20 December 2021
Economic-environmental Indicators – Material Flow Accounts
1995-2020

PRODUCTIVITY ASSOCIATED WITH THE USE OF MATERIALS DECREASED BY 7.0% IN 2020

In 2020 the Domestic Consumption of Materials (DMC) decreased 1.6%, with a more intense real decrease (-8.4%) in Gross Domestic Product (GDP), causing a 7.0% reduction in productivity associated with the use of materials (GDP/DMC). The small reduction in DMC was associated to the increase in Gross Value Added (GVA) in construction (3.0% in volume), an activity that is highly material consumer, while most economic activities were strongly affected by the impacts of the COVID-19 pandemic.

Statistics Portugal publishes the provisional results of the Material Flows Account (MFA) for the year 2020 and also presents revised data for the period 1995 to 2019. On Statistics Portugal website, in the National Accounts release area, tables can be found with more detailed information.

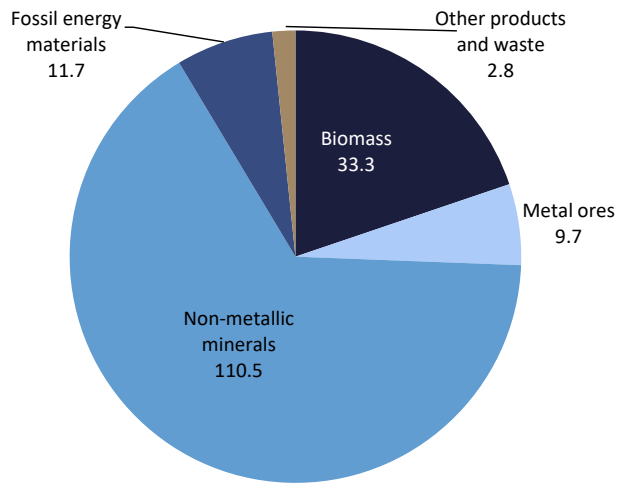
Domestic Material Consumption (DMC) decreased by 1.6% in 2020

DMC measures the total amount of materials consumed directly in an economy, by corporations and households. In 2020 the DMC was 167.9 million tonnes, 1.6% less than in 2019 and 17.3% less than in 2010.

Non-metallic minerals were the most relevant materials, representing 65.8% of the DMC in 2020. Biomass, fossil energy materials and metal ores represented 19.8%, 7.0% and 5.8%, respectively. Between 2019 and 2020, with the exception of non-metallic minerals (+3.7%), the remaining material categories recorded decreases: fossil energy materials (-25.7%), metal ores (-12.3%) and biomass (-3.8%).

Chart 1: Domestic material consumption (DMC), by type of material, 2020

Unit: million tonnes

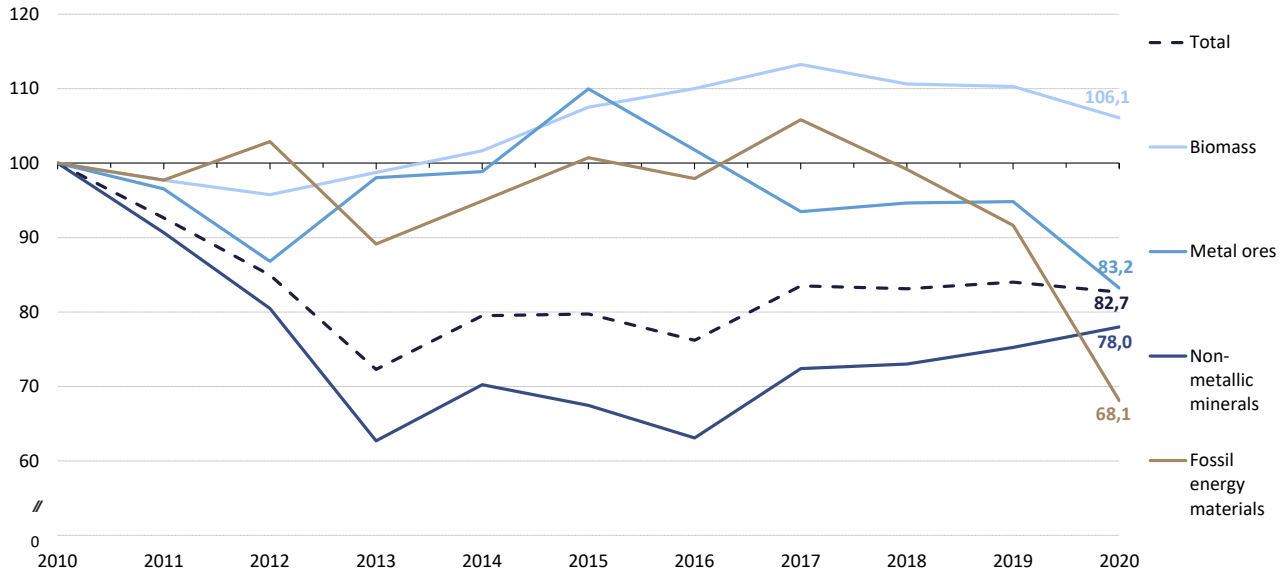


Source: Statistics Portugal (Material Flows Accounts)

Analysing material consumption patterns since 2010, with the exception of biomass, which grew by 6.1%, the DMC of the remaining material categories decreased. The reduction in fossil energy materials (-31.9%) is particularly noteworthy. The consumption of non-metallic minerals recorded a decrease of 22.0% between 2010 and 2020, highlighting, however, a growth of 23.6% since 2016. The consumption of metallic ores shows a downward trend since 2016, having decreased by 16.8% since 2010.

Chart 2: **Evolution of Domestic material consumption (DMC) by type of material, 2010-2020**

Index: 2010 = 100



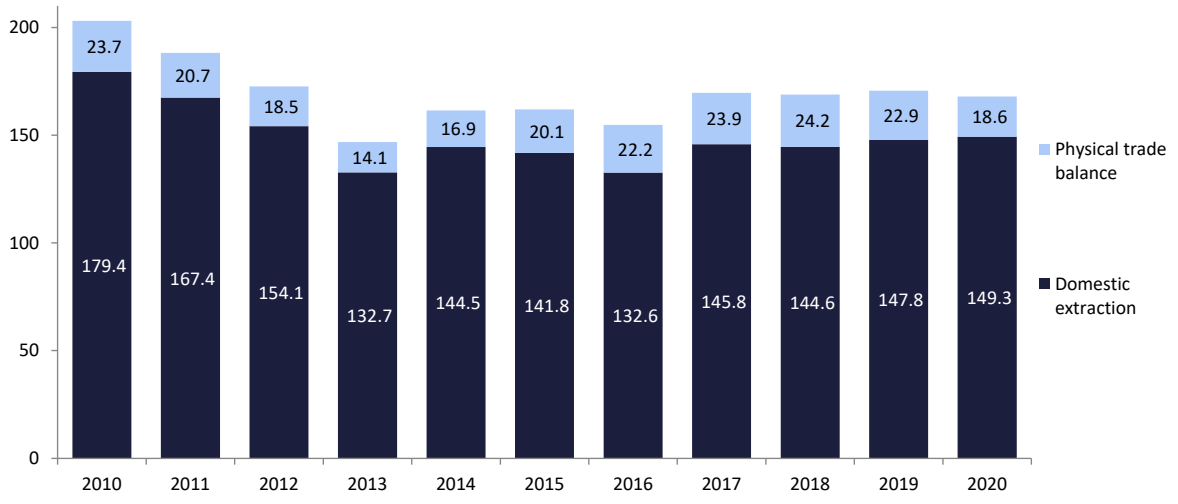
Source: Statistics Portugal (Material Flows Accounts)

Domestic extraction of materials increased by 1.0% in 2020

The DMC results from the sum of domestic extraction of materials and the physical trade balance (imports minus exports). In 2020, domestic extraction of materials increased by 1.0%, accounting for 88.9% of the DMC.

Chart 3: **Domestic material consumption, by components, 2010-2020**

Unit: million tonnes



Source: Statistics Portugal (Material Flows Accounts)

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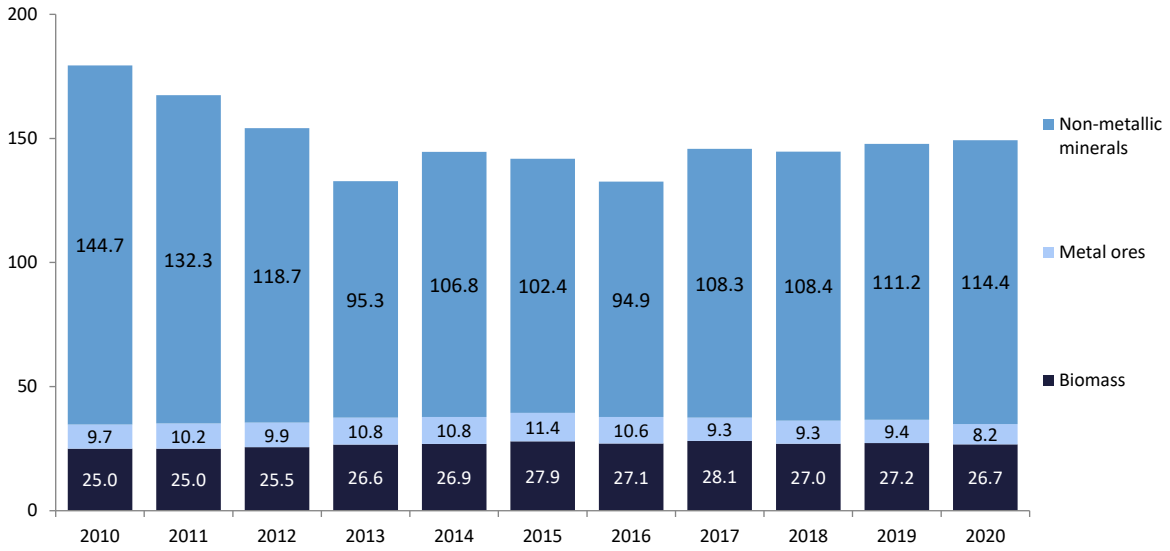
The increase in the domestic extraction of materials in 2020 is explained exclusively by the behaviour of non-metallic minerals (namely ornamental rocks and sand and gravel), the only materials that recorded an increase over 2019 (2.9%). This evolution is related to the growth of the construction industry, the main user of this type of materials, whose Gross Value Added (GVA) increased 3.0% in volume, constituting an exception in the context of contraction of economic activity due to the pandemic situation.

Chart 4: **Domestic extraction of materiais, by type of material, 2010-2020**

Unit: million tonnes



Source: Statistics Portugal (Material Flows Accounts)

Physical trade balance down by 18.7% in 2020

In 2020, exports and imports decreased by 5.3% and 10.0%, respectively (the largest decrease since the beginning of the series, 1995). The physical trade balance diminished 18.7%, reaching the lowest value since 2015. This reduction explains the decrease in the DMC (-1.6%), as the domestic extraction of materials increased (+1.0%).

Table 1. **Physical trade balance, by type of material, 2020**

Unit: million tonnes

	Physical trade balance	Imports	%	Exports	%
Total	**18.6**	**58.8**	**100**	**40.2**	**100**
Biomass	6.6	17.7	30.1	11.1	27.7
Non-metallic minerals	-4.0	4.5	7.7	8.5	21.1
Metal ores	1.5	7.2	12.2	5.7	14.1
Fossil energy materials	11.7	23.3	39.7	11.6	28.9
Other products	1.4	3.6	6.1	2.2	5.4
Waste	1.3	2.5	4.2	1.1	2.8

Source: Statistics Portugal (Material Flows Accounts)

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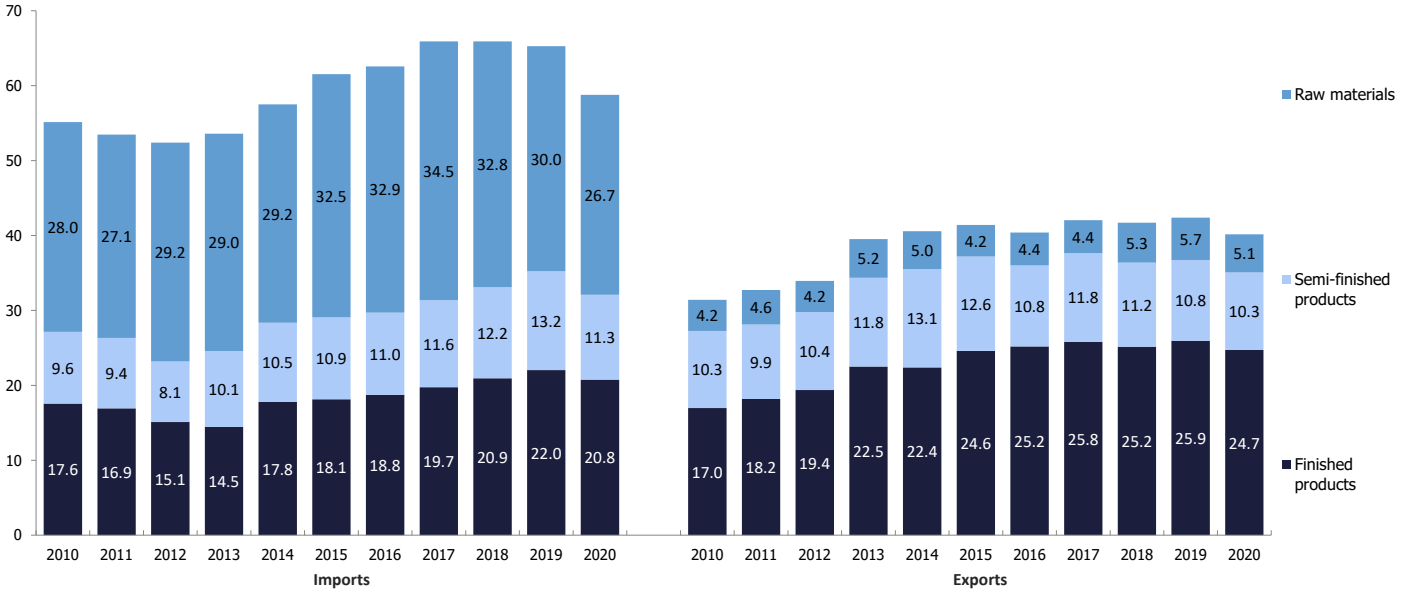
Between 2010 and 2020, exports increased by 27.8%, while imports grew by 6.6%.

Analysing by transformation phase, in 2020 raw materials were predominant in imports (45.4%), despite a decrease of 11.2%. In exports, finished products were predominant (61.6%), registering a decrease of 4.7% in 2020.

Between 2010 and 2020, the most pronounced increases in imports were registered in finished products (+18.3%) and semi-finished products (+18.1%). In exports, the increases in finished products (+45.7%) stand out.

Chart 5: **Physical imports and exports by manufacturing phase, 2010-2020**

Unit: million tonnes



Source: Statistics Portugal (Material Flows Accounts)

Productivity associated with the use of materials decreased 7.0% in 2020

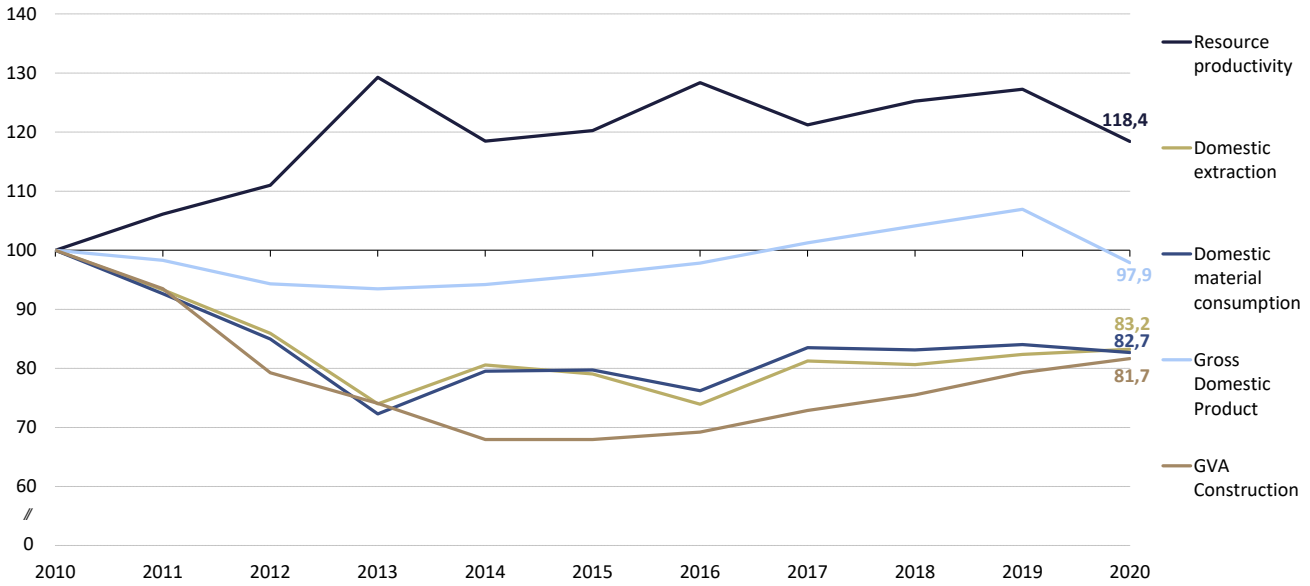
Productivity associated to the use of materials is measured by the ratio between Gross Domestic Product (GDP) in volume and the DMC. In 2020, this indicator decreased by 7.0%, following a reduction in DMC (-1.6%) lower than the real decrease in GDP (-8.4%).

Despite that result, productivity in the use of materials increased by 18.4% between 2010 and 2020, as a result of the 17.3% reduction in DMC while GDP decreased by 2.1% in volume.

The DMC evolution is influenced by the dynamics of material intensive activities, such as construction, but also paper pulp production and oil refining. The comparison with GVA of construction evidences some alignment between the respective evolutions, so it is possible to conclude that the evolution of the construction activity determines, to a large extent, the quantity of materials produced and consumed in the national economy.

Chart 6: Resource productivity, GDP and DMC, 2010-2020

Index: 2010 = 100

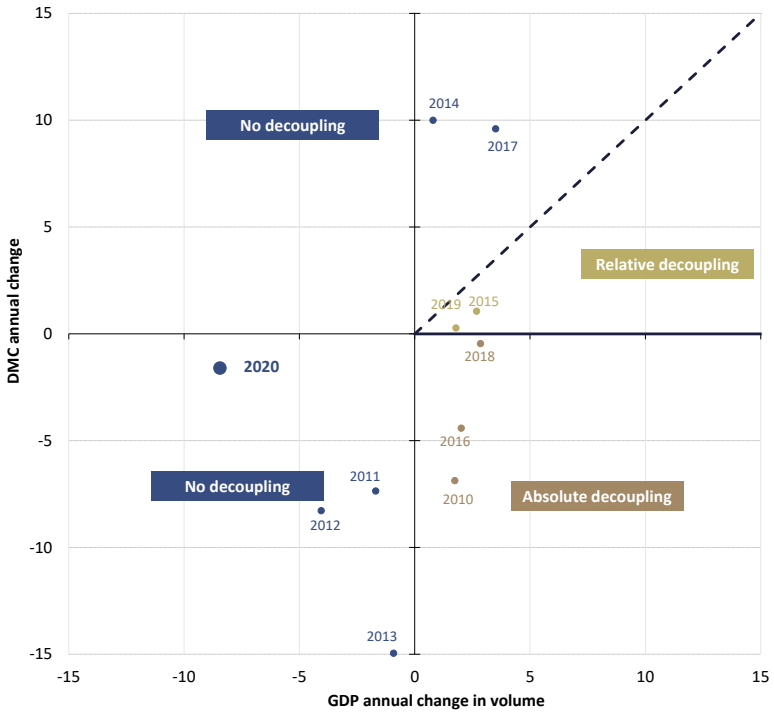


Source: Statistics Portugal (Material Flows Accounts; National Accounts - Table A.1.1.6 - GDP; National Accounts - Table A.1.4.4.5 - GVA Construction)

The joint analysis of the rates of change of DMC and GDP allows us to assess the degree of decoupling between the pressure on the environment and economic growth. In 2020, as in 2011, 2012 and 2013, there was no decoupling.

Chart 7: Annual changes in DMC and GDP in volume, 2010-2020

(annual change rates,%)



Source: Statistics Portugal (Material Flows Accounts; National Accounts - Table A.1.1.6 - GDP)

Box 1. SUSTAINABLE DEVELOPMENT GOALS and the Material Flow Accounts

MFA provides information for the construction of indicators 8.4.2 and 12.2.2 - Domestic material consumption, domestic material consumption *per capita*, and domestic material consumption per GDP and for indicators 8.4.1 and 12.2.1 - material footprint, material footprint *per capita* and material footprint *per* GDP (see box 2), which monitor Sustainable Development Goals (SDG) targets 8.4 and 12.2.

This information is also available in the thematic dossier on Sustainable Development Goals Indicators on the Statistics Portugal website.

Table 2: MFA indicators in SDG (8.4.2 and 12.2.2)

	Domestic material consumption	Domestic material consumption *per capita*	Domestic material consumption per GDP
	change rates		
2019-2020	-1.6	-1.6	7.5
2010-2020	-17.3	-15.1	-15.5
2016-2020	8.5	8.6	8.4

Box 2. Indicators expressed in raw material equivalents and material footprint

The overall material footprint measures the weight of materials actually consumed in an economy, converted into the "primary unit" that is at the origin of the various materials consumed, regardless of the degree of transformation with which raw materials enter or leave the economy. MFA indicators do not provide a fully consistent picture of the material footprint because they record imports and exports in the actual weight of goods traded when they cross the border, rather than the weight of materials extracted to produce them. As such, MFA's main indicators, namely the DMC, underestimate the material footprint. To adjust for this difference, the weight of internationally traded processed goods is converted into the corresponding extractions of raw materials they cause and expressed in the concept "raw material equivalents" (RME).

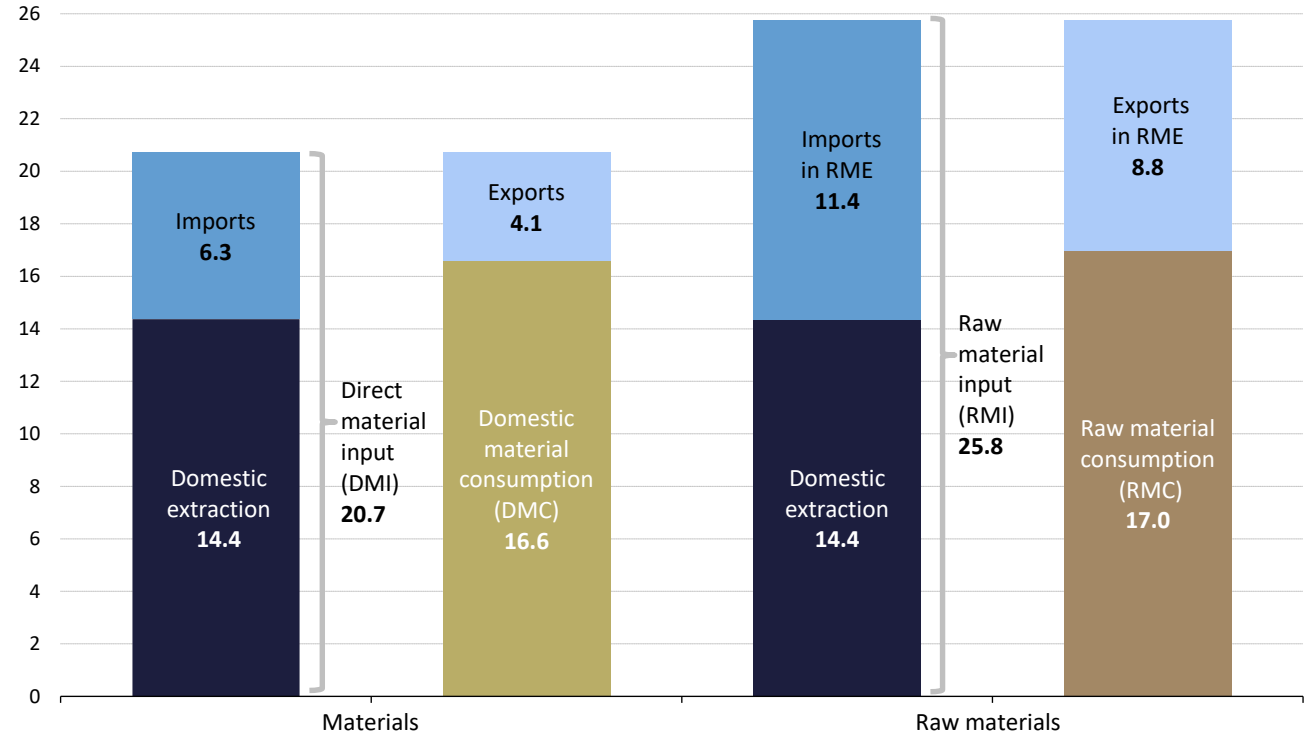
RME are estimated using a model created by Eurostat (see "Handbook for estimating raw material equivalents"), which is still under development, so the results obtained are not yet considered official statistics. Experimental calculations of some RME based indicators for Portugal are presented in this box.

In 2019, in Portugal, imports and exports expressed in RME were higher than those recorded in MFA (1.8 times and 2.1 times, respectively), as processed and semi-finished products constitute a significant part of these items. Consequently, Raw Material Input (RMI) was 1.2 times higher than Direct Material Input (DMI).

The material footprint (RMC) in Portugal was 17.0 tonnes *per capita* in 2019, 2.4% higher than the DMC (16.6 tonnes *per capita*). The overall EU material footprint was 14.5 tonnes *per capita* and 2.9% higher than the DMC.

Chart 8: **Material flow indicators derived from MFA and MFA-RME, 2019**

Unidade: tonnes *per capita*



Source: Statistics Portugal, Eurostat

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METHODOLOGY

The methodological aspects and explanations essential to the operationalization and understanding of the MFA compilation are available in *Notas Metodológicas da Conta de Fluxos Materiais* at Statistics Portugal's website (Portuguese version only).

EXTERNAL LINKS

- European Commission - Environment - Material flows and resource productivity
- European Commission - Environment - Circular economy
- European Commission - Environment - Material footprints
- European Environment Agency: The European environment — state and outlook 2020: knowledge for transition to a sustainable Europe - SOER 2020
- OECD - Resource efficiency
- UNECE - Sustainable use of natural resources

DATA REVISION AND UPDATES

The MFA series now available incorporates the updating of different data sources, more specifically the extractive industry data from the Directorate-General for Energy and Geology; the air emissions inventory and the cross-border movement of waste from the Portuguese Environment Agency I.P.; the Portuguese National Accounts, including the satellite accounts: Economic Accounts for Agriculture, Economic Accounts for Forestry and the Air Emissions Account (AEA). As a consequence of what was observed on AEA, there were changes in international trade, which resulted mainly from changes in the adjustment of the residence principle on air transport, namely fuel associated with that mode of transport.

Table 3. Revision of the main MFA aggregates, 2010-2019

Unit: million tonnes

	Data sent to Eurostat	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Domestic extraction	**2020**	179,2	167,2	153,9	132,6	144,4	141,6	132,4	145,5	144,6	150,0
	2021	179,4	167,4	154,1	132,7	144,5	141,8	132,6	145,8	144,6	147,8
	revision:	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%	0,0%	-1,5%
Imports	**2020**	55,0	53,3	52,2	53,4	57,2	61,2	62,1	65,4	65,3	64,4
	2021	55,1	53,5	52,4	53,6	57,5	61,5	62,6	65,9	65,9	65,3
	revision:	0,3%	0,3%	0,3%	0,4%	0,5%	0,6%	0,8%	0,7%	0,9%	1,4%
Exports	**2020**	32,4	33,7	34,9	40,4	41,4	42,2	41,0	42,6	42,1	42,7
	2021	31,4	32,7	33,9	39,5	40,6	41,4	40,4	42,0	41,7	42,4
	revision:	-3,0%	-2,9%	-2,6%	-2,1%	-2,0%	-1,9%	-1,6%	-1,3%	-0,9%	-0,7%
Domestic material consumption	**2020**	201,8	186,8	171,3	145,6	160,1	160,6	153,5	168,4	167,8	171,7
	2021	203,1	188,2	172,6	146,8	161,5	161,9	154,8	169,6	168,8	170,6
	revision:	0,7%	0,7%	0,8%	0,8%	0,8%	0,8%	0,8%	0,8%	0,6%	-0,6%

ACRONYMS AND DESIGNATIONS

DMI - Direct Material Input
DMC - Domestic Material Consumption
MFA - Material Flows Account
GDP - Gross Domestic Product
GVA - Gross value added
RMC - Raw Material Consumption
RME - Raw Material Equivalent
RMI - Raw Material Input
SDG - Sustainable Development Goals