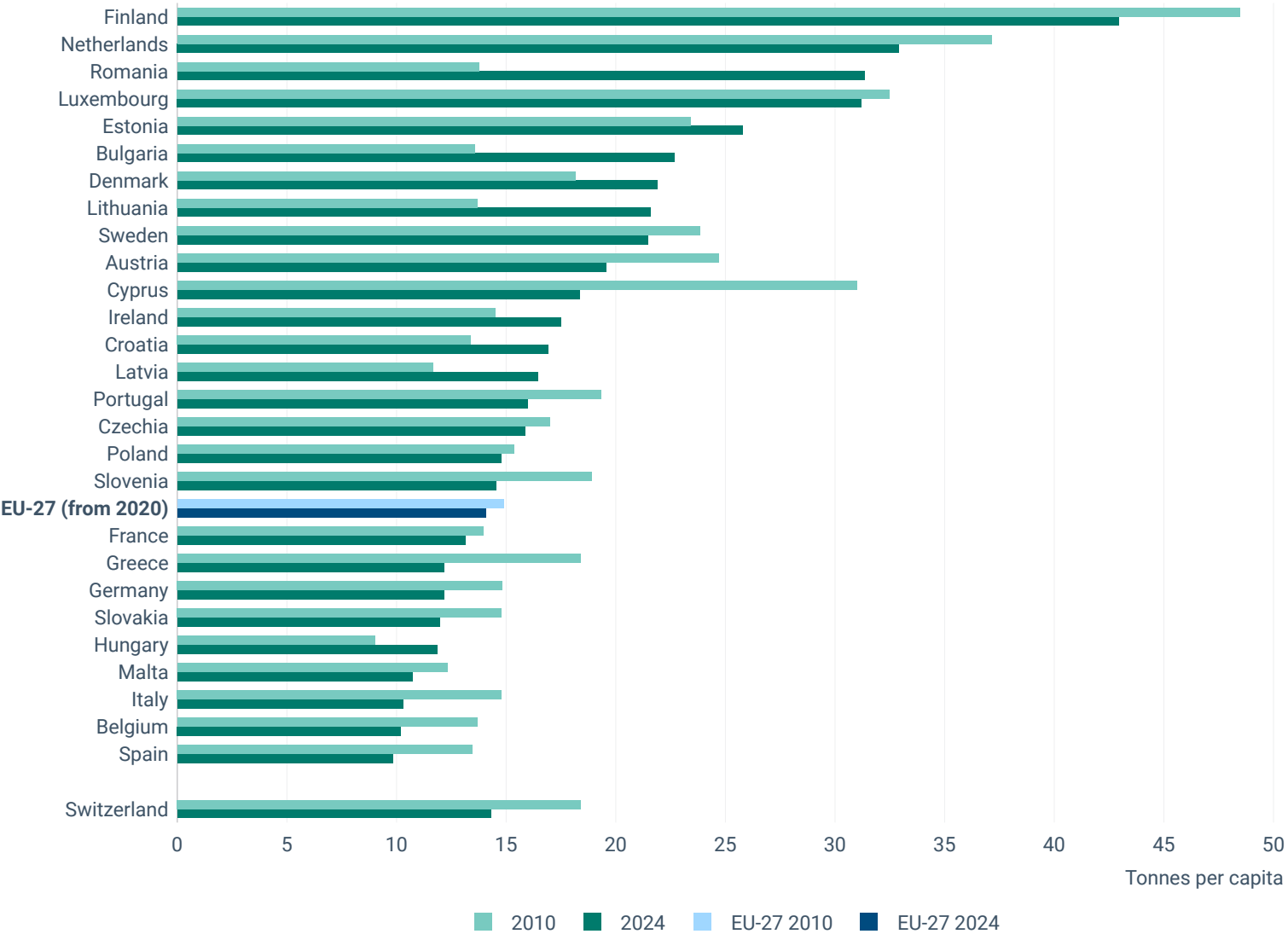
The material footprint provides a comprehensive measure of **all materials extracted**, including outside the EU and imported, to satisfy consumption demand. The reliance on external suppliers differs by material. Demand for metals and fossil fuels is mainly met by imports, while demand for biomass and 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.
↱