Industry and Circular Economy´s Metabolism in the Metropolitan Area of Porto

Summary

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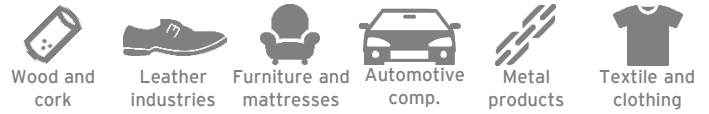
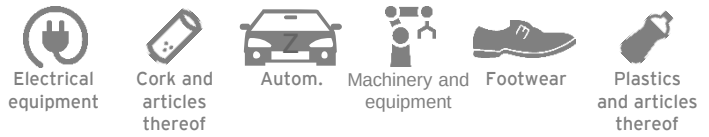
Metropolitan Area of Porto: socioeconomic context

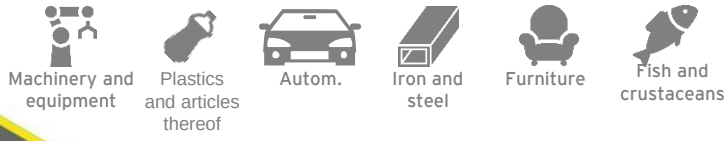
Sectors of specialisation *(in relation to Portugal)*

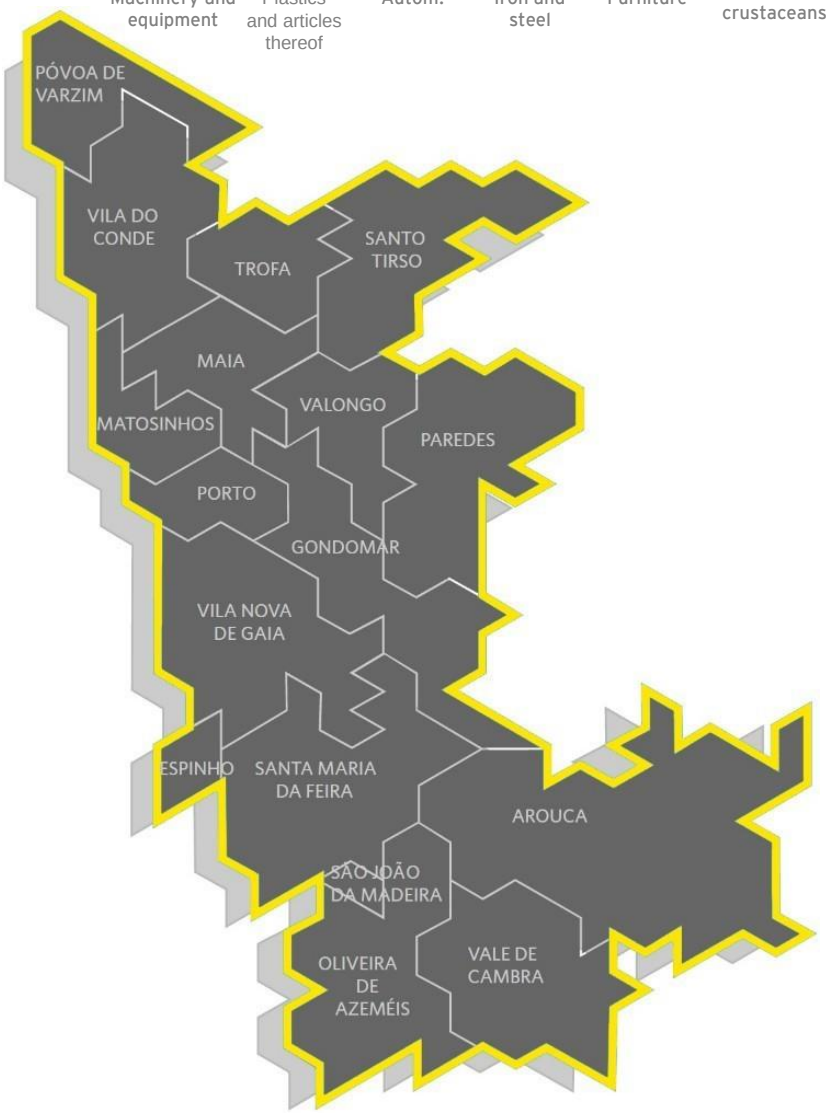


Most exported products



Most imported products





1,7
Population
(millions of inhabitants)
(2016)

842
Population density
(inhab./sq. km)
(2016)

55,6
Turnover of establishments
(in billions €)
(2015)

1.169
Trade balance
(in millions €)
(2016)

38,6%
Share of the trade sector
(in the total turnover of establishments)
(2015)

32,1%
Share of the manufacturing industry
(% of turnover)
(2015)

5%
Concentration of the 4 largest companies
(in turnover)
(2015)

"The study intends to make known the economic reality of the Metropolitan Area of Porto, as well as the pattern of material consumption and the generation of waste and stocks in the municipalities of this region

This study mainly aims at characterising the fundamental features of both the industry and the circular economy´s metabolism in the NUTS III region of the Metropolitan Area of Porto as a whole and in each of the 17 municipalities that make it up:

To this end, four key strands of work were considered :

- Geographical, demographic and socio-economic situation of the territory;
- Productive specialisation pattern of the territory, highlighting the main sectors and dynamics at the level of employment and foreign trade;
- Municipalities' industrial metabolism, more specifically in terms of direct material input and its domestic consumption;
- Analysis of the relevance and dynamics of the waste sector, as well as the waste recovery in the geographical area under study.

This study further aims to promote the circular economy, particularly highlighting the materials with potential for technical (namely recycling) and financial (economic value of waste) valorisation at the end-of-life of the products that these materials incorporate.

The Metropolitan Area of Porto has got approximately 1,7 million residents, mostly aged between 25 and 64 years (54%).

It is a densely populated geographical region compared to the national average, with a density about 7.5 times higher.

About 16% of its population has a degree, slightly above the national average (15%). The average monthly gain is close to the national average and the purchasing power is 5.1% higher.

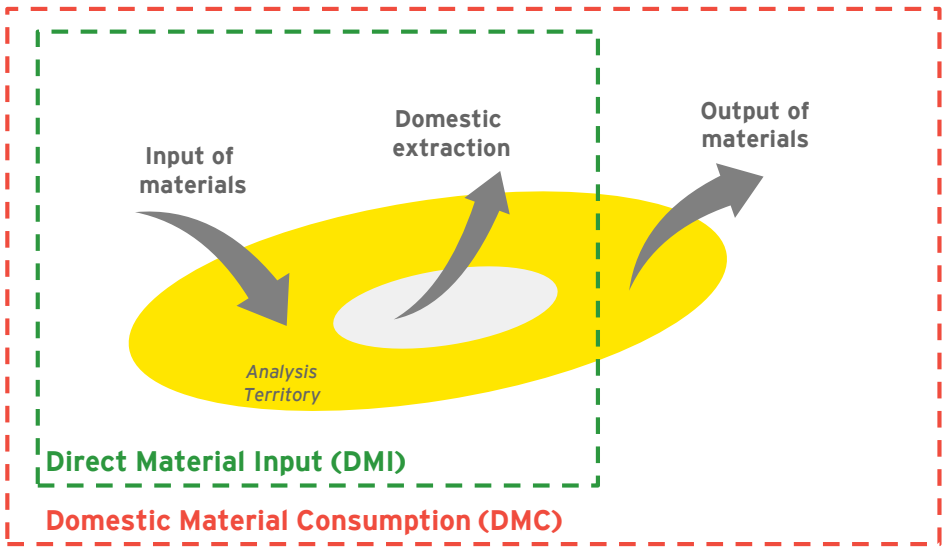
The weight of the manufacturing industry in the Metropolitan Area of Porto is significantly higher than that of the country as a whole (32% vs. 25% of the turnover, respectively), reflecting its strong industrial tradition.

Unemployment is higher than that for the country as a whole (11.1% vs. 8.3%, respectively).

In 2016, there were 196,413 active establishments in the Metropolitan Area of Porto that employed 636,003 people and invoiced 55.6 billion Euros.

The industrial structure of the economy of the Metropolitan Area of Porto is marked by the existence of some outstanding sectors at national and even international level, such as cork, furniture or clothing.

The Metropolitan Area of Porto is home to some of the largest national business groups (e.g. SONAE or Amorim) and has a remarkable trade surplus due to the strong export orientation of its industry.



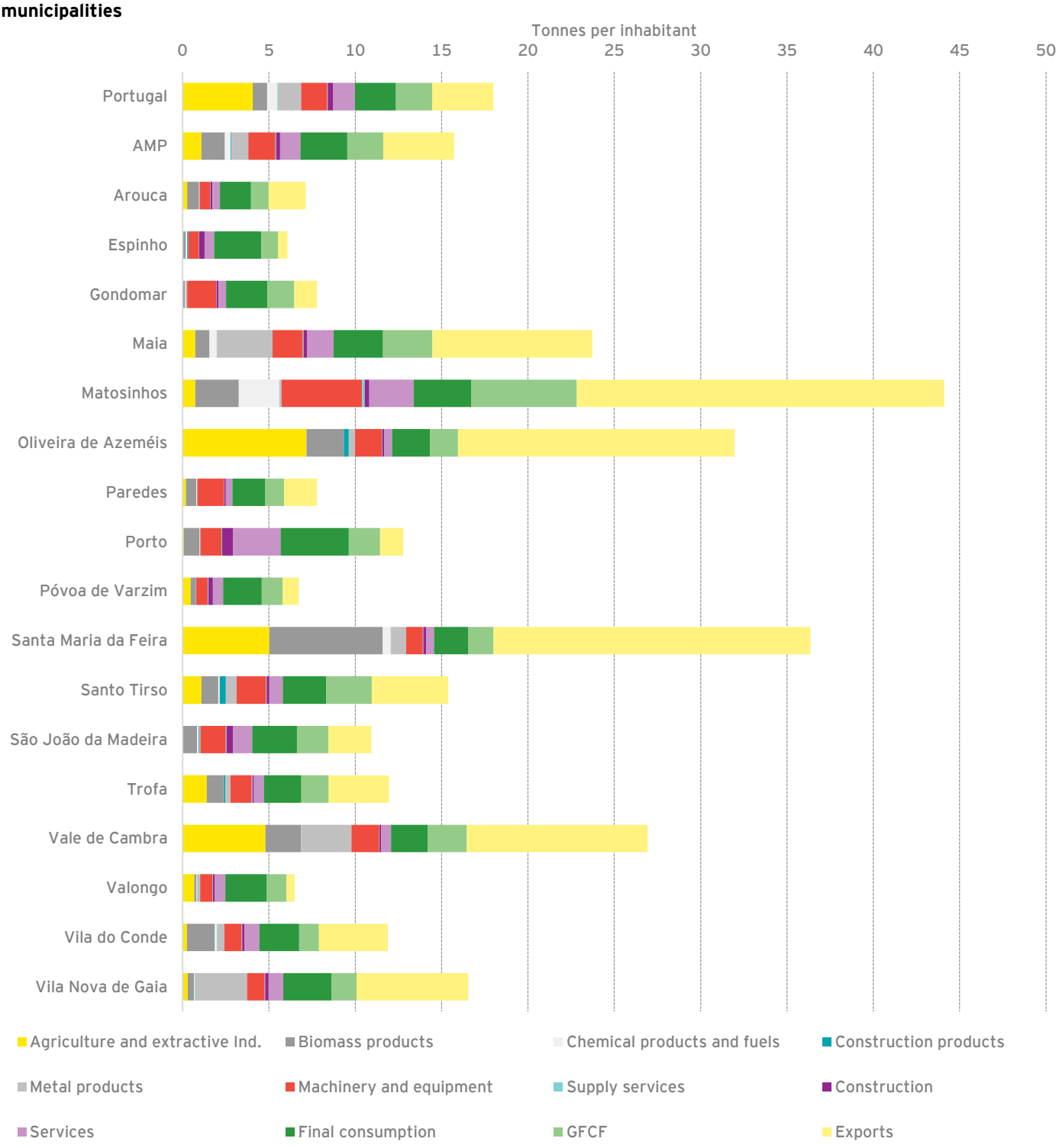
Key-concepts of the industrial metabolism

The two main accounting indicators of the material flows in an economy are:

- DMI: total of domestic extraction of materials subtracted from the environment plus inputs of materials (including imports) aimed at meeting the production and consumption needs of the territory's economy under analysis
- DMC: results from the outputs of materials from the municipality minus the DMI and expresses the quantities of materials that are actually consumed in the territory under analysis

Industrial Metabolism in the Metropolitan Area of Porto: direct material input

Direct material input, *per capita* and per type of acquisitions, in Portugal, in the metropolitan area of Porto and in its municipalities



Source: Estimates obtained from the latest available data from Statistics Portugal (INE), Eurostat and UN ComTrade

The DMI per inhabitant of the Metropolitan Area of Porto is 11% lower than that of the country. The main difference is due to the importance that agriculture and extractive industries have in the country's material consumption.

Five municipalities of the Metropolitan Area of Porto have a total DMI per inhabitant above the national average: Maia, Matosinhos, Oliveira de Azeméis, Santa Maria da Feira and Vale de Cambra. This result is mainly explained by the exports dynamics of these municipalities.

About 43% of the material resources consumed in the Metropolitan Area of Porto are absorbed by the companies as non-productive consumption (i.e. waste or accumulation of stocks). The main non-productive consumptions are sands and cements (49%), wood (17%) and fuels (11%).

The outputs of materials accounted for 26% of the material consumption of the Metropolitan Area of Porto. Woods, fuels and iron, metal alloys and ferrous metals are the main "exported" materials.

Final consumption has absorbed 17% of the materials consumed, mainly agricultural biomass and fossil fuels, while investment (GFCF) comprised 13% of the total consumption of materials in the region.

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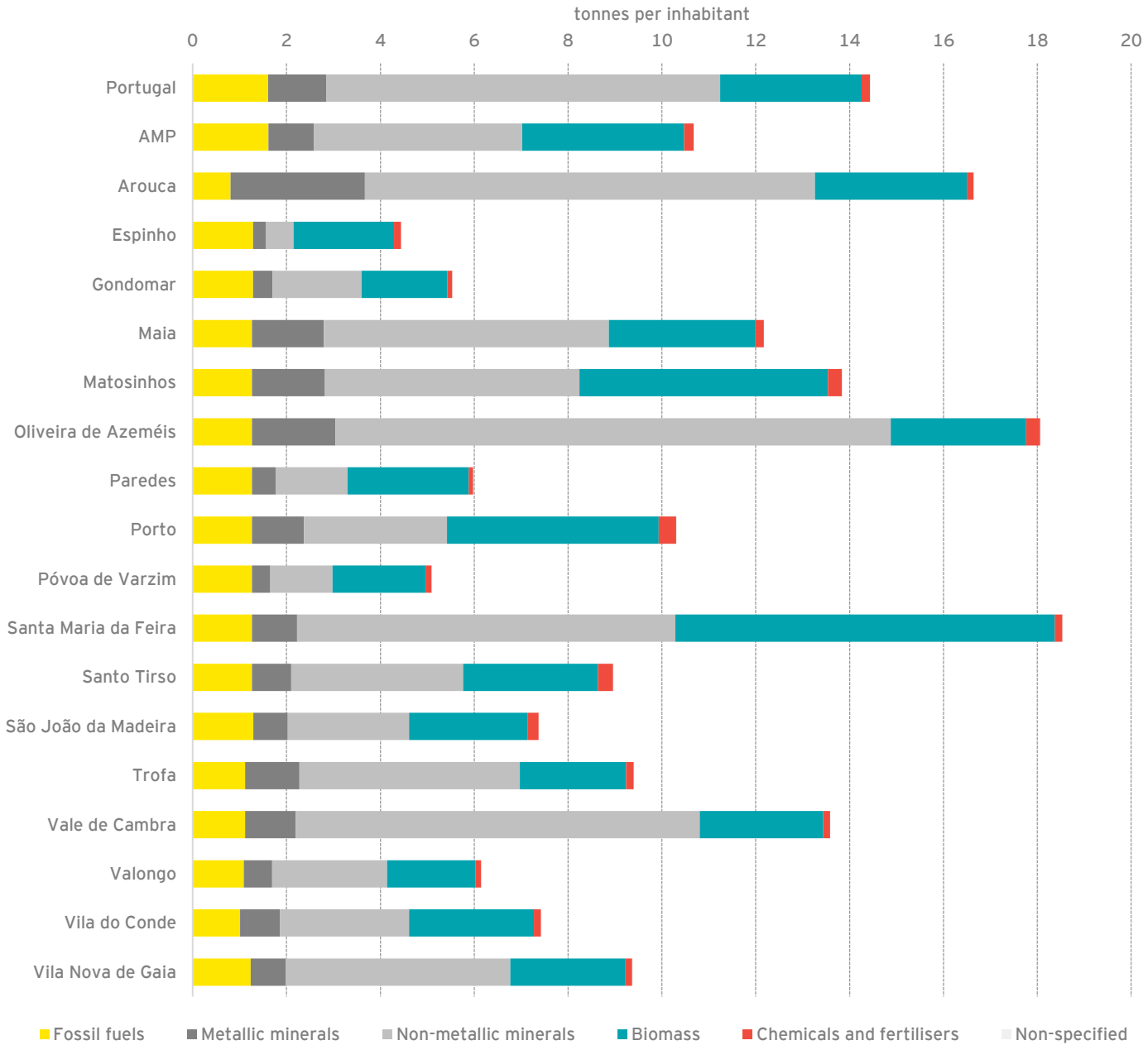
"5 municipalities of the Metropolitan Area of Porto have a total DMI per inhabitant above the national average

Industrial metabolism in the Metropolitan Area of Porto: domestic material consumption

Domestic material consumption, per capita and per type of material, in Portugal, in the Metropolitan area of Porto and in its municipalities



Source: Estimates obtained from the latest available data from Statistics Portugal (INE), Eurostat and UN ComTrade

The DMC per inhabitant of the Metropolitan Area of Porto is 26% lower than that of the country. This difference is mainly due to the higher average consumption of non-metallic minerals in the country.

Three of the Metropolitan Area of Porto municipalities have an average domestic consumption per capita above the national average: Arouca, Oliveira de Azeméis and Santa Maria da Feira. These results owe much to the relevance of the construction sector in Arouca, the industry sector in Oliveira de Azeméis and the wood and cork industries in Santa Maria da Feira, along with the low population concentration.

According to the latest available data, the accumulated materials (waste and material stocks, whether of raw materials or finished products) by the activity sectors were around 12 million tonnes. The sectors that have contributed the most to this result were the extractive industry, the wood and cork industries, the construction sector and the manufacture of non-metallic mineral products.

Exports amounted to approximately 6 million tonnes of products, which derived mainly from the sectors of wood and cork industries, petroleum products, metallurgical industries and non-metallic mineral products.

Inter-regional transactions totalled 1.1 million tonnes of products. These were mainly based on wood and cork products as well as metallurgical products.

The final demand in the region accounted for about 4.7 million tonnes of material resources (about 2,700 kg per inhabitant). Imports are the main source of resources consumed (1.1 million tonnes), while the food and beverage industries, agricultural and fisheries materials and oil products are the most important sectoral sources.

Gross fixed capital formation (GFCF) consumed about 3.6 million tonnes of materials in the region.

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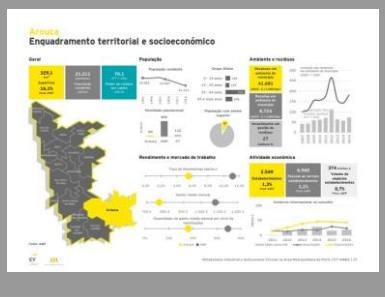
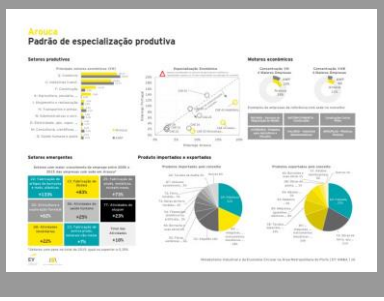
Industrial Metabolism in the municipalities of the Metropolitan Area of Porto

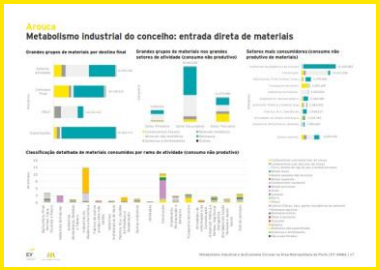
Territorial and socioeconomic framework
(Territory, Population, Environment and waste, Income and labour market, Economic activity)



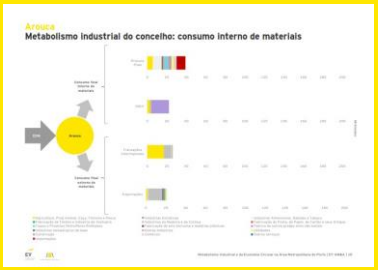
Productive specialisation pattern
(Productive sectors, Economic drivers, Emergent sectors, Imported and exported products)



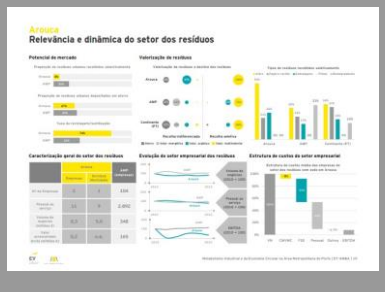
Municipality's industrial Metabolism: DMI
(Large groups of materials by destination and in the activity sectors, most consuming sectors, Materials consumed by branch of activity)



Municipality's industrial Metabolism : DMC
(Domestic material consumption by type of destination and by branch of activity)



Waste sector´s relevance and dynamics
Characterisation, cost evolution and structure of the sector)



Highlights on industrial metabolism
(Territorial and socioeconomic context, Productive specialisation pattern, DMI, DMC, Waste sector)

"There are industrial clusters quite concentrated in the territory and that allow for the exploration of opportunities of industrial symbioses

This study contributes to deepening the knowledge on the resource consumption of the local and regional economy. It aims at supporting more effectively the definition of public policies on environment and waste management. It also contributes to highlight economically attractive opportunities in the valorisation of non-productive resources.

This study shows that there is a great diversity of contexts and patterns of specialisation in the Metropolitan Area of Porto that make the organisation and the waste management more complex. However, there are industrial clusters quite concentrated in the territory that allow for the development of efficient logistics solutions in the management of waste and by-products, as well as the exploration of opportunities of industrial symbioses that make it possible to substitute the input and extraction of materials in the Metropolitan Area of Porto.

Around 43% of the material resources consumed in the Metropolitan Area of Porto are absorbed by the companies as non-productive consumption (i.e. materials consumed that do not result directly in products). This value shows that there is still a long way to go in terms of efficient use of resources and potential for the circular economy.

The productivity of resources (economic value per unit of resource consumed) varies in the different municipalities. The high consumption of materials per inhabitant or per worker associated with the manufacturing industries does not always weight greatly in favour of turnover, largely depending on the value added of the manufactured products.

In certain circumstances, moving up the value chain can lead to environmental benefits.

The extractive industries and the construction sector are the activities that show a greater amount of non-productive consumption of materials due to the typology of materials used. The wood and cork industries, the glass and ceramics industries and the metallurgy and metal-mechanic industries have a high degree of non-productive consumption.

Thus, the region should take as a priority the deepening of the management of specific flows of sectoral waste and its effective control.

The significant consumption of materials on the part of the final demand also requires the prioritisation of the final consumer's awareness, mainly with a view to increasing the selectivity in the generation and collection of waste.

The strong relevance of some of the main non-productive consumption generating industries in Matosinhos, Santa Maria da Feira, Oliveira de Azeméis, Vale de Cambra and Maia suggests that the practices of circularity and of increased productivity of materials should be specially fostered in these municipalities.

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