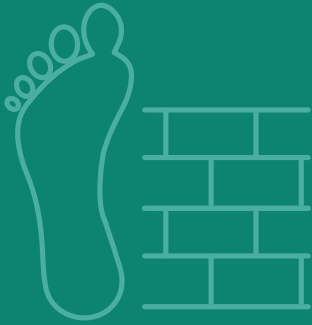


# 8th Environment Action Programme

Raw material consumption: Europe's material footprint

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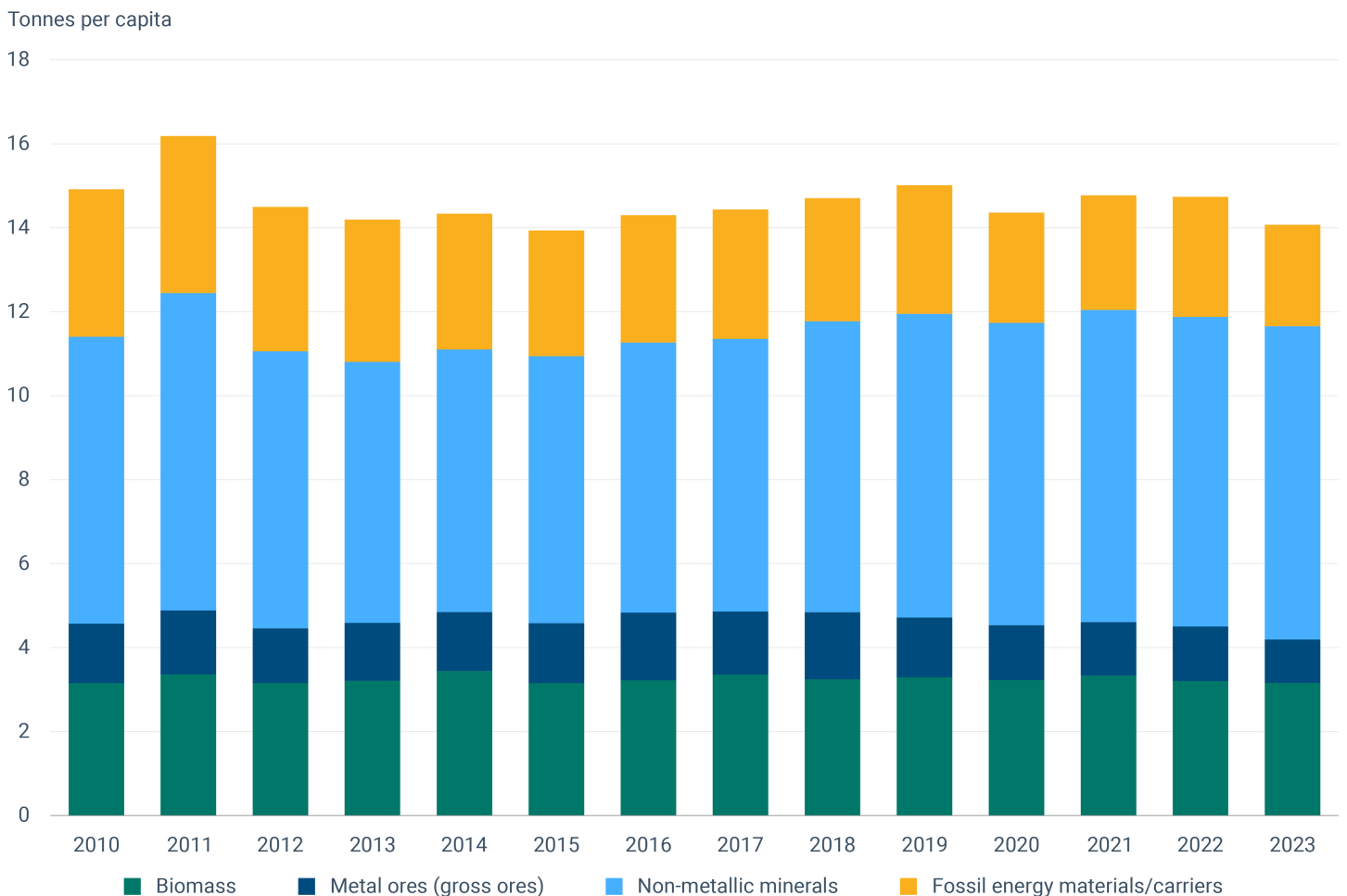
# Europe's material footprint

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The 8th Environment Action Programme aims to significantly reduce the EU's material footprint, meaning the amount of raw material extracted to produce goods and services. The per capita material footprint remained stable during 2010-2022 and dropped by 4.5% in 2023. Raw material extraction was 14.1 tonnes per capita in 2023, which is considered unsustainable and above the global average. Based on historical trends, it appears unlikely that the EU will significantly reduce the per capita material footprint in the coming decade unless the 2023 drop continues. Major effort is needed to reduce extraction and consumption, by switching to goods and services that require less material.

Figure 1. EU Material Footprint, expressed in tonnes of raw material equivalent 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](#) aim to significantly decrease the EU's material footprint to safeguard precious natural resources and to mitigate environmental impacts, such as climate change and biodiversity loss<sup>[1]</sup>.

From 2010 to 2023, the EU per capita material footprint **decreased** by 5.7%. 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 decrease of 4.5% occurred between 2022 and 2023, mainly caused by a decrease in the consumption of metals and fossil fuels.

While the fossil fuels' decreasing consumption reflects the EU's decarbonisation efforts and market diversification due to the Russian aggression in Ukraine, the **metals consumption** decrease of 20% is more substantial and pronounced. The EU [decreased its imports of metals from Russia](#) and [increased its exports to Ukraine](#), overall resulting in a lower metals' footprint. It is uncertain if this is a temporary decrease and the market will recalibrate using different supply chains, or if it remains a permanent phenomenon with sustained lower metals consumption.

Consumption of non-metallic minerals is the **highest** of the various material groups, accounting for 53% of the footprint in 2023. Consumption changes in this group were largely responsible for the overall trend during the entire time period. Biomass was the next largest group (22%), followed by fossil fuels (17%) and metals (7%). The share of fossil fuels decreased (24% in 2010), while the share of non-metallic minerals increased from 46% in 2010. 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. This is because they are mostly composed of inert materials such as gravel, limestone<sup>[2]</sup>.

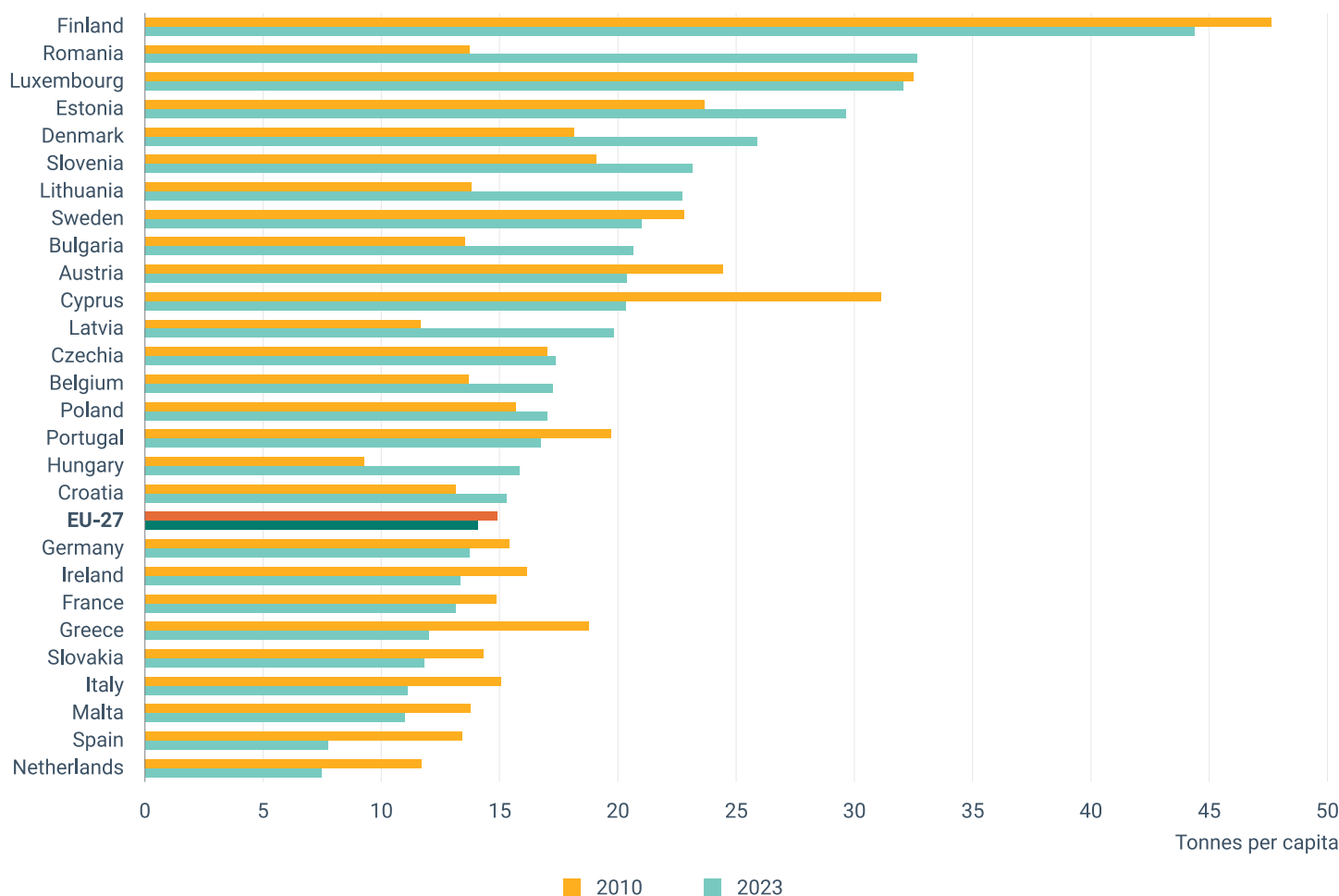
The material footprint provides a comprehensive **measure** of all materials extracted to satisfy consumption demand in the EU, including materials extracted outside the EU and imported. The reliance on external suppliers differs by material. Demand for metals and fossil fuels is mainly met by imports,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

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<sup>[3]</sup>. 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 could be reduced by decreasing consumption 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, their value as high as possible, and boosting high-quality recycling.

Excluding the temporary dip in 2020, the level of the material footprint was relatively stable until 2022. Available projections for material use, such as the [OECD Global Material Resources Outlook](#), predict an increased future demand for materials in the EU<sup>[4]</sup>. However, if the recent sharp decrease in 2023 continues, it may lead to significant reductions. Given this uncertainty, it appears **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 2023, ranked according to the 2023 footprint



Material footprints **vary substantially** across EU countries, from 7.5 tonnes/capita in the Netherlands to 44.4 tonnes/capita in Finland. Since 2010, 15 of the 27 Member States have reduced their material footprint. Spain, the Netherlands, Greece and Cyprus reduced their footprints by more than 30%. However, Romania, Hungary, Latvia, Lithuania and Bulgaria’s 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. However, elements such as high levels of circularity in the national economy are particularly important. High levels of circularity partly explain the low footprint value in the Netherlands, which has the lowest material footprint in the EU and also the highest circular material use rate. On the other hand, Finland and Romania with the highest material footprint display the lowest circular material use rate.

## 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 \(2021\)<sup>\[5\]</sup>](#). 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<sup>\[6\]</sup>](#) 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 footprints - main indicators \(env\\_ac\\_rme\)](#), Statistical Office of the European Union (EUROSTAT)
- [Material flow accounts in raw material equivalents - modelling estimates](#), Statistical Office of the European Union (EUROSTAT)

## ▼ Metadata

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## **DPSIR**

State

### **Topics**

# Waste and recycling # Resource use and materials # Sustainability challenges

### **Tags**

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

### **Temporal coverage**

2010-2023

### **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**

SDG12: Responsible consumption and production

### **Unit of measure**

Tonnes per capita

### **Frequency of dissemination**

Once a year

## ▼ References and footnotes

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1. IRP, 2019, *Global Resources Outlook 2019: Natural Resources for the Future We Want*, International Resource Panel, Nairobi, Kenya.  
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2. IRP, 2019, 'Global Resources Outlook 2019: Natural Resources for the Future We Want', (<https://www.resourcepanel.org/reports/global-resources-outlook>) accessed July 4, 2022.  
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3. 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.  
↵
4. 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.  
↵
5. Eurostat, 2021, 'Population on 1 January', *Data Browser* (<https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en>) accessed March 4, 2022.  
↵
6. 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](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)) accessed June 27, 2022.  
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