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ENVIRONNEMENT

Domestic Material Consumption in EU Countries, 2000 to 2019

MARCH 2022

Over the past 10 years, domestic consumption of materials in European countries has averaged around 13 tonnes per capita, while varying widely from country to country. Although material consumption in EU-15[1] countries has fallen sharply since the financial crisis of 2008, reflecting the more moderate growth of the construction sector in particular, consumption in Central and Eastern European countries has been rising steadily. Countries' characteristics such as their history, population density and natural resources, have an effect on the level and composition of their material consumption, as well as their dependency on imports.

For domestic economic actors to meet the demand for goods and services, raw materials (biomass, metal ores, non-metallic minerals and fossil fuels) either have to be extracted from the country or imported if they cannot be produced locally. Domestic Material Consumption (DMC) measures the quantity of materials directly consumed by the local population for its own needs. Calculated as the sum of material flows extracted from the country and material flows imported, minus flows exported, this indicator measures the pressure consumption exerts on the environment. As such, it falls under the 2030 United Nations Sustainable Development Goals and is included in the objectives of the French Law of 17 August 2015 on the energy transition for green growth.

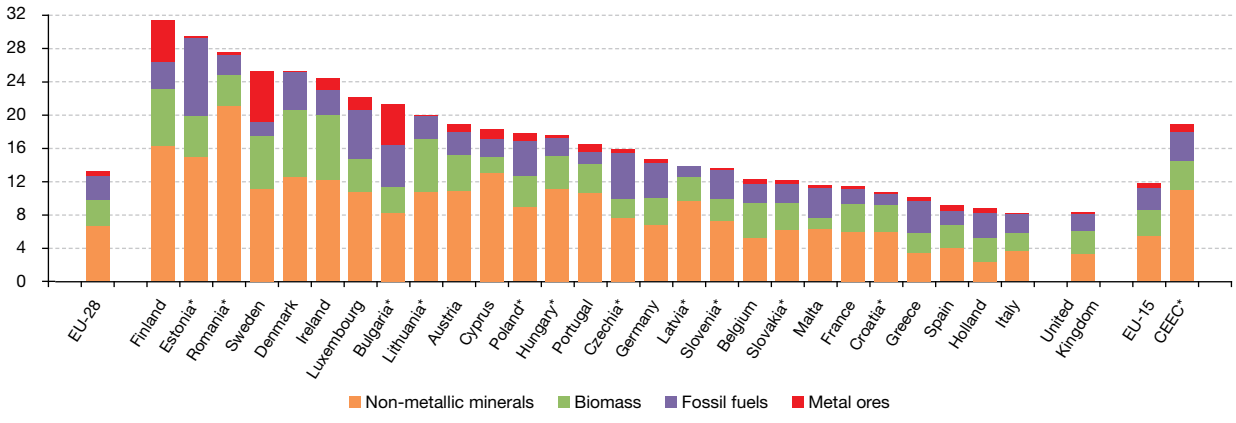
Since 2000, data on physical material flows (submitted annually to Eurostat) allows us to compare the domestic material consumption of the major European countries.

MATERIAL CONSUMPTION VARYING FROM COUNTRY TO COUNTRY

In 2019, domestic material consumption in the 28 countries of the European Union (EU) stood at 13.4 tonnes per capita (t/capita). Domestic material consumption per capita varies

Figure 1: Domestic material consumption by main categories, 2019

In tonnes per capita



** CEEC = Central and Eastern European Countries.*
Note: Belgium = 2018 data; EU15 excluding Malta and Cyprus.
***Source**: Eurostat, August 2021*

[1] The EU-15 comprises the oldest EU countries: France, Germany, Belgium, Italy, Luxembourg and Holland (members since 1958); Denmark, Ireland and the United Kingdom (1973); Greece (1981); Spain and Portugal (1986); Austria, Finland and Sweden (1995). The United Kingdom left the EU in 2020.

greatly from country to country. It is 11.9 t/capita in the oldest EU member states (EU-15) and 18.9 t/capita in the Central and Eastern European Countries (CEEC) that joined the EU more recently. Across Member States, consumption ranges from 8.1 t/capita in Italy to almost 32 t/capita in Finland. At 11.5 t/capita, France is one of the top ten least-consuming countries (*Figure 1*).

DECREASE IN MATERIAL CONSUMPTION IN 'OLDEST' EU COUNTRIES

Almost half of the EU's domestic material consumption (49% in 2019) is made up of non-metallic minerals, mainly aggregates, gravel and sand, used for the most part in construction. Of the total, biomass (mainly agricultural production and wood) accounts for around a quarter, fossil fuels make up one fifth and metal ores 5%. The sharp drop in the use of non-metallic minerals after the 2008 crisis contributed to the reduction in material consumption: from around 15 to 16 t/capita between 2000 and 2008, since 2012 it has been ranging around 13 t/capita *(Figure 2)*.

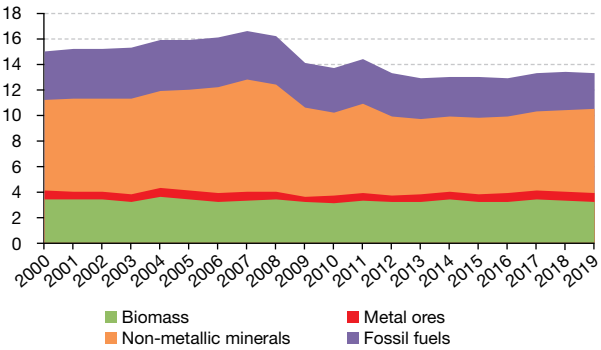
Indeed, after the early 2000s, a decade marked by a very dynamic construction sector in most EU-15 countries and southern European countries (Greece, Portugal, Spain) and Ireland in particular, the post-recession return to a more moderate growth rate in the building and public works sector resulted in a sharp drop in the use of gravel sands and other aggregates. Domestic material consumption in the older EU Member States (EU-15), accounting for around three quarters of the EU's DMC at the beginning of the 2010s, fell sharply between 2008 and 2013, before stabilising at a level well below that reached in the mid-2000s. The decline in fossil fuel consumption also contributed – albeit to a lesser extent – to the reduction in material consumption.

CENTRAL AND EASTERN EUROPEAN COUNTRIES CATCHING UP

Through successive enlargements, the EU has expanded by gradually integrating countries that are less developed than the original Member States. These nations have seen a boost to in their economic and social development, resulting in strong material consumption. Domestic material consumption per capita in the CEECs has therefore grown almost continuously since the early 2000s (except for a dip after the 2008 crisis) and now exceeds the domestic material consumption of the EU-15 countries *(Figure 3)*.

Figure 2: Trends of domestic material consumption in the EU-28, 2000 to 2019

In tonnes per capita



***Source**: Eurostat, August 2021*

APPARENT DECOUPLING BETWEEN GROWTH AND CONSUMPTION

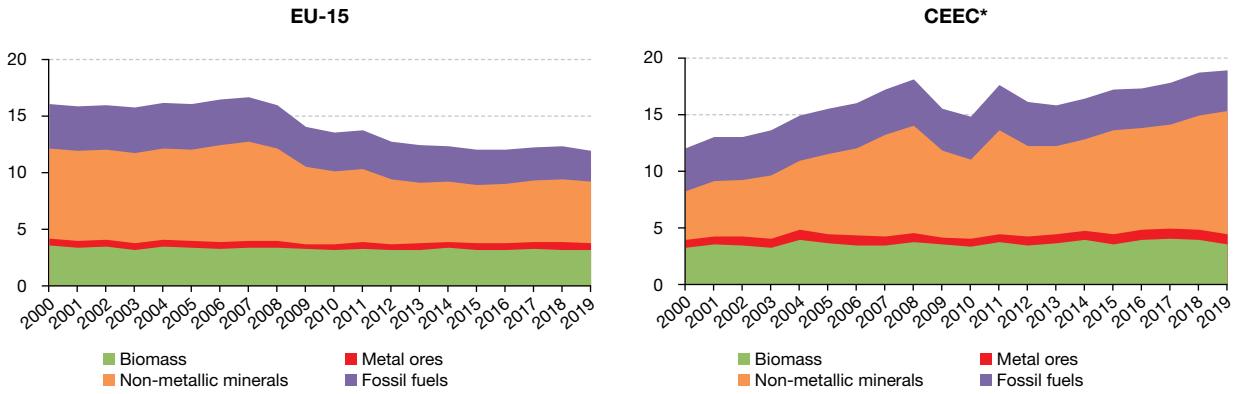
Material productivity, which correlates gross domestic product (GDP) and domestic material consumption, is a measure of the transition to a more resource-efficient economic system. When the pressure on the environment (in this case domestic material consumption) increases less than the economic driving force (GDP), this is known as "decoupling".

Over the period 2000-2019, all EU countries – with the exception of Romania – have seen GDP outpace their domestic material consumption. However, as material consumption has increased in most CEE countries, decoupling is only "relative" for these countries, whereas it is more pronounced ("absolute decoupling") in most EU-15 countries whose material consumption has decreased over a longer period (*Figure 4*).

Between 2000 and 2008, southern European countries (Croatia, Greece, Spain, Italy, Portugal) consumed materials at a higher rate than their GDP growth (or at the same rate for Ireland) due in particular to very dynamic construction activity. Only in a few countries did material consumption

Figure 3: Trends of domestic material consumption in the EU-15 and CEEC*, 2000 to 2019

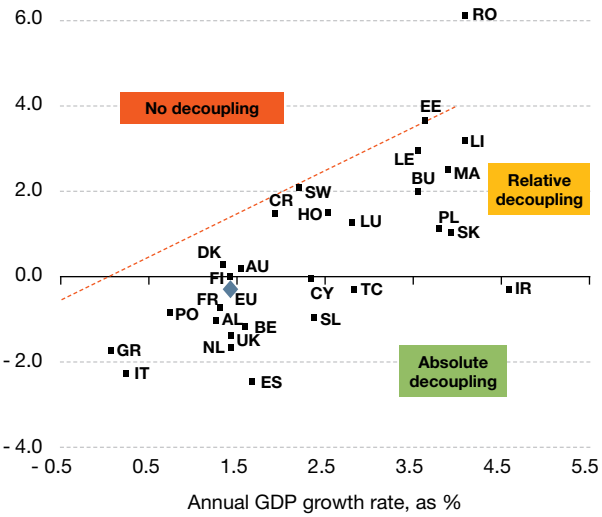
In tonnes per capita



** CEEC = Central and Eastern European Countries.*
***Source**: Eurostat, August 2021. Data processing: SDES*

Figure 4 : Trends of domestic material consumption and GDP in the EU, 2000 to 2019

Annual change in DMC (as %)



Reading notes: each country is positioned according to its rate of change (GDP on the X-axis and DMC on the Y-axis) over the three "decoupling zones". France is therefore in the absolute decoupling zone, as its DMC decreased, whereas its GDP increased.
*Note: GDP in volume, chain-linked prices base 2014; EU 28: **FR** France, **AL** Germany, **BE** Belgium, **IT** Italy, **LU** Luxembourg; **NL** Holland (members since 1958); **DK** Denmark, **IR** Ireland, **UK** United Kingdom (1973); **GR** Greece (1981); **ES** Spain, **PO** Portugal (1986); **AU** Austria, **FI** Finland, **SW** Sweden (1995); **HO** Hungary, **PL** Poland, **TC** Czechia, **SK** Slovakia, **SL** Slovenia, **EE** Estonia, **LE** Latvia, **LI** Lithuania, **MA** Malta, **CY** Cyprus (2004); **BU** Bulgaria, **RO** Romania (2007); **CR** Croatia (2014).*
***Source**: Eurostat, August 2021. Data processing: SDES*

grow at a slower pace than GDP (Germany, Luxembourg and the United Kingdom in particular). For the other countries, the rates of increase are rather homogeneous. After 2008, this consumption became more moderate than economic growth in most EU countries, with the exception of Romania, Hungary and Sweden. The biggest decreases were in Spain, Italy and Ireland (countries that experienced the sharpest decline in construction activity after 2008) and in CEEC – Czechia and Slovenia – (countries that reduced their domestic extraction while increasing their exports).

COUNTRIES' VARYING DEPENDENCY ON IMPORTS

European countries import materials to meet demand that cannot be sufficiently covered by domestic extraction. However, some of the materials they extract (as well as some imports) are also exported. Domestic extraction, which is closely tied to the natural resources available at domestic level, can therefore differ greatly, both in level and composition, from domestic demand (*Figure 5*).

As such, the share of demand covered by domestic extraction varies between European countries. Domestic extraction exceeds domestic requirements in Latvia, Estonia and Bulgaria, and is also high in Sweden, Finland, Poland and the Czechia. Whilst nearly 80% of the volume of domestic consumption in many countries, domestic extraction provides a low coverage of demand in countries with few natural resources (Luxembourg, Malta) and, to a lesser extent, in Holland and Italy. In most European countries, non-metallic minerals (sand, gravel) account for a large share of local extraction, which enables them to cover almost all their national demand for construction materials, and even to export part of their resources (e.g. Greece, Spain). Locally extracted biomass exceeds domestic demand in countries with developed agriculture or large forest areas (France, Finland, Slovenia, Croatia, Czechia, Bulgaria). Domestic extraction of metal ores takes place in just a few countries (Sweden, Bulgaria and Finland), as does fossil fuel extraction (Greece, Poland, Holland, Czechia, Bulgaria, Estonia).

MATERIAL CONSUMPTION TIED TO COUNTRY CHARACTERISTICS

There are many factors explaining the differences between countries in terms of material consumption, both in level and composition: economic activity, climatic conditions and heating methods which affect the demand for energy resources (wood, energy), geography and population density (impacting the infrastructure network), agricultural orientation, natural resources, etc.

Non-metallic minerals account for 40 to 60% of the materials consumed in most EU-28 countries (51% for France in 2019). This rate is over 60% in some countries (e.g. Portugal and Romania). Sweden and Finland are very vast, sparsely populated countries and consume more non-metallic minerals per capita. The length of transport infrastructure and, in turn, the mass of material required to build it, is therefore likely to be higher in these countries in proportion to population size. In contrast, non-metallic materials account for a small share of material consumption in Holland (26%). Indeed, the Holland has the highest population (507 inhabitants per km^2 compared to the EU average of 118) and its infrastructure is already highly developed, so its need for new constructions is likely to be lower.

Biomass consumption ranges from 1.4 t/capita in Malta (the warmest country in Europe) to 6 to 8 t/capita in Finland, Sweden, Ireland and Denmark. In Ireland and Denmark, the most part is fodder crops and biomass from pastures, however these do not cover all of the demand, whereas Finland and Sweden (being more than two thirds covered by forest) are able to meet their needs with domestic resources (5 to 7 t/capita of wood biomass). Belgium and Holland, where the population density is high and the share of forest area low (24% of the territory in Belgium and 10% in Holland, compared to a European average of 40%), are biomass importers.

Fossil fuels (coal, oil, gas) are widely consumed in many countries, with Estonia at the top (10 t/capita), which meets its demand through the extraction of oil shale to generate electricity. The lowest consumption is in Latvia and Croatia (1.3 and 1.2 t/capita respectively). France, whose energy

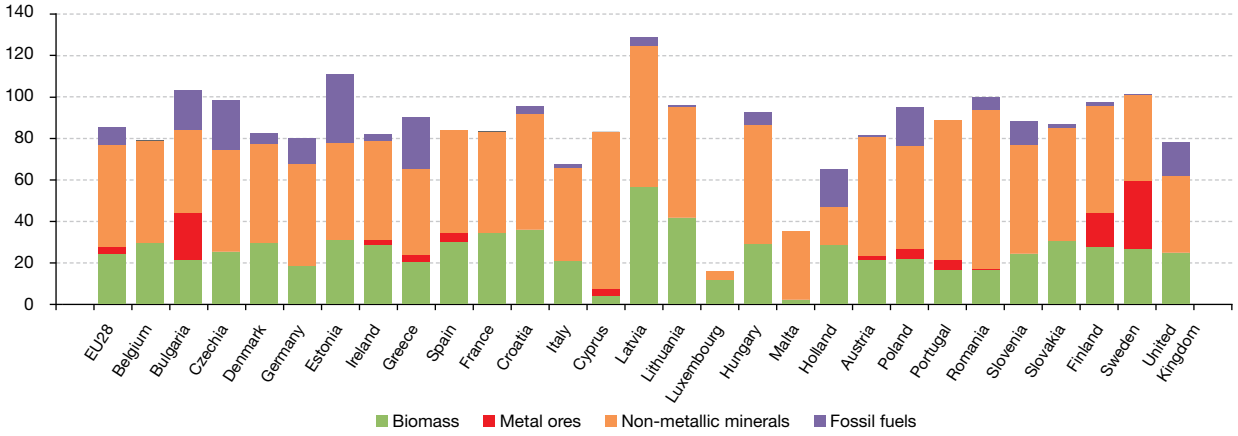
BOX

Material footprint

The material footprint is a more comprehensive indicator than domestic material consumption for measuring how much pressure is exerted by France's domestic demand on material flows. On top of the flows extracted at domestic level and direct imports, the material footprint also includes the materials mobilised outside French borders to produce and transport all imported products (consumption of fuels and ores in particular). Taking these indirect material flows into account, the quantity of materials mobilised by a country increases. For France, the material footprint is estimated at 13.7 t/capita in 2019, compared to 11.5 t/capita for domestic material consumption. The calculation methods between international bodies (Eurostat, OECD, UNEP-IRP) are currently being harmonised.

Figure 5: Domestic extraction as a percentage of DMC, by component, 2019

As %



Note: As DMC is equal to domestic extraction plus the physical trade balance (imports - exports), the ratio between domestic extraction and DMC exceeds 100% when a country exports more than it imports (negative balance).
Scope: EU-28.
***Source**: Eurostat, August 2021. Data processing: SDES*

production is largely nuclear, remains below the EU average, at 1.9 and 3 t/capita respectively.

Lastly, average consumption of metal ores in the EU is 0.7 t/capita (versus 0.3 t/capita in France). Metal ores are used to a greater extent in Sweden, Finland and Bulgaria (between 5 and 6 t/capita) for domestic mining (iron, copper, nickel, platinum, etc.) and to a lesser extent in Romania, Portugal and Spain.

MATERIAL CONSUMPTION CATCHING-UP GLOBALLY

Much like within the EU, the countries which joined the union more recently have seen a boost to their development, in turn using more and more materials. Meanwhile, at the global level, emerging and/or developing countries are also continuing to grow. These are striving to “catch up” with the standard of living in Western countries, be it through their level of consumption or of investment, fuelled by their demography. Between 2000 and 2017, the gap in material consumption per capita narrowed: from 15 t/capita at European level, against a worldwide average of 9 t/capita in 2000, with consumption reaching 13.3 and 12.3 t/capita respectively. If these trends continue into the future, emerging and/or developing countries will soon catch up with developed countries, while also increasing their use of natural resources. This growth will have significant impacts on the environment: pollution, soil degradation and loss of biodiversity.

FIND OUT MORE

- *Key indicators for monitoring the circular economy - 2021 Edition*, SDES, *Datalab*, April 2021, pp. 9-16.
- *Resource efficiency and the circular economy in Europe - EEA*, 2019.
- *Key figures on Europe - 2020 Edition*, Eurostat.
- *Global Material Resources Outlook to 2060*, OECD, 2019.

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