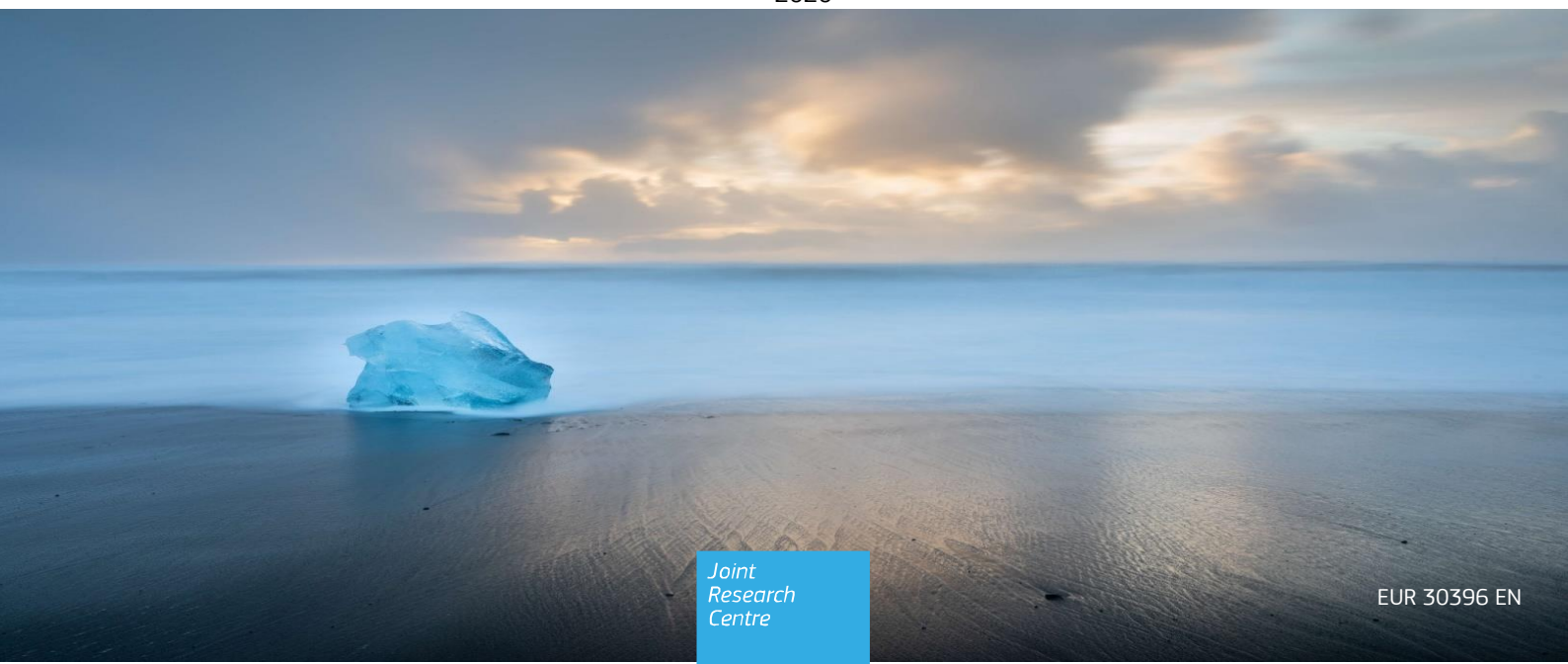# JRC TECHNICAL REPORT

EU Country profiles in the Raw Materials Information System (RMIS): Austria

Country-level key data and information related to non-food, non-energy raw materials

Nita, V., Garbossa, E., Ciută, T., Bonollo, B., Mancini, L., Vidal, B., Latunussa, C., Wittmer, D., Hamor, T., d'Elia, E. Unguru, M. and Manfredi, S.

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Contents

Foreword

The Raw Materials Information System (RMIS), developed and hosted by the Joint Research Centre (JRC), is the EC's reference knowledge platform on non-food, non-energy raw materials from primary to secondary sources. The RMIS includes a number of thematic sections, covering a broad range of topics relevant to raw materials policy. Among them, EU Country Profiles provide data and indicators for EU countries.

This report mirrors the content of the profile developed for Austria, as available online in the RMIS.

Authors

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Abstract

The module European Country Profiles of the European Commission's Raw Materials Information System (RMIS) provides country-specific data and indicators related to non-food, non-energy raw materials. These data and indicators are derived from data from official sources and well-established data providers, or by their elaboration. Each profile is structured into nine thematic sections: i) Key indicators; ii) Investment and regulatory framework; iii) research, development and innovation; iv) Resources and reserves; v) Supply; vi) Raw materials use; vii) Trade; viii) Environment; and ix) Social & Policy.

The current country report presents the data and indicators for Austria, mirroring the EU Country Profile for Austria included in the RMIS in May 2019, which is the reference month of the data used.

1   Introduction

The module European Country Profiles ([1]) of the European Commission's Raw Materials Information System (RMIS) aims to provide country-specific knowledge for non-food, non-energy raw materials. Seventeen EU countries profiles are currently accessible in the RMIS. For the remaining EU countries, work is ongoing.

These country profiles synthetize key data, information and indicators related to raw materials by either using data from established data providers (e.g., Eurostat, IMF, World Bank, UNIDO, UN Statistics) or by JRC elaboration based on the available official data (e.g., data on country's trade in raw materials at HS 6-digit level, country's exports of mining equipment, etc.).

Each profile is structured into nine thematic sections, as presented hereafter.

Key Indicators (section 1) and *Research, development and innovation* (section 3) include both selected economy-wide indicators (e.g., industrial competitiveness, contribution of mining sector to national economies, industry and manufacturing value added as share of GDP) and data on the economic performance of industrial sectors particularly relevant for raw materials - e.g. value added, employment, labor productivity, as well as magnitude of research and development expenditure.

Indicators of country-level and sectorial investments (e.g., share of total investment in GDP, foreign direct investments and exploration budget in metals and mining), as well the specificities of countries' mining legislative frameworks are presented in section 2, *Investment and regulatory framework*.

Data relating to country's estimated mineral resources and reserves are provided in section 4, *Resources and reserves*.

Supply section (section 5) presents data on country's volume of imported goods, domestic extraction by broad category of materials, production value of selected mining and manufacturing sectors, and country's production of non-food, non-energy minerals.

Section 6, *Raw material use*, focuses on utilization of raw materials, presenting data on country's volume of goods exported and domestic consumption by broad category of materials.

Section 7, *Trade*, presents country indicators and data on trade in non-food, non-energy raw materials, by relevant material category, product cluster, and Harmonized System chapter and subheading. Based on the methodology developed within the framework of Raw Materials Scoreboard ([2]), this section also presents the country's exports of mining equipment.

Environment section (section 8) includes tables and charts of selected indicators of environmental performance of relevant industrial sectors, such as emissions of greenhouse gases and particulate matter and generation of waste.

Several social and policy indicators are displayed in the section 9, *Social & Policy*, such as governance quality, policy perception, country risk and occupational safety.

The current country report presents data and indicators for Austria, as elaborated in the *EU Country Profiles* module in the RMIS. This country profile was developed in May 2019, which is the reference month of all data (i.e., it includes the data available at that time).

Austria has a highly competitive industry, holding the 14th position in UNIDO's Competitive Industrial Performance Index in 2016. Industrial value added accounted for more than a quarter of GDP in the same year.

Based on the share in the total manufacturing's value added, the most important manufacturing sectors are fabricated metal products and chemicals and chemical products. From the selected raw material relevant sectors, manufacture of basic metals contributes the most to the total value added and total employment of the whole industry in 2016 (6% and 5.5% respectively). The share of the production value of mining and quarrying sector in the production of total industry is around 1%. In 2015, manufacture of basic metals and manufacture of rubber and plastic have the highest levels of business expenditure on R&D from the selected raw material relevant sectors. Manufacture of basic metals, manufacture of wood and products of wood and cork, and manufacture of other non-metallic minerals have high production value in 2016.

([1])   https://rmis.jrc.ec.europa.eu/?page=country-profiles#/
([2])   For more methodological details and the list of 21 six-digit HS codes covered by this indicator, Raw materials scoreboard 2018, Methodological notes, Mining equipment exports, https://op.europa.eu/en/publication-detail/-/publication/117c8d9b-e3d3-11e8-b690-01aa75ed71a1

For three minerals – tungsten, magnesite and talc – Austria has a share of global production higher than 1 percent.

While being a net importer of Raw Materials (food- and energy related included), Austria had a positive trade balance for Intermediate goods in 2017.

For the four raw material relevant HS product clusters selected, Austria was a net importer of Minerals and Stone and Glass, and had trade surplus for Wood and Metals in 2017. Austria has highly positive trade balance for HS chapters such as Iron and steel (HS 72), Wood and articles of wood (HS 44) and Aluminium and articles thereof (HS 76).

As far as the environmental performance of the relevant industrial sectors is concerned, manufacturing of basic metals and manufacture of other non-metallic minerals have the highest greenhouse gas emission intensity, while manufacture of wood and wood products and mining and quarrying have the highest PM 2.5 emission intensity.

Austria has high levels of governance indicators (i.e. The Worldwide Governance Indicators), and a very low country risk, according to INFORM index.

2 Key indicators

2.1 Gross domestic product

Definition: GDP data are expenditure-based, in constant prices and billions of national currency units. Base year is country specific.

Figure 1. Gross domestic product (constant prices; 2010) ([3])
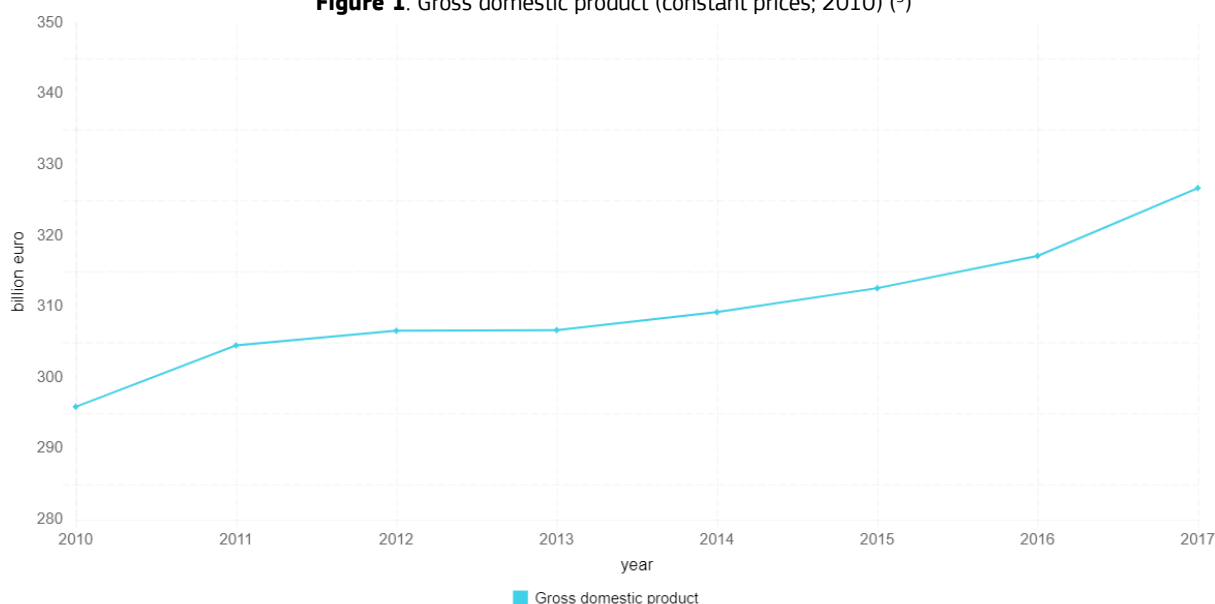
2.2 Competitive Industrial Performance Index

Definition: As calculated by UNIDO, Competitive Industrial Performance Index (CIP) aims at measuring the industrial performance of countries. CIP is a composite index based on eight indicators, grouped into three dimensions of industrial competitiveness: production and export capability; technology; and impact on global industrial production and trade.

The 2018 CIP report covers 150 economies ([4]).

([3])   IMF, World Economic Outlook Database, October 2018, https://www.imf.org/external/pubs/ft/weo/2017/02/weodata/index.aspx
([4])   UNIDO, Competitive Industrial Performance Report 2018, https://www.unido.org/sites/default/files/files/2019-05/CIP_Report_2019.pdf

Figure 2. Competitive Industrial Performance Index [5]
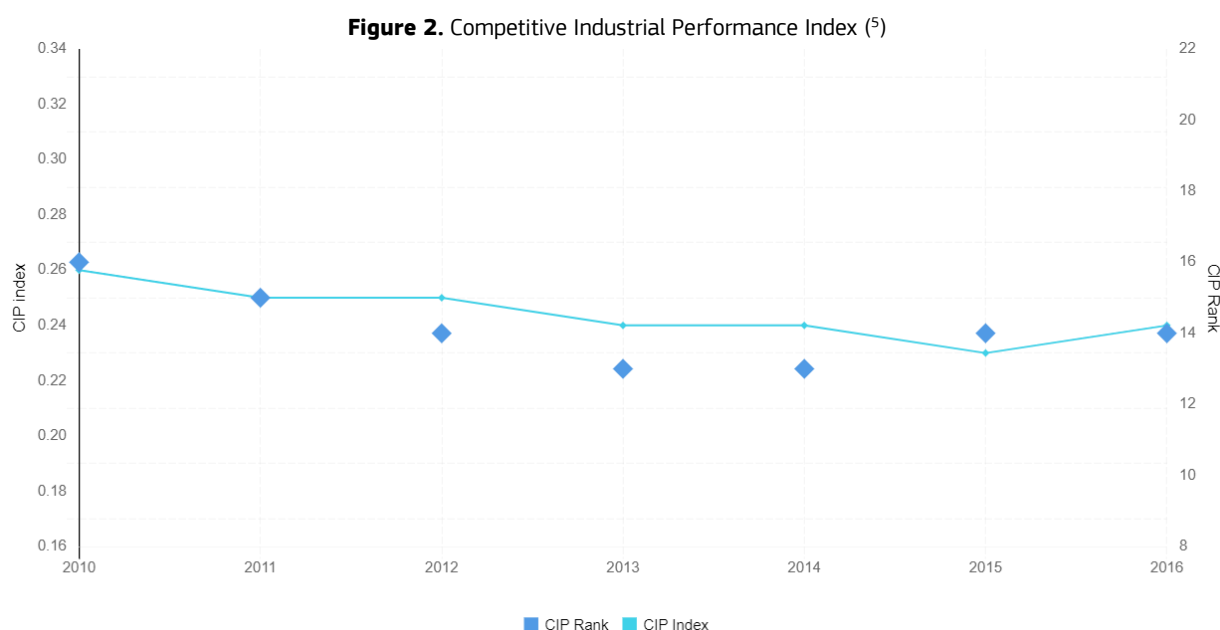
2.3 Mining Contribution Index

Definition: The Mining Contribution Index (MCI) quantifies the extent of mining sector's contribution to a country's economy. It is an index composed of four indicators, namely:

1) mineral and metal contribution to country's exports in 2016

2) change in export contribution of mining and metal exports over the period 2011-2016

3) mineral production value in 2016, expressed as a percentage of GDP

4) mineral rents as percentage of GDP.

Table 1. Mining Contribution Index 2018 [6]

Mining Contribution Index 2018	**2018 MCI Score**: 35.5	**Rank**: 122 (out of 182)

2.4 Industry's and manufacturing's value added as share of GDP

Definition: Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. Industry covers the International Standard Industrial Classification (ISIC) divisions 10-45. As defined by World bank, industry's value added comprises value added in mining, manufacturing, construction, electricity, water, and gas. Value added is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.

Manufacturing covers ISIC divisions 15-37.

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[5]   UNIDO, Competitive Industrial Performance Index, CIP 2018 database, https://stat.unido.org/database/CIP%202018 .
[6]   Source of data (and details on MCI calculation): International Council on Mining and Metals, Role of mining in national economies. Mining Contribution Index 2018 4th edition, https://www.icmm.com/en-gb/society-and-the-economy/role-of-mining-in-national-economies/mining-contribution-index

Figure 3. Industry's and manufacturing's value added as share of GDP ([7])

Manufacturing   Industry
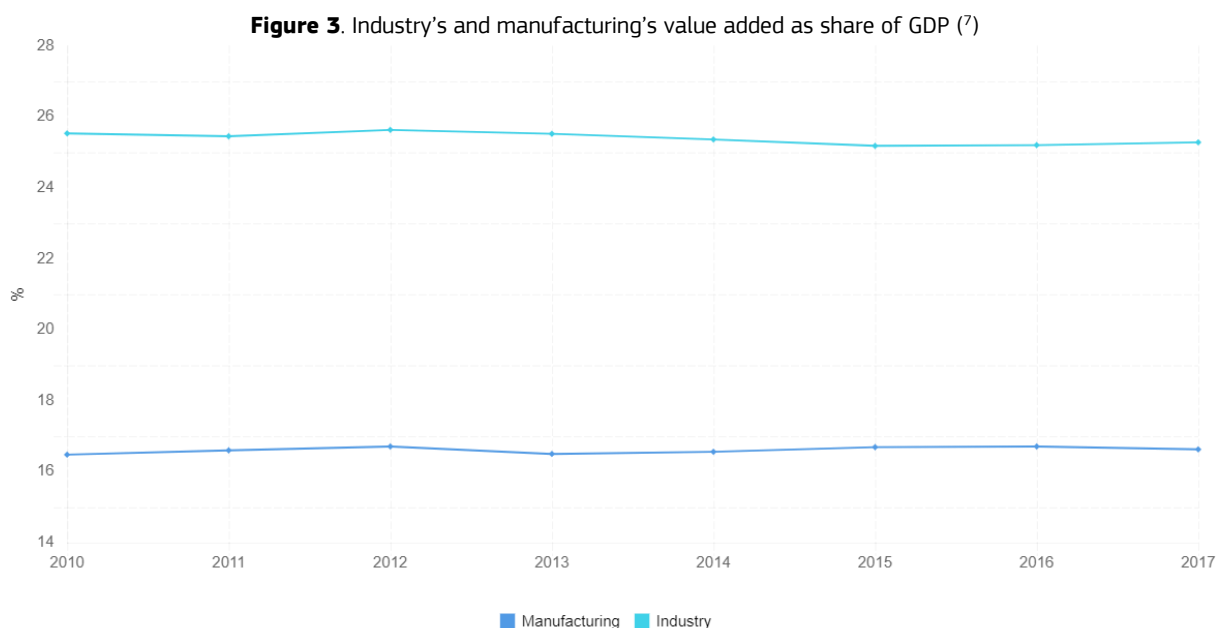
2.5 Main five manufacturing sectors

This indicator presents the country's leading five manufacturing sectors, based on their share in the total value added of manufacturing sector.

Table 2. Main five manufacturing sectors (share of value added; 2017) ([8])

Rank	Manufacturing sector (ISIC Rev. 3.0, 2 digits)	Share (%)
1	Machinery and equipment n.e.c.	16.4
2	Fabricated metal products	10.8
3	Food and beverages	10.8
4	Chemicals and chemical products	9.9
5	Electrical machinery and apparatus	7.9

2.6 Value added of selected industrial sectors

Definition: As calculated by Eurostat, "Value added at factor costs is the gross income from operating activities after adjusting for operating subsidies and indirect taxes; value adjustments (such as depreciation) are not subtracted" ([9]).

The figure includes data for the following NACE Rev.2 sectors relevant for industrial raw materials:

1. B07 Mining of metal ores

2. B08 Other mining and quarrying

3. B09.9 Support activities for other mining and quarrying

4. C16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

5. C17 Manufacture of paper and paper products

([7])   World Bank, World Development Indicators. https://data.worldbank.org/products/wdi

([8])   UNIDO, Country profile, http://stat.unido.org/?_ga=2.94848220.1164807116.1524737768-1906126199.1524492512

([9])   Eurostat, metadata of Structural Business Statistics, https://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm

6. C22.1 Manufacture of rubber products

7. C23 Manufacture of other non-metallic mineral products

8. C24 Manufacture of basic metals

9. E38.3 Materials recovery

As complete time series for value added were not available, the forestry-related sectors are not covered.

The contribution (percentage) of each sector to the total value added of industry (NACE sections B–E) is also presented in the figure.

Figure 4. Value added of selected industrial sectors ([10]) ([11])

Legend:
■ Manufacture of basic metals ■ Manufacture of other non-metallic mineral products ■ Manufacture of paper and paper products ■ Manufacture of rubber products
■ Manufacture of wood and wood products ■ Materials recovery ■ Mining of metal ores ■ Other mining and quarrying
■ Support activities for other mining and quarrying

2.7 Number of employees in selected industrial sectors

Definition: One of the indicators used for monitoring employment sectors is the *Number of employees*. This variable is defined by Eurostat as those persons who work for an employer and who have a contract of employment and receive compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in kind. A worker from an employment agency is considered to be an employee of that temporary employment agency and not of the unit (customer) in which they work.

The NACE Rev.2 sections used to collect data and calculate the sectoral percentage of employees in the total industry sectors are the following: B, Mining and quarrying; C: Manufacturing; D: Electricity, gas, steam and air conditioning supply; E: Water supply; sewerage, waste management and remediation activities.

([10]) Value added at factor cost in raw materials sectors over time. It also shows the contribution of these activities to the value added of the whole industrial sector (including: mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage, waste management and remediation activities).

([11]) Eurostat, Structural Business Statistics, Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E), dataset code: sbs_na_ind_r2, Value added at factor cost. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Figure 5. Number of employees in selected industrial sectors ([12]) ([13])

Legend:
- Other mining and quarrying
- Manufacture of wood and wood products
- Manufacture of paper and paper products
- Manufacture of rubber products
- Manufacture of other non-metallic mineral products
- Manufacture of basic metals
- Materials recovery
- Mining of metal ores
- Support activities for other mining and quarrying
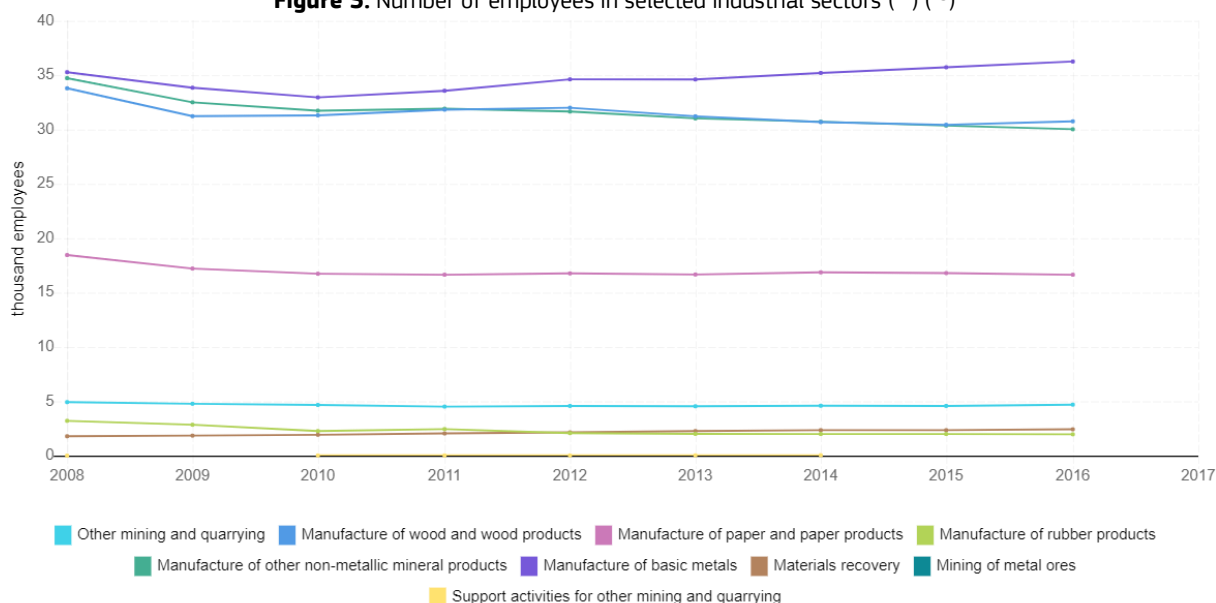
2.8 Labor productivity of industry

This indicator present the *labor productivity* of the four NACE Rev.2 sections of industry (B, Mining and quarrying; C, Manufacturing; D, Electricity, gas, steam and air conditioning supply; E, Water supply; sewerage, waste management and remediation activities), calculated by Eurostat as gross value added per employee.

Figure 6. Labor productivity of industry (NACE Rev.2, sections B-E) ([14])

Legend:
- Water supply; sewerage, waste management and remediation
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
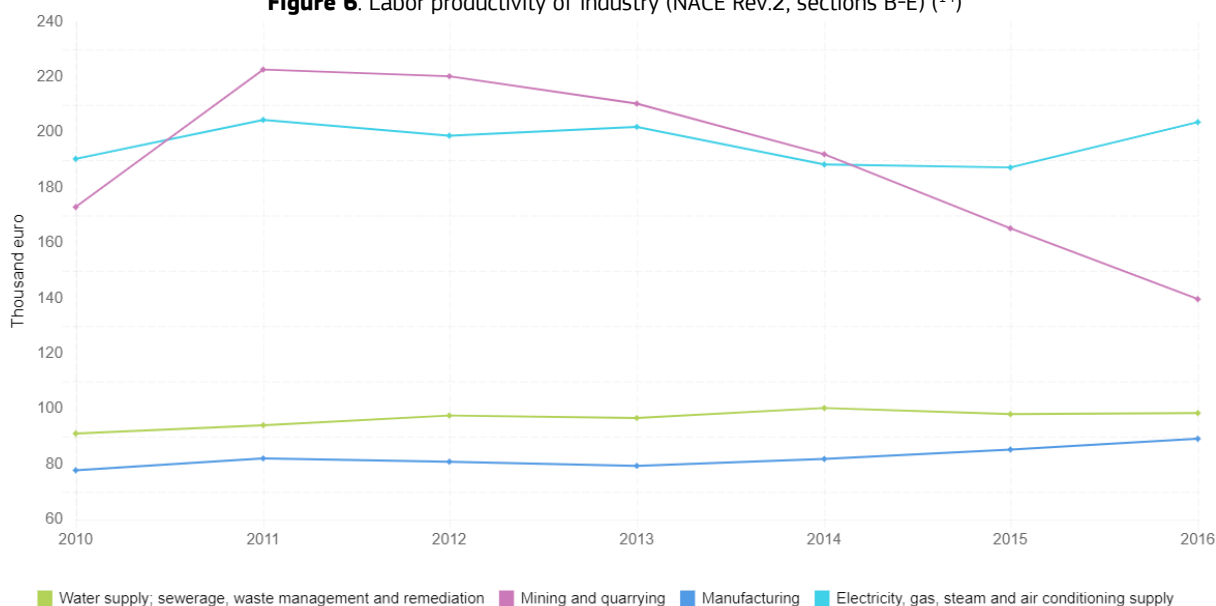
([12]) Number of employees in the raw materials sectors over time. It also shows the contribution of these activities to the total number of jobs in the industrial sector (including: mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage, waste management and remediation activities).

([13]) Eurostat, Structural business statistics (sbs), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E), dataset code: *sbs_na_ind_r2, Employees – number*. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

([14]) Eurostat, Structural business statistics (sbs), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E), dataset code: *sbs_na_ind_r2, Gross value added per employee*

2.9   Production value of mining and quarrying as share in total industry

Definition: Production value measures "the amount produced based on sales and including changes in stocks and the resale of goods and services. It is calculated by Eurostat as turnover plus/minus the changes in stocks of finished products, work in progress and goods and services purchased for resale, minus the purchases of goods and services for resale, plus capitalized production, plus other operating income (excluding subsidies). Income and expenditure classified as financial or extraordinary in company accounts is excluded from production value" ([15]).

Data provided in the chart for *Mining and quarrying sector* are calculated as share of total industry (i.e., sections B-E, NACE Rev.2).

Figure 7. Production value of mining and quarrying as share in total industry
(sections B-E, NACE Rev.2) ([16])

Mining and quarrying

([15])   Eurostat, Structural Business Statistics, Reference Metadata, http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm
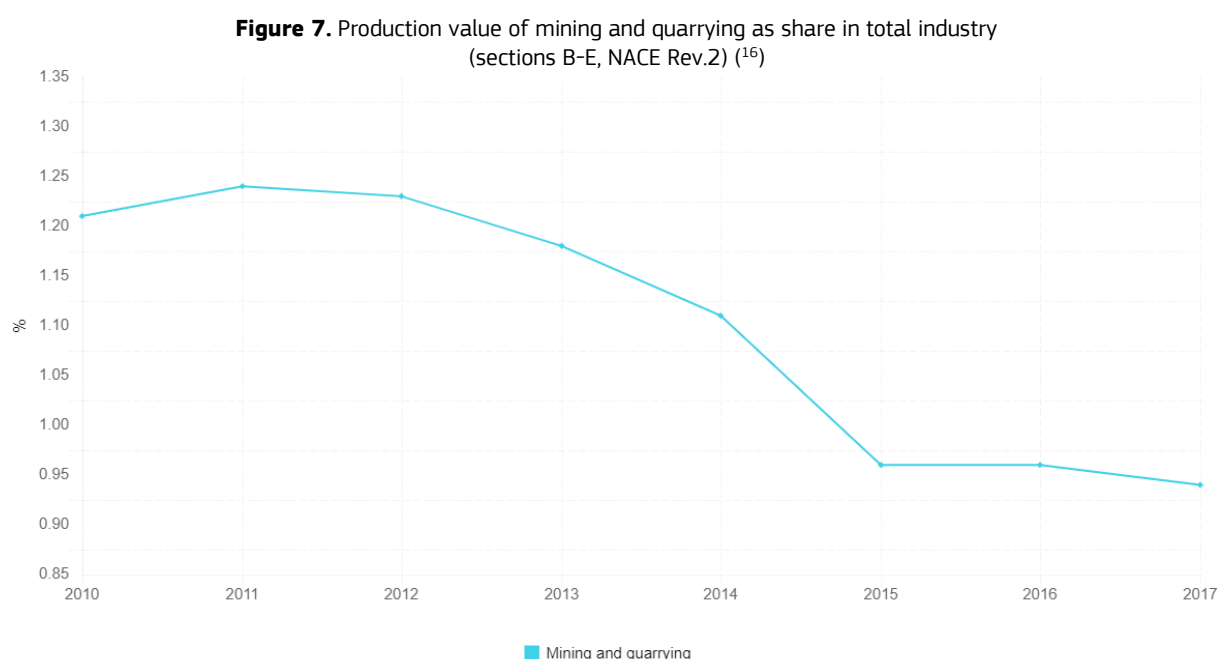([16])   Eurostat, Structural business statistics (sbs), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E), dataset code: sbs_na_ind_r2, Production value http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=enz

3 Investments and regulatory framework

3.1 Total investment as percentage of GDP

This indicator is calculated by the International Monetary Fund as a "ratio of total investment and GDP (both in current local currency). Investment is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables" ([17]).

Figure 8. Total investment as percentage of GDP ([18])
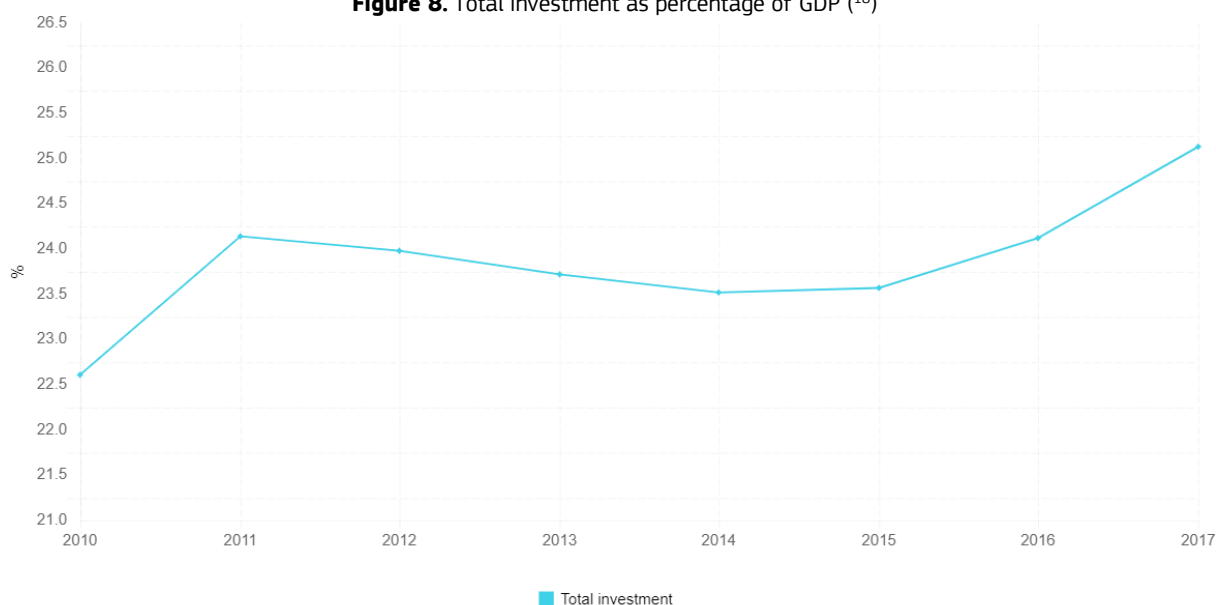
3.2 Foreign direct investments: flows and stocks

As defined by UNCTAD in the *Methodological Note* accompanying the World Investment Report 2017([19]):

1. "flows of FDI comprise capital provided (either directly or through other related enterprises) by a foreign direct investor to an FDI enterprise, or capital received from an FDI enterprise by a foreign direct investor",

2. "FDI stock is the value of the share of their capital and reserves (including retained profits) attributable to the parent enterprise, plus the net indebtedness of affiliates to the parent enterprise".

([17]) IMF, World Economic Outlook Database, October 2018,https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx
([18]) IMF, World Economic Outlook Database, October 2018,https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx
([19]) http://unctad.org/en/PublicationChapters/wir2017chMethodNote_en.pdf

Figure 9. Inward flows and stocks ([20])
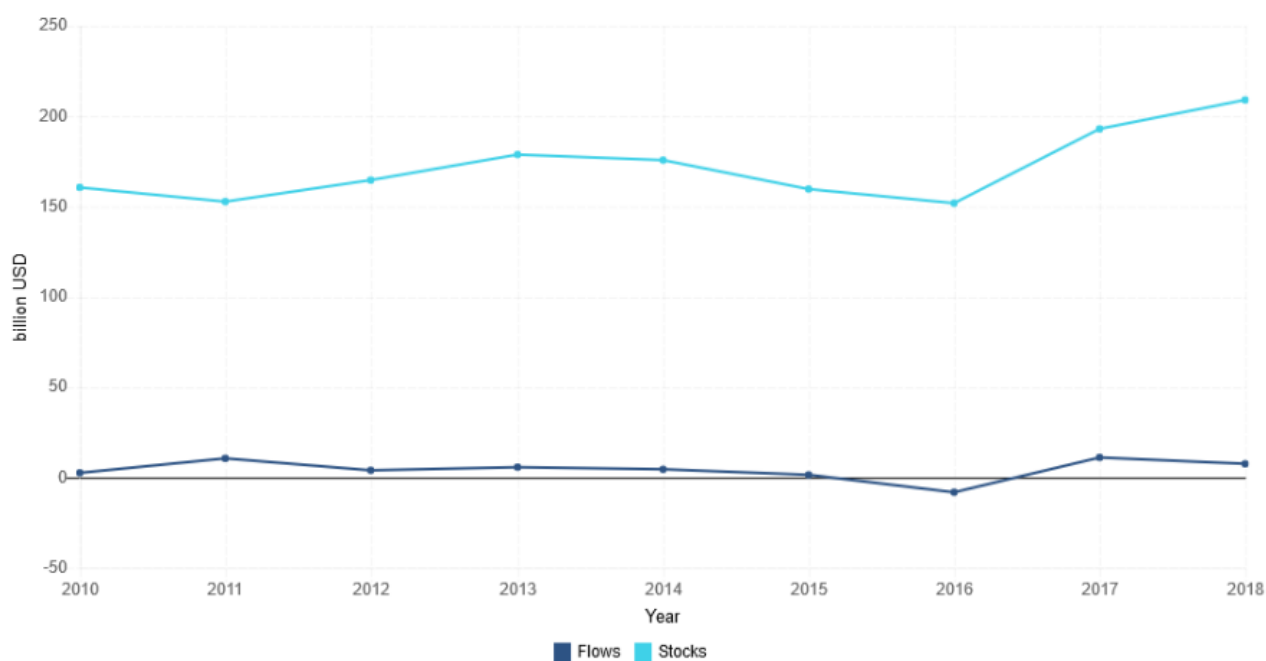
Figure 10. Outward flows and stocks ([21])
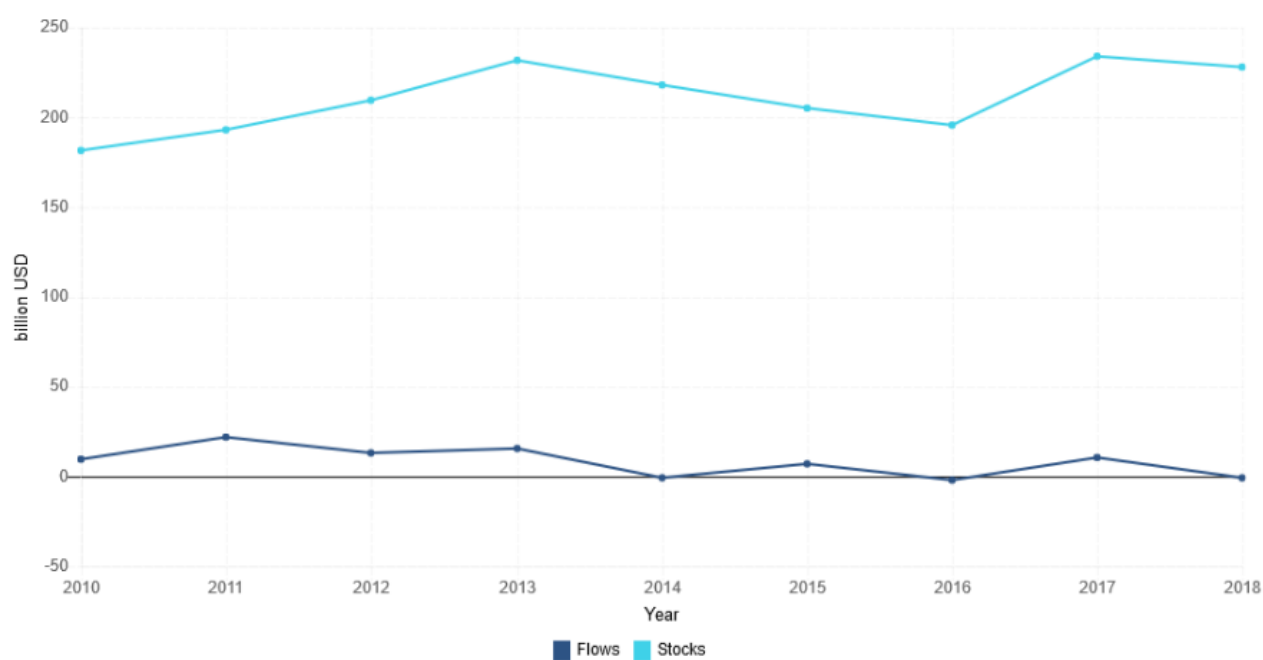
3.3 Flows and stocks of foreign direct investment in mining and quarrying sector

No data available

([20]) UNCTAD, Statistics Data Center, Foreign direct investments, http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en
([21]) UNCTAD, Statistics Data Center, Foreign direct investments, http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en
For detailed data see the FDI Stocks and Flows section in Economics &Trade module, https://rmis.jrc.ec.europa.eu/?page=fdi-stocks-and-flows-86abca#/

3.4 Annual exploration budget in metals and mining

S&P Global Market Intelligence, based on the data reported by companies and its own estimates, is the data provider. The nonferrous exploration budgets covered by S&P Global Market Intelligence include spending for gold, base metals, platinum group metals, diamonds, U3O8, silver, rare earths, potash/phosphate, and many other hard-rock metals, but exclude exploration budgets for iron ore, coal, aluminium, oil and gas, and many industrial minerals.

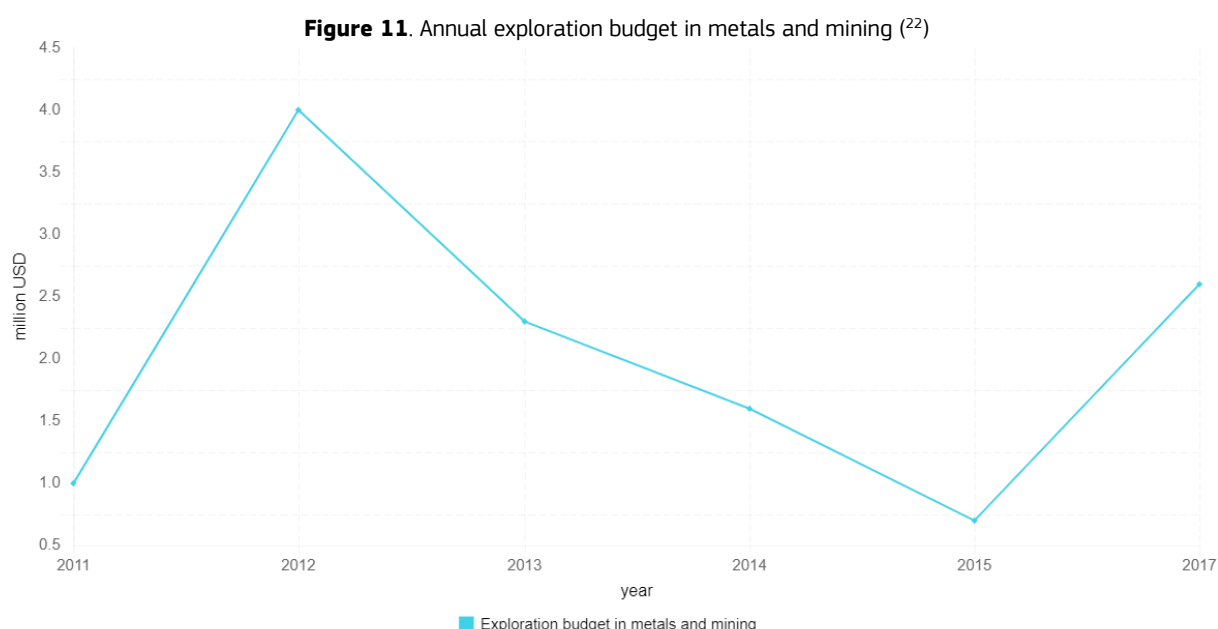**Figure 11**. Annual exploration budget in metals and mining [22]

Exploration budget in metals and mining

3.5 Business environment

Doing Business 2019 aims at measuring business regulation in 190 economies by examining five dimensions:

1. Starting a business,
2. Getting a location,
3. Accessing finance,
4. Dealing with day-to-day operations,
5. Operating in a secure business environment.

It contains 11 indicator sets: Starting a business; Labor market regulation; Dealing with construction permits; Getting electricity; Registering property; Getting credit; Protecting minority investors; Trading across borders; Paying taxes; Enforcing contracts; and Resolving insolvency (according to *Doing Business 2019. Reforming to Create Jobs)* [23].

Table 3. Business environment [24]

Ease of doing Business index 2019	Rank: 26 (out of 190)

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[22] S&P Global Market Intelligence, Country profile, Exploration Budget Trends
[23] http://www.doingbusiness.org/reports/global-reports/doing-business-2019
[24] World Bank, Doing Business. Measuring Business Regulations, http://www.doingbusiness.org/

3.6 Regulatory framework

The regulatory framework review is focusing on minerals ownership, major governing laws, permitting rules and competent authorities. This extract is based on the MINLEX report published by DG GROW ([25]).

Legislation, ownership, and categories of minerals

Mining in Austria is mainly governed by the Mining Law which regulates the exploration and extraction of all minerals. Austria has a mixed permitting regime with decentralised and centralised procedures depending on the type of mineral. Two authorities issue the exploration and mining permits: the District Administrative Authority at first instance and (provincial) governor for landowner minerals (extracted at the surface), and the Federal Minister of Science, Research and Economy via the national mining authority for "free for mining" minerals (including landowner minerals extracted not at the surface), and state-owned minerals (rock salt, oil, gas, uranium, thorium.) The federal state is responsible for certain environmental issues, most mining related environmental issues rest entirely with the provinces.

Regulatory framework and permitting

For "free for mining minerals" (metallic ores, coal, major industrial minerals) an exploration licence is valid for 5 years with possible extension; for landowner minerals (construction and minor industrial minerals) exploration is part of the approval of an extraction plan. The exploration of state-owned raw materials is reserved to the State, the national mining authority has to approve exploration activities.

Concerning extraction of landowner minerals, the main permitting authority is the District Administrative Authority (for areas <5 ha); if the area is >10 ha for hard rock quarries and >25 ha for sand and gravel pits, an EIA is normally required. The extraction of "free for mining" minerals requires a mining license granted by the federal mining authority subject to an exploitation plan for five years. The extraction of state-owned raw materials requires the approval of a mining plot for five years.

The Austrian Mineral Resources Plan (AUTMINPLAN) was prepared by the Minister of Economy which strives to achieve a broad consensus among the federal government, the federal states and businesses for safeguarding the supply of mineral resources. Outside of these areas mining is also possible i.e. not forbidden by the AUTMINPLAN. The AUTMINPLAN itself has no legally binding character.

([25]) DG GROW, Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU, final report of MINLEX project, 2017, https://publications.europa.eu/en/publication-detail/-/publication/18c19395-6dbf-11e7-b2f2-01aa75ed71a1/language-en
More detailed information on the legal and regulatory framework can be found at the Policy&Legislation/Member States Legislation section.

4 Research, development, and innovation

4.1 Gross domestic expenditure on R&D

Definition: Gross domestic expenditure on R&D (GERD) includes expenditure on research and development by business enterprises (BERD), higher education institutions, as well as government and private non-profit organizations. For additional methodological details, see Eurostat, Statistics on research and development (rd) ([26]).

Figure 12. Gross domestic expenditure on R&D ([27])
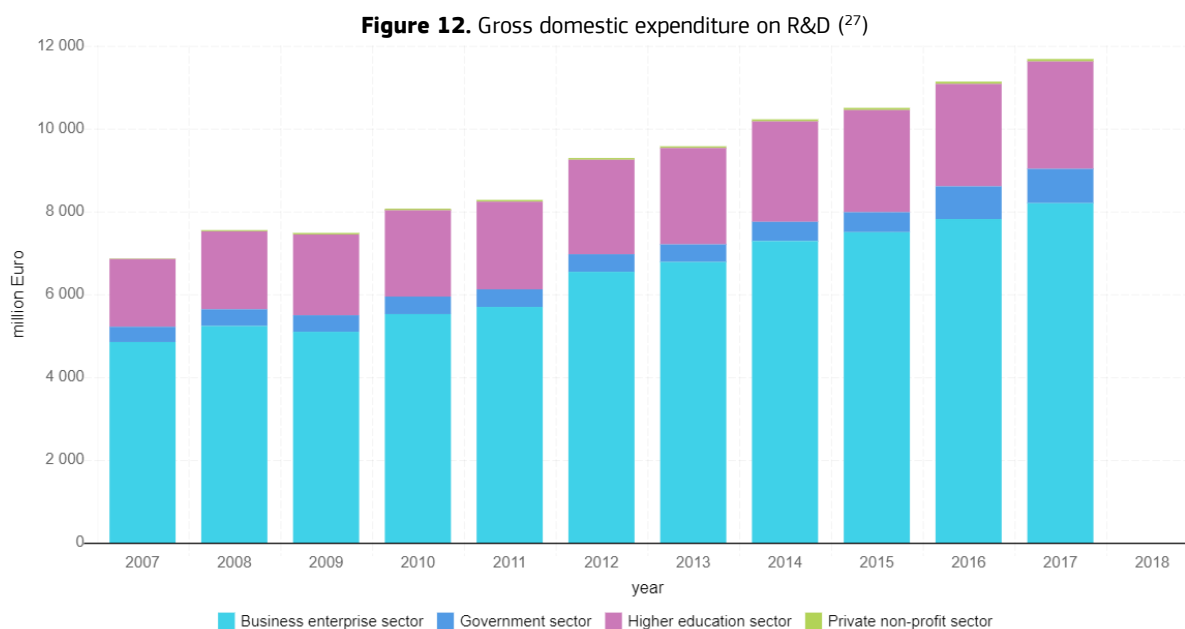
4.2 Business expenditure on R&D by relevant NACE Rev. 2 sector

Definition: Expenditure on R&D in the business enterprise sector (BERD) includes all business R&D carried out on national territory ([28]).

The figure includes data for the following NACE Rev.2 sectors:

1. Mining and quarrying (B);

2. Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (C16);

3. Manufacture of paper and paper products (C17);

4. Manufacture of rubber and plastic products (C22);

5. Manufacture of other non-metallic mineral products (C23);

6. Manufacture of basic metals (C24);

7. Sewerage, waste management, remediation activities (incl. materials recovery) (E37-E39).

([26]) http://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm

([27]) Eurostat, Gross domestic expenditure on R&D (GERD) by sectors of performance, dataset code: *rd_e_gerdtot*, http://ec.europa.eu/eurostat/product?code=rd_e_gerdtot&language=en&mode=view

([28]) DG EUROSTAT (2000): Structural business statistics. EU economy in the Triad with contrasted results. In: Statistics in focus, Theme 4, 23/2000

Figure 13. Business expenditure on R&D by relevant NACE Rev. 2 sector ([29])
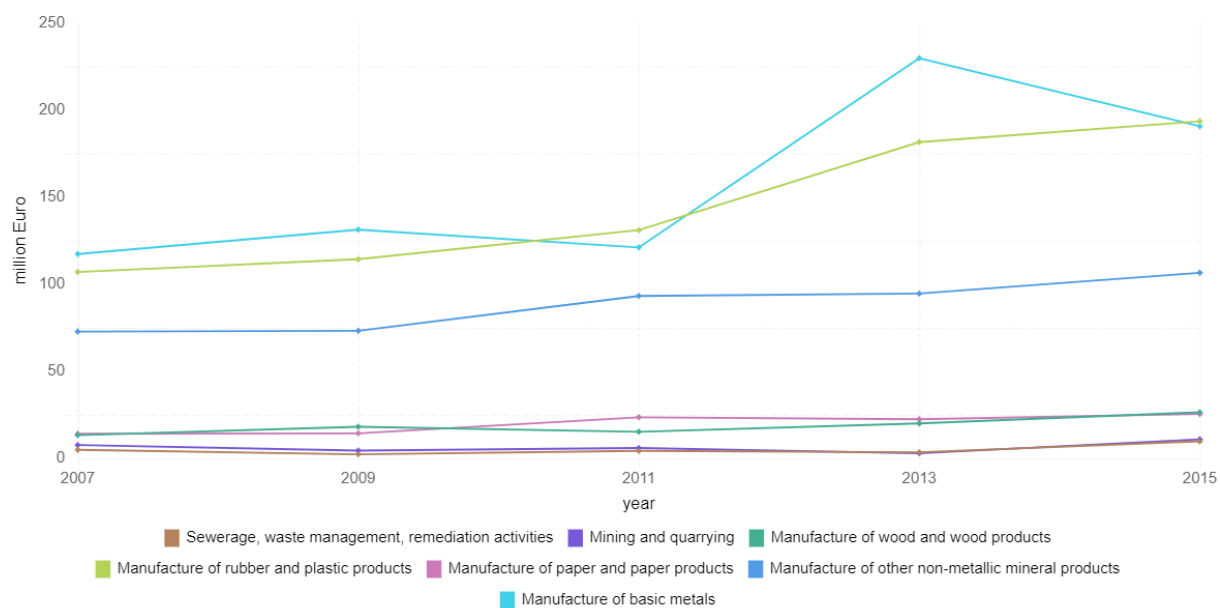
([29])   Eurostat, Business expenditure on R&D (BERD) by NACE Rev. 2 activity, dataset
        code: *rd_e_berdindr2*, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdindr2&lang=en

5 Resources and reserves

5.1 Estimated resources

Definition: The term is synonymously used for "mineral resource", "inferred mineral resource", "indicated mineral resource" and "measured mineral resource". In this case, confidence in the existence of a resource is indicated by the geological knowledge and preliminary data, while at the same time the extraction would be legally, economically, and technically feasible ([30]).

In addition to the data shown in the figure, resources are known to exist for the following mineral commodities: Aggregates, crushed rock, Bentonite and fuller's earth, Building stone, Clay, e.g. brick clay, Graphite, Gypsum, Halite (rock salt), Iron ore, Kaolin, Limestone/dolomite, Lithium, Magnesite, Mica, Talc and Tungsten. Companies submit the resources and reserve data to the Federal Ministry of Science, Research and Economy on voluntary basis. However, the data remain confidential and are not published.

Table 4. Estimated resources ([31])

Commodity	Sub-Commodity	Reporting code	Quantity	Unit	Ore grades	Classification
Aggregates and related materials	Aggregates, sand & gravel	None	19677	Million cubic metres	–	–

5.2 Estimated reserves

Definition: The term is synonymously used for "mineral reserve", "probable mineral reserve" and "proven mineral reserve". In this case, confidence in the reserve is measured by the geological knowledge and data, while at the same time the extraction would be legally, economically, and technically feasible and a licensing permit is certainly available ([32]).

All data relating to mineral reserves are confidential in Austria. However, it is known that Austria has reserves of the following minerals: Aggregates, crushed rock, Aggregates, sand and gravel, Bentonite and fuller's earth, Building stone, Clay, e.g. brick clay, Graphite, Gypsum, Halite (rock salt), Iron ore, Kaolin, Limestone/dolomite, Lithium, Magnesite, Mica, Talc, Tungsten.

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[30]   Minerals4EU, accessible at http://minerals4eu.brgm-rec.fr/m4eu-yearbook/
[31]   Austrian Mineral Resources Plan, 2012, published by the Austrian Geological Survey in the journal "Artchivfür Lagerstättenforschung", vol. 26, and downloadable at http://www.geologie.ac.at/produkte-shop/textpublikationen/zeitschriften/archiv_fr_lagerstttenforschung_der_geologischen_bundesanstalt/
[32]   Minerals4EU, accessible at http://minerals4eu.brgm-rec.fr/m4eu-yearbook/

6 Supply

6.1 Annual percentage change of the volume of imports of goods

As defined in the methodology of IMF's World Economic Outlook, October 2017, *Annual change of imports of goods* refers to the aggregate change in the quantity of imports of goods. This indicator measures the percentage change in the volume estimates of imports of goods from the base year, which is country specific[33]. According to the OECD's definition, trade in goods includes "all goods which add to, or subtract from, the stock of material resources of a country by entering its economic territory (imports) or leaving it (exports)" ([34]). The goods commodity group aggregates commodity classes referring to the subheadings of the Harmonized System.

Figure 14. Annual percentage change of the volume of imports of goods (base year = 2005) ([35])
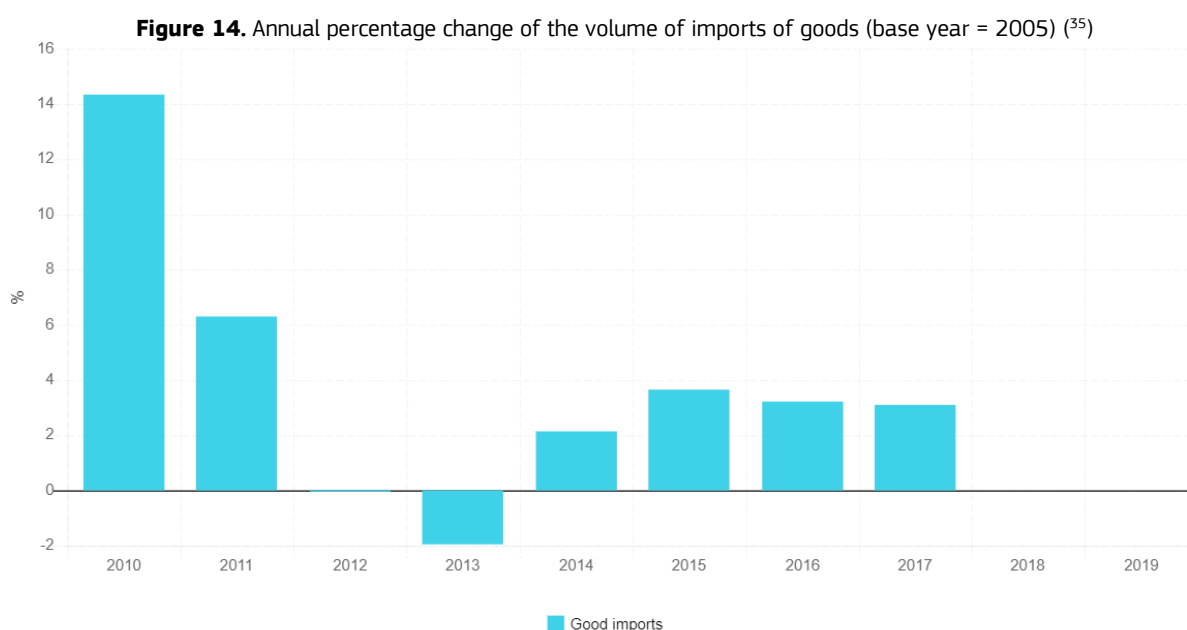
6.2 Domestic extraction by main category

Definition: Domestic extraction indicates the total amount of material extracted by resident units from the natural environment for further processing in the economy; the visualizations include three material categories (metals ores, non-metallic minerals, and woods).

The domestic extraction figure refers to the data provided by Eurostat Economy-wide material flow accounts (EW-MFA).

Table 5. Domestic extraction by main category (million tonnes) ([36])

Material category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Metal ores (gross ores)	2.5	2.3	2.5	2.6	2.5	2.8	2.9	3.3	3.3	3.3
Non-metallic minerals	97.2	89.7	89.2	94.2	89.6	89.3	88.4	88.1	92.5	103.8
Wood	14.8	11.8	12.9	12.9	12.6	12.3	11.6	12.3	12.0	NA

([33]) According to Export and Import Price Index Manual: Theory and Practice, Glossary; also http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx
([34]) https://data.oecd.org/trade/trade-in-goods.htm#indicator-chart
([35]) IMF, World Economic Outlook Database, October 2018,https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx
([36]) Eurostat, Material flow accounts statistics, http://ec.europa.eu/eurostat/product?code=env_ac_mfa&language=en&mode=view

6.3 Production of relevant industrial sectors

This section presents the gross output of selected raw materials related sectors in monetary terms (million Euro), referring to year 2016.

Sectoral data are taken from Eurostat, Structural Business Statistics. According to Eurostat's methodology, *Production value* is an output-related variable that "measures the amount produced based on sales and including changes in stocks and the resale of goods and services. Production value is calculated by Eurostat as turnover plus/minus the changes in stocks of finished products, work in progress and goods and services purchased for resale, minus the purchases of goods and services for resale, plus capitalized production, plus other operating income (excluding subsidies)"[37].

Table 6. Production of relevant industrial sectors (million Euro; 2016) ([38])

Sector	Production
Mining of metal ores (B07, NACE Rev.2)	NA
Other mining and quarrying (B08, NACE Rev.2)	1074.8
Mining support service activities (B09, NACE Rev.2)	28.7
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (C16, NACE Rev.2)	7962.0
Manufacture of other non-metallic mineral products (C23, NACE Rev.2)	6093.7
Manufacture of basic metals (C24, NACE Rev.2)	14610.1

6.4 Production of primary minerals

Definition: Mineral Raw Materials are defined as mineral constituents of the earth's crust, which are of economic value, including output from mines as well as the output from processing at or near the mines.

The data related to mineral raw materials were obtained by WMD through evaluation of questionnaires sent to the National Committees of member countries of the World Mining Congress as well as to other bodies such as Embassies, Foreign Trade Representatives etc. In addition, WMD have also used, when available, official mining statistics such as BGS and USGS.

Table 7. Production of primary minerals in 2017 ([39])

Commodity	Quantity	Unit	% of world production
Iron	954156	Tonnes	0.06
Tungsten	975	Tonnes	1.13
Feldspar	35000	Tonnes	0.10
Graphite	150	Tonnes	0.02
Gypsum	712469	Tonnes	0.47
Kaolin	13500	Tonnes	0.03

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(37) Eurostat, Structural Business Statistics, Reference Metadata, http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm
(38) Eurostat, Structural business statistics (sbs), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E), dataset code: *sbs_na_ind_r2, Production value* http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en
(39) The mineral raw materials production refer to the data provided by The World Mining Data (WMD) – accessible at http://www.world-mining-data.info/?World_Mining_Data___Data_-_new%21.
      The production data reported by WMD indicate the content of recoverable valuable elements and compounds.

Commodity	Quantity	Unit	% of world production
Magnesite	730482	Tonnes	2.87
Salt	1156326	Tonnes	0.41
Sulfur	7691	Tonnes	0.01
Talc	123558	Tonnes	1.54

7 Raw material use

7.1 Annual percentage change of the volume of exports of goods

As defined in the methodology of IMF's World Economic Outlook, October 2017, *Annual change of exports of goods* refers to the aggregate change in the quantity of exports of goods. This indicator measures the percentage change in the volume estimates of exports of goods from the base year, which is country specific ([40]). According to the OECD's definition, trade in goods includes "*all goods which add to, or subtract from, the stock of material resources of a country by entering its economic territory (imports) or leaving it (exports)*" ([41]). The goods commodity group aggregates commodity classes referring to the subheadings of the Harmonized System.

Figure 15. Annual percentage change of the volume of exports of goods (base year = 2005) ([42])
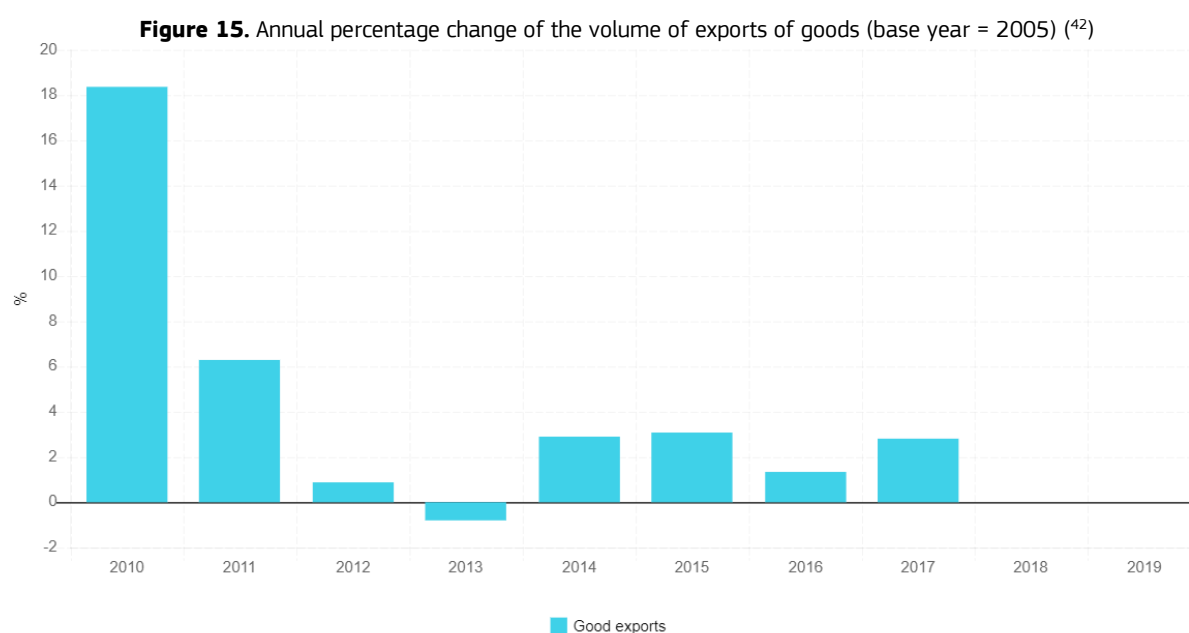
7.2 Domestic material consumption by main category

Definition: Domestic material consumption (DMC), measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.

Table 8. Domestic material consumption by main category (million tonnes) ([43])

Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Metal ores (gross ores)	8.4	6.7	9.3	10.5	9.7	8.2	6.3	7.5	7.8	8.5
Non-metallic minerals	96.6	89.4	88.5	93.9	89.6	89.6	89.3	88.8	93.0	104.2
Wood	16.2	15.4	16.1	16.3	16.5	17.3	15.6	15.7	16.3	NA

([40]) According to Export and Import Price Index Manual: Theory and Practice, Glossary; also http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx
([41]) https://data.oecd.org/trade/trade-in-goods.htm#indicator-chart
([42]) IMF, World Economic Outlook Database, October 2018, https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx
([43]) Eurostat, Material flow accounts statistics, http://ec.europa.eu/eurostat/product?code=env_ac_mfa&language=en&mode=view

8 Trade
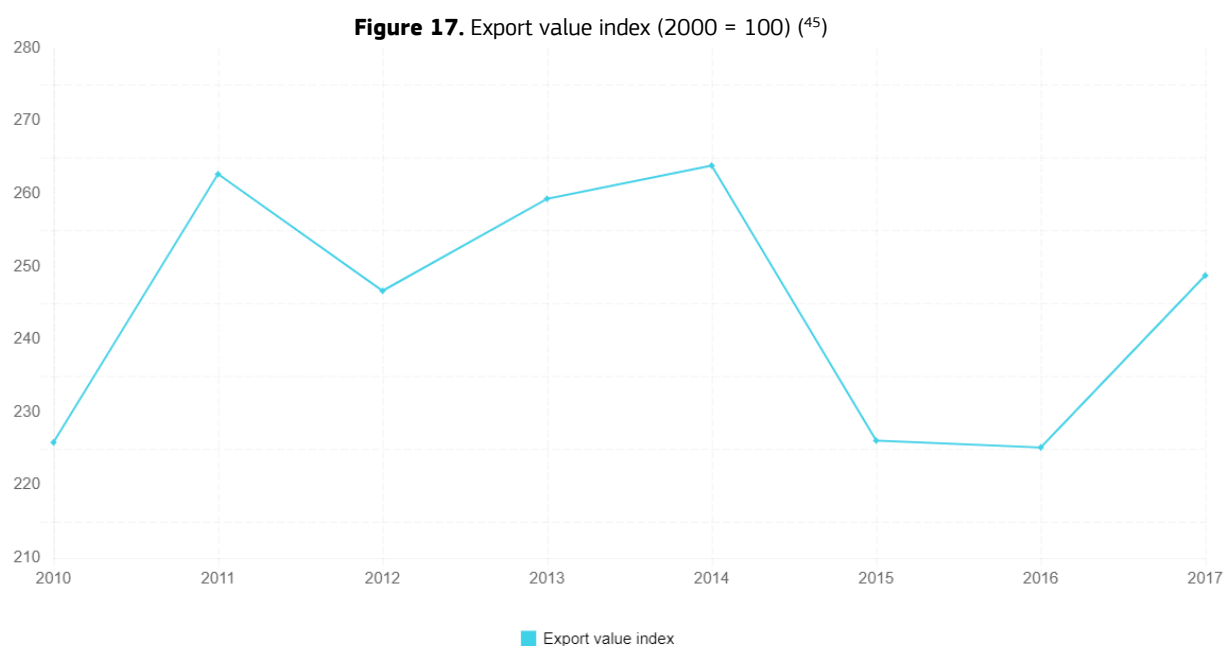
8.1 Import value index

Definition: Data are provided by World Bank, World Development Indicators, based on United Nations Conference on Trade and Development, Handbook of Statistics and data files, and International Monetary Fund, International Financial Statistics. For calculation of this index, import values are the current value of imports (f.o.b.) converted to U.S. dollars and expressed as a percentage of the average for the base period (year 2000).

Figure 16. Import value index (2000 = 100) [44]
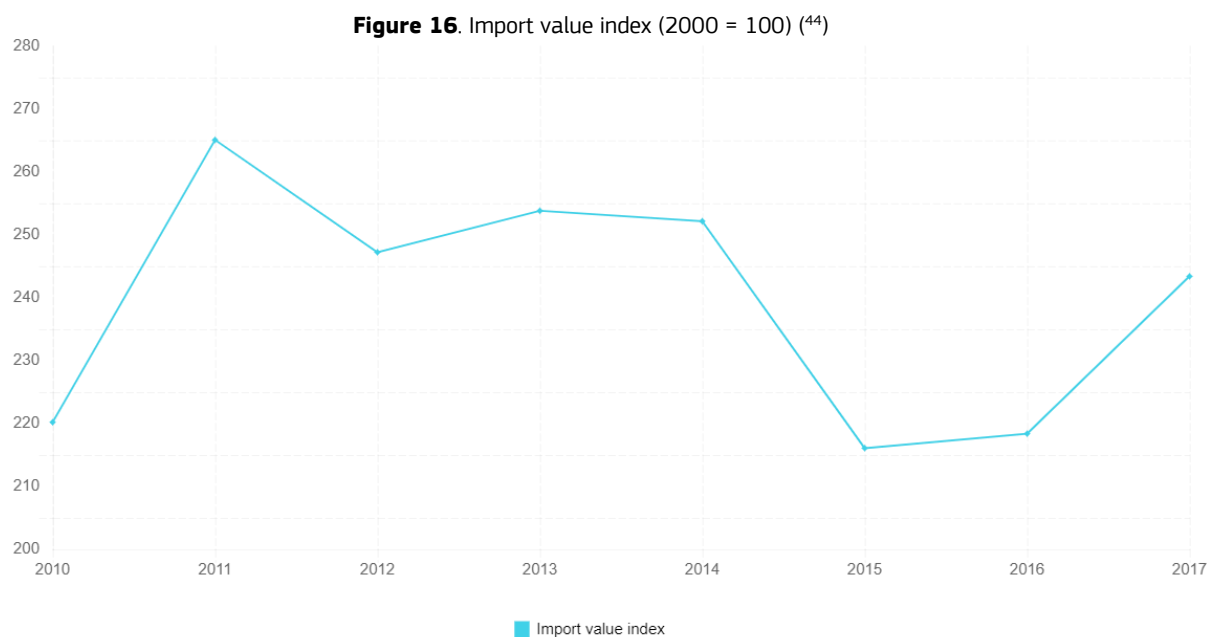
8.2 Export value index

Definition: Data are provided by World Bank, World Development Indicators, based on United Nations Conference on Trade and Development, Handbook of Statistics and data files, and International Monetary Fund, International Financial Statistics. For calculation of this index, export values are the current value of exports (f.o.b.) converted to U.S. dollars and expressed as a percentage of the average for the base period (year 2000).

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[44]   World Bank, World Development Indicators, https://data.worldbank.org/indicator/TM.VAL.MRCH.XD.WD

Figure 17. Export value index (2000 = 100) (⁴⁵)

Export value index

8.3 Raw materials' physical trade balance by selected material category

Definition: Physical trade balance is calculated as imports minus exports, by material category.

Table 9. Raw materials' physical trade balance by selected material category (million tonnes) [46]

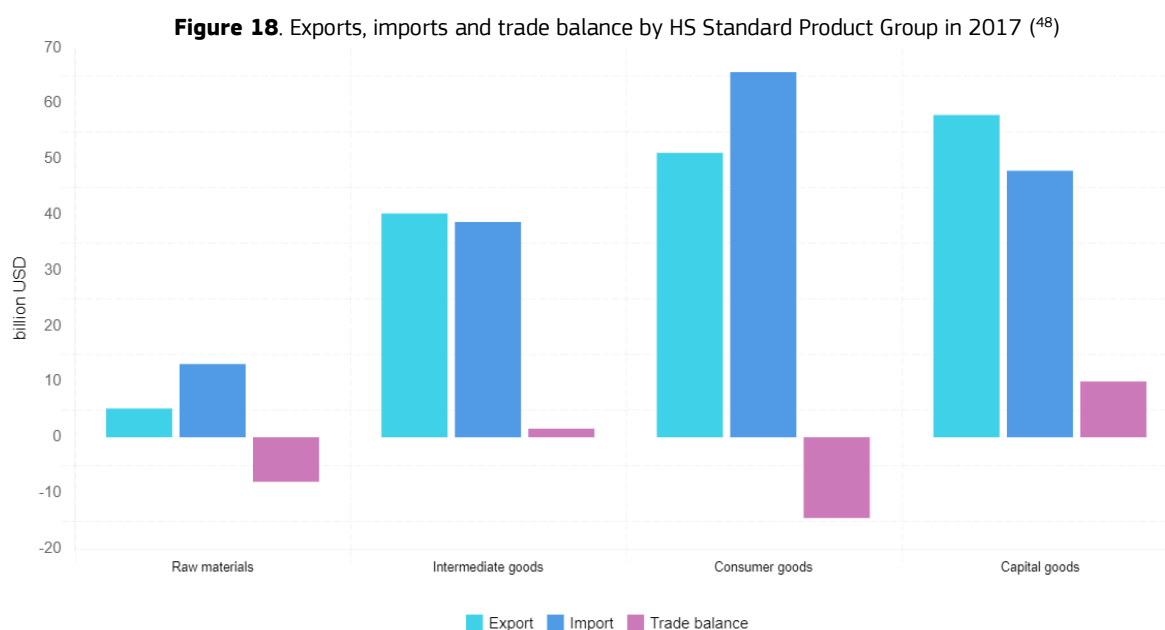| Material category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Metal ores (gross ores)	5.9	4.4	6.8	7.9	7.2	5.4	3.4	4.2	4.5	5.2
Non-metallic minerals	-0.6	-0.3	-0.7	-0.3	-0.1	0.2	0.9	0.8	0.5	0.4
Wood	1.4	3.6	3.2	3.4	3.9	5.0	4.0	3.5	4.3	4.3

8.4 Exports, imports and trade balance by HS Standard Product Group

The four HS Standard Product Groups provided by UNCTAD – i.e. *Raw Materials (SoP1), Intermediates (SoP2), Consumer Goods (SoP3) and Capital Goods (SoP4)* – are commodity aggregates that also include food and energy-related products (⁴⁷). They are available in the predefined product clusters of the Advanced Query tool of the World Integrated Trade Solutions database (WITS).

(⁴⁵)   World Bank, World Development Indicators, https://data.worldbank.org/indicator/TM.VAL.MRCH.XD.WD
(⁴⁶)   Eurostat, Material flow accounts statistics, http://ec.europa.eu/eurostat/product?code=env_ac_mfa&language=en&mode=view
(⁴⁷)   WITS Reference Data, https://wits.worldbank.org/referencedata.html

Figure 18. Exports, imports and trade balance by HS Standard Product Group in 2017 ([48])
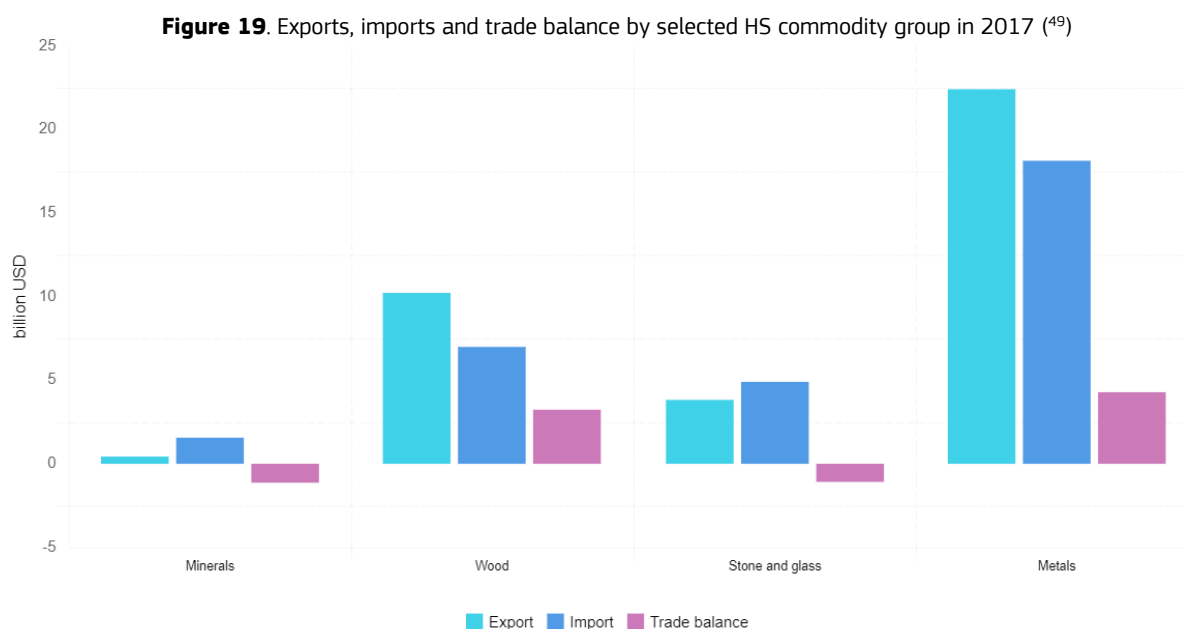
8.5   Exports, imports, and trade balance by selected HS commodity group

The selected HS commodity groups are:

1.   Metals (HS chapters 72-83),
2.   Minerals (HS chapters 25 and 26),
3.   Stone and Glass (HS chapters 68-71)
4.   Wood (HS chapters 44-49).

These selected commodity groups contain non-food, non-energy raw material commodities. They are available in the predefined product clusters of the Advanced Query tool of the World Integrated Trade Solutions database (WITS).

Figure 19. Exports, imports and trade balance by selected HS commodity group in 2017 ([49])

([48])   World Integrated Trade Solution (WITS), https://wits.worldbank.org/
([49])   World Integrated Trade Solution (WITS), https://wits.worldbank.org/

8.6 Exports, imports and trade balance by selected HS chapter

The selected HS chapter contain HS 6-digit non-food, non-energy raw material commodities.

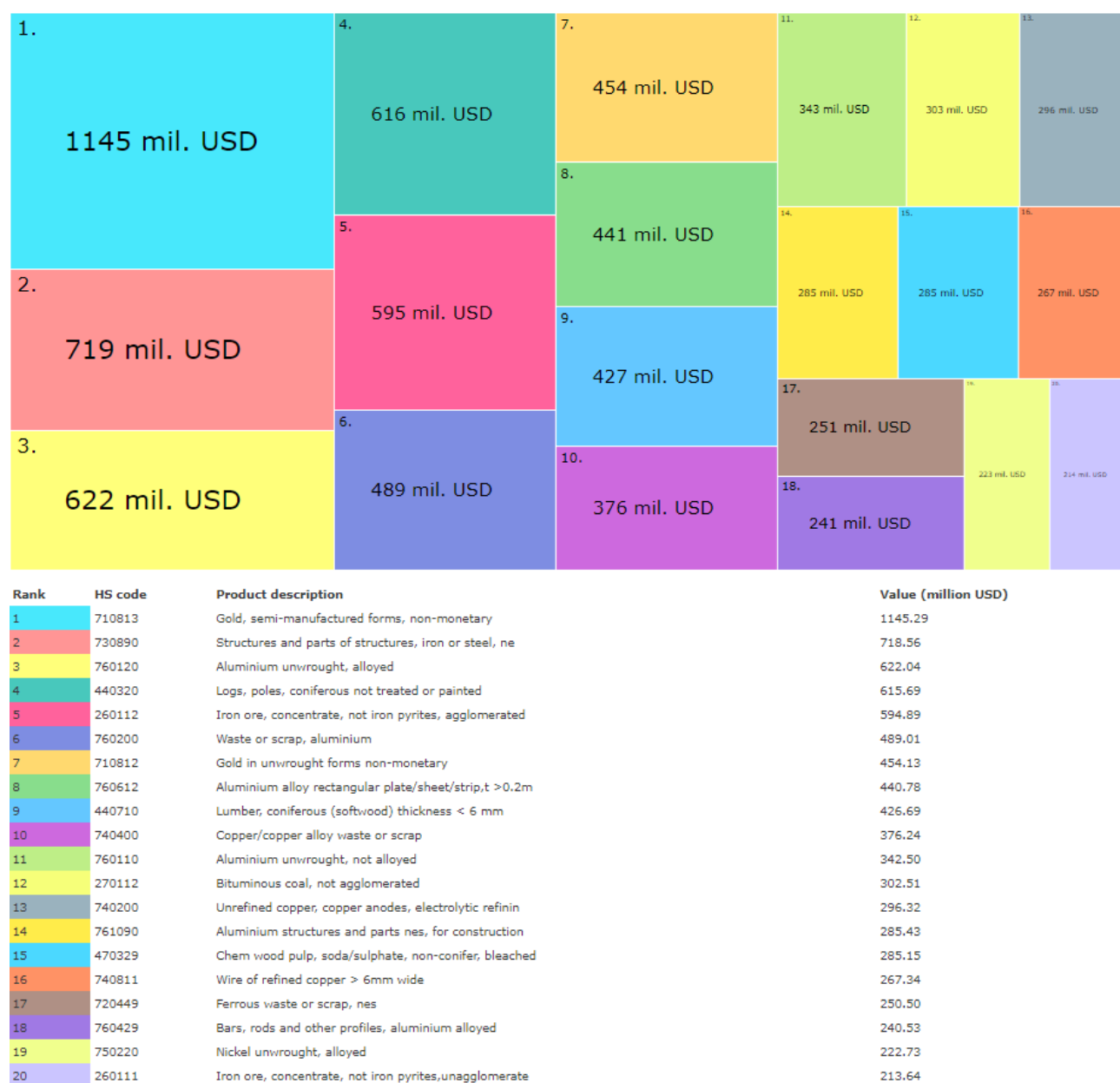**Table 10.** Exports, imports and trade balance by selected HS chapter in 2017 (million USD) [50]

HS chapter	HS chapter name	Export	Import	Trade balance
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	387.9	500.7	-112.8
26	Ores, slag and ash	39.2	1058.7	-1019.5
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	3055.8	12126.8	-9071.0
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	363.5	881.7	-518.3
31	Fertilisers	313.9	223.1	90.8
40	Rubber	708.8	1587.3	-878.5
44	Wood and articles of wood	4694.3	2798.0	1896.3
45	Cork and articles of cork	7.6	15.2	-7.7
71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal, and articles thereof	1446.2	2598.5	-1152.3
72	Iron and steel	7264.2	4466.9	2797.4
74	Copper and articles thereof	1447.8	1682.3	-234.5
75	Nickel and articles thereof	309.6	500.6	-191.0
76	Aluminium and articles thereof	3930.8	3512.3	418.5
78	Lead and articles thereof	54.4	108.8	-54.3
79	Zinc and articles thereof	208.1	478.5	-270.4
80	Tin and articles thereof	36.4	95.5	-59.1
81	Other base metals; cermets; articles thereof	558.8	434.9	123.9

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[50] World Integrated Trade Solution (WITS), https://wits.worldbank.org/

8.7 Top 20 non-food, non-energy raw material commodities

The Top 20 non-food, non-energy raw material commodities imported in 2017 and Top 20 non-food, non-energy raw material commodities exported in 2017 indicators present the country's top 20 HS 6-digit non-food, non-energy raw materials imported/exported in 2017, based on the database built in the of Raw Materials Information System's Economics & Trade module ([51]).
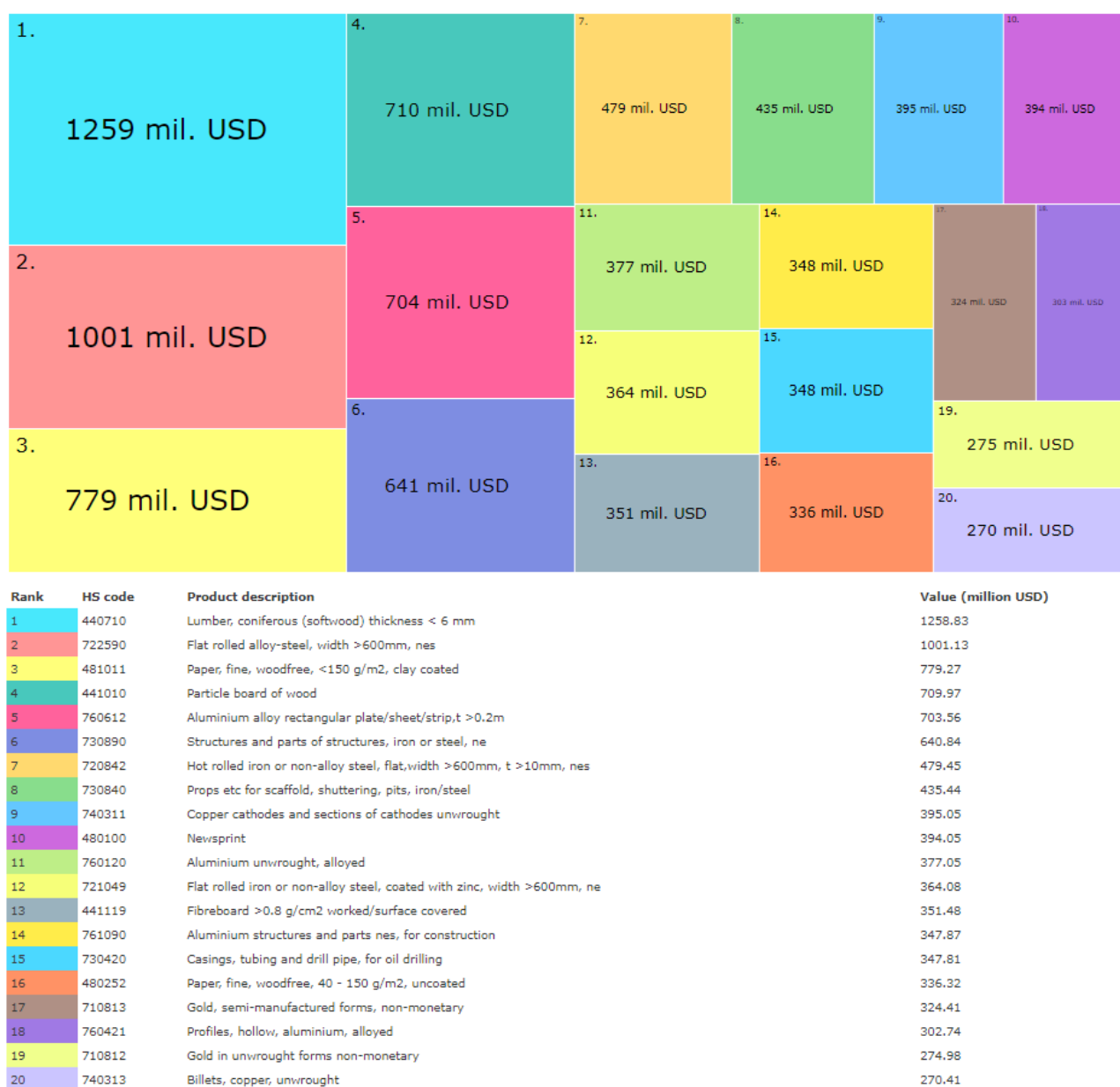
Figure 20. Top 20 non-food, non-energy raw material commodities imported in 2017 ([52])

Rank	HS code	Product description	Value (million USD)
1	710813	Gold, semi-manufactured forms, non-monetary	1145.29
2	730890	Structures and parts of structures, iron or steel, ne	718.56
3	760120	Aluminium unwrought, alloyed	622.04
4	440320	Logs, poles, coniferous not treated or painted	615.69
5	260112	Iron ore, concentrate, not iron pyrites, agglomerated	594.89
6	760200	Waste or scrap, aluminium	489.01
7	710812	Gold in unwrought forms non-monetary	454.13
8	760612	Aluminium alloy rectangular plate/sheet/strip,t >0.2m	440.78
9	440710	Lumber, coniferous (softwood) thickness < 6 mm	426.69
10	740400	Copper/copper alloy waste or scrap	376.24
11	760110	Aluminium unwrought, not alloyed	342.50
12	270112	Bituminous coal, not agglomerated	302.51
13	740200	Unrefined copper, copper anodes, electrolytic refinin	296.32
14	761090	Aluminium structures and parts nes, for construction	285.43
15	470329	Chem wood pulp, soda/sulphate, non-conifer, bleached	285.15
16	740811	Wire of refined copper > 6mm wide	267.34
17	720449	Ferrous waste or scrap, nes	250.50
18	760429	Bars, rods and other profiles, aluminium alloyed	240.53
19	750220	Nickel unwrought, alloyed	222.73
20	260111	Iron ore, concentrate, not iron pyrites,unagglomerate	213.64

([51]) For further details, see Raw Materials Information System, Methodological Overview section – http://rmis.jrc.ec.europa.eu/?page=methodological-overview-f5f020

([52]) Raw Materials Information System, Economics & Trade module, Raw Materials Trade Flows, https://rmis.jrc.ec.europa.eu/?page=trade-flows#/

Figure 21. Top 20 non-food, non-energy raw material commodities exported in 2017 ([53])

Rank	HS code	Product description	Value (million USD)
1	440710	Lumber, coniferous (softwood) thickness < 6 mm	1258.83
2	722590	Flat rolled alloy-steel, width >600mm, nes	1001.13
3	481011	Paper, fine, woodfree, <150 g/m2, clay coated	779.27
4	441010	Particle board of wood	709.97
5	760612	Aluminium alloy rectangular plate/sheet/strip,t >0.2m	703.56
6	730890	Structures and parts of structures, iron or steel, ne	640.84
7	720842	Hot rolled iron or non-alloy steel, flat,width >600mm, t >10mm, nes	479.45
8	730840	Props etc for scaffold, shuttering, pits, iron/steel	435.44
9	740311	Copper cathodes and sections of cathodes unwrought	395.05
10	480100	Newsprint	394.05
11	760120	Aluminium unwrought, alloyed	377.05
12	721049	Flat rolled iron or non-alloy steel, coated with zinc, width >600mm, ne	364.08
13	441119	Fibreboard >0.8 g/cm2 worked/surface covered	351.48
14	761090	Aluminium structures and parts nes, for construction	347.87
15	730420	Casings, tubing and drill pipe, for oil drilling	347.81
16	480252	Paper, fine, woodfree, 40 - 150 g/m2, uncoated	336.32
17	710813	Gold, semi-manufactured forms, non-monetary	324.41
18	760421	Profiles, hollow, aluminium, alloyed	302.74
19	710812	Gold in unwrought forms non-monetary	274.98
20	740313	Billets, copper, unwrought	270.41

([53]) Raw Materials Information System, Economics & Trade module, Raw Materials Trade Flows, https://rmis.jrc.ec.europa.eu/?page=trade-flows#/ .

8.8 Exports of mining equipment

This indicator was developed by JRC, based on data from UN Comtrade, accessed via World Bank's World Integrated Trade Solution. The starting point for identifying the mining-equipment-related commodities were the products covered by the 4-digit NACE class 28.92, Manufacture of machinery for mining, quarrying and construction.

For more methodological details and the list of 21 six-digit HS codes covered by this indicator, see Raw materials scoreboard 2018, Methodological notes, Mining equipment exports ([54]).

Figure 22. Exports of mining equipment ([55])

([54])   https://publications.europa.eu/en/publication-detail/-/publication/117c8d9b-e3d3-11e8-b690-01aa75ed71a1
([55])   World Integrated Trade Solution (WITS), https://wits.worldbank.org/
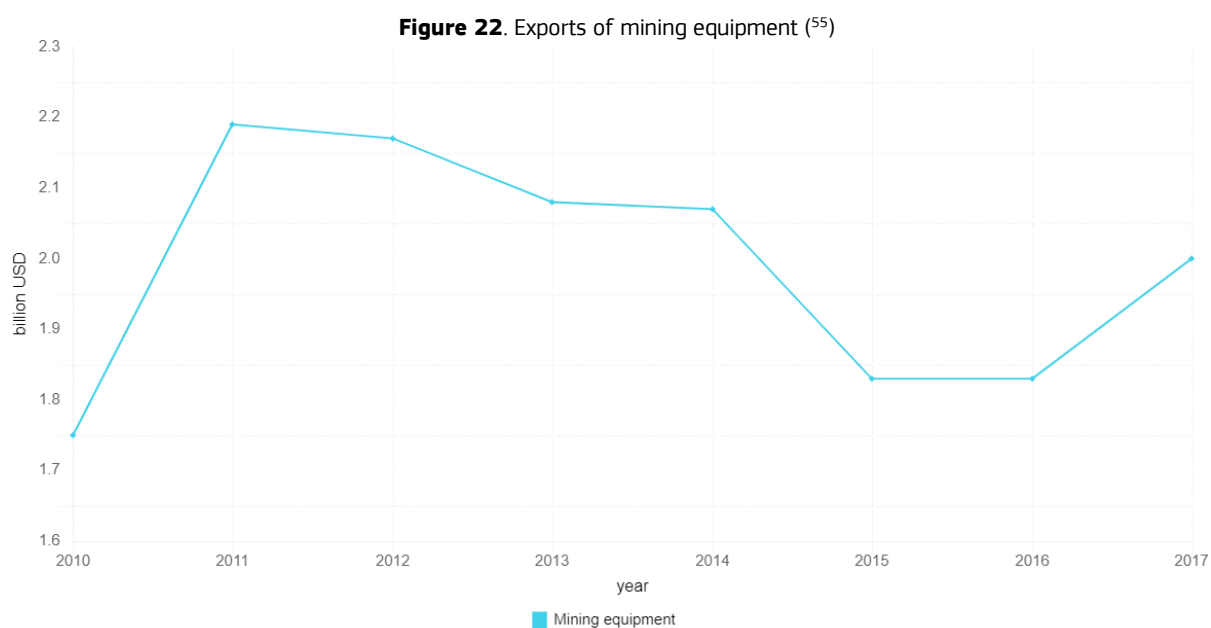
9 Environment

9.1 Land used by mining sites and other activities

Definition: Mineral extraction sites (category 1.3.1): Areas with open-pit extraction of industrial minerals (sandpits, quarries) or other minerals (opencast mines). Includes flooded gravel pits, except for river-bed extraction. Urban areas refers to the sum of *continuous urban fabric* (land use category 1.1.1) and *discontinuous urban fabric* (land use category 1.1.2), which cover, respectively, land where buildings, roads and artificially surfaced area cover almost all the ground, and land where buildings, roads and artificially surfaced areas associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces. Agricultural areas are the sum of categories 2.1.1-2.4.4, which include arable land, rice fields, permanent crops, pastures, and heterogeneous agricultural areas. Forests cover broad-leaved forest (category 3.1.1), coniferous forest (category 3.1.2) and mixed forest (category 3.1.3). The percentage of the total area related to the official country area as reported by the Eurostat ([56]). The net change refers to the area of each land use in 2012 minus the area in 2006, divided by area in 2006.

Table 11. Land used by mining sites and other activities ([57])

	Area (Km^2) 2012	Percentage of country area 2012	Net change 2006-2012
Mineral extraction sites	95	0.11%	5.7%
Construction sites	4	0.005%	17.1%
Urban	3866	4.6%	0.34%
Agricultural areas	26826	32.0%	-0.11%
Forests	36956	44.0%	-0.45%

9.2 Greenhouse gas emissions and emissions intensity by raw materials sector

Definition: Greenhouse gas emissions refer to absolute emissions covering CO_2, N_2O and CH_4, measured in CO_2 equivalent). Emissions intensity presents intensity-ratios relating emissions to economic parameters, in this case gross value added, chain linked volumes (2010). Data are displayed for a selection of raw materials sectors (following the NACE Rev.2 classification). For absolute emissions, data are presented also for the sum of all economic activities. For emission intensity, average emission intensity for all NACE activities is also displayed. Concepts and principles are the same as in national accounts.

([56])   https://europa.eu/european-union/about-eu/countries/member-countries/
([57])   JRC calculation based on data from European Environment Agency, CORINE land cover 2012 and 2006, https://land.copernicus.eu/pan-european/corine-land-cover

Figure 23. Absolute greenhouse gas emissions [58]
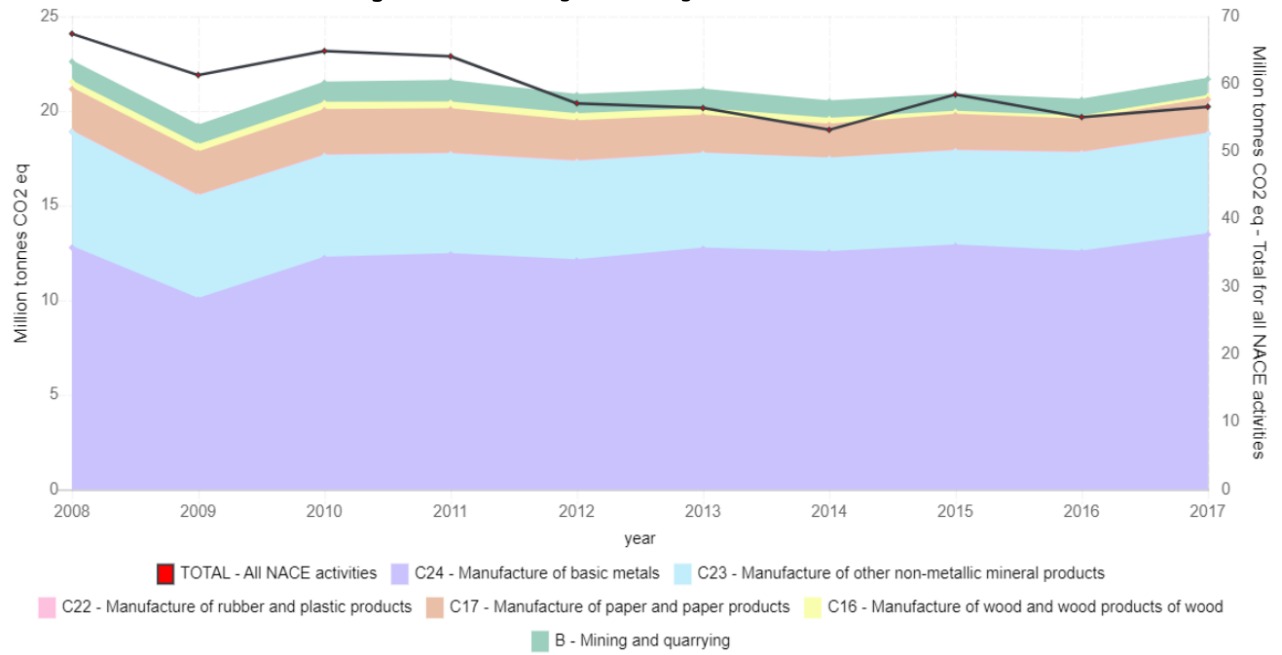
Figure 24. Greenhouse gas emissions intensity (emissions per gross value added) [59]

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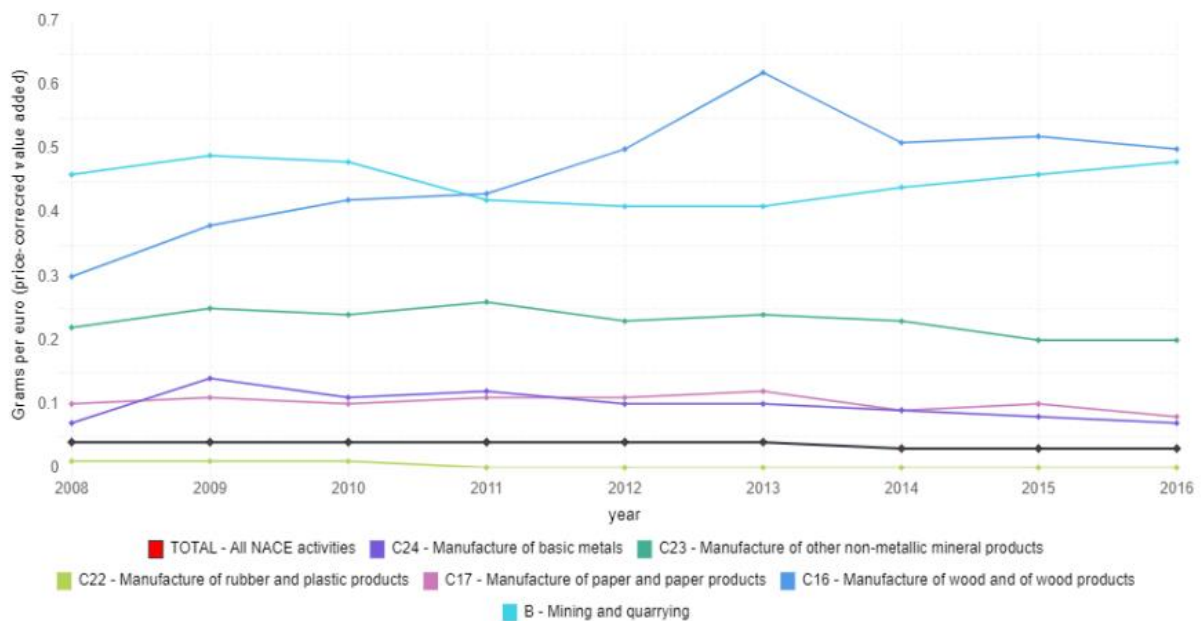
[58] Eurostat, Air emissions accounts by NACE Rev. 2 activity, code: *env_ac_ainah_r2*
[59] Eurostat, Air emissions intensities by NACE Rev. 2 activity, code: *env_ac_aeint_r2*

9.3 PM_{2.5} emissions and emissions intensity by raw materials sector

Definition: Particulate matter is a complex mixture of microscopic solid or liquid matter in the air, and a key pollutant affecting human health. $PM_{2.5}$ emissions refer to absolute emissions of $PM_{2.5}$, which refers to the fraction of particulate matter with a size up to 2.5µm, which are responsible for damages to human health given their higher potential to enter much deeper in the respiratory system. $PM_{2.5}$ emissions intensity presents intensity-ratios relating emissions to economic parameters, in this case gross value added, in chain linked volumes (2010). Data are displayed for a selection of raw materials sectors (following the NACE Rev.2 classification). For absolute emissions, data are presented also for the sum of all economic activities. For emission intensity, average emission intensity for all NACE activities is also displayed. Concepts and principles are the same as in national accounts.

Figure 25. Absolute $PM_{2.5}$ emissions [60]
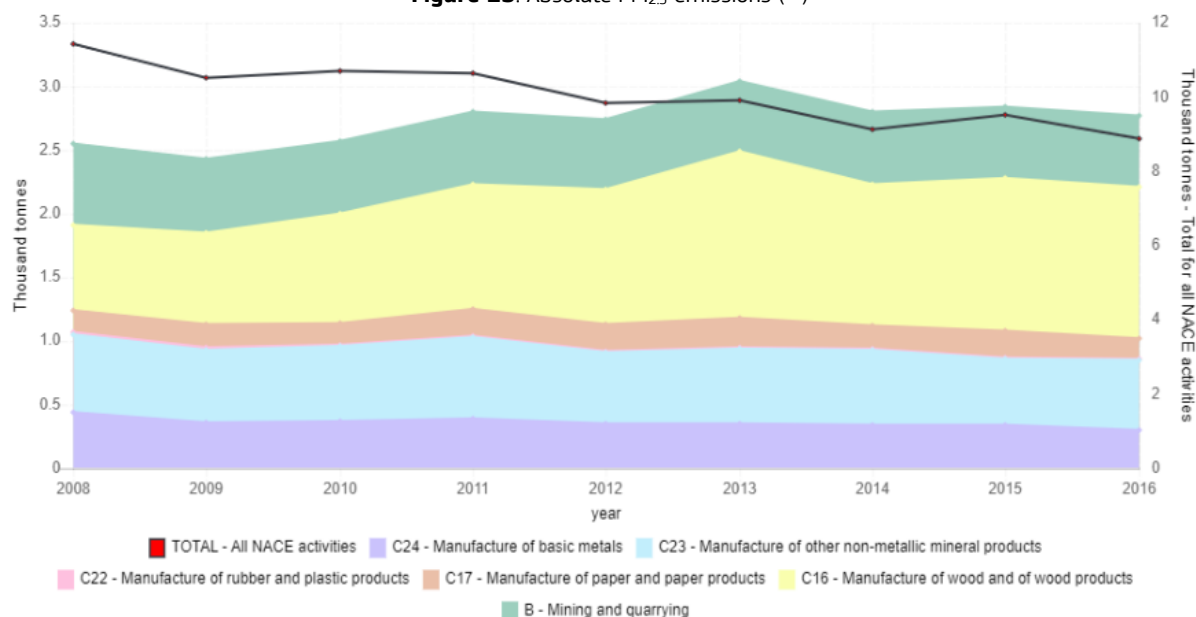
Figure 26 . $PM_{2.5}$ emissions intensity (emissions per gross value added) [61]

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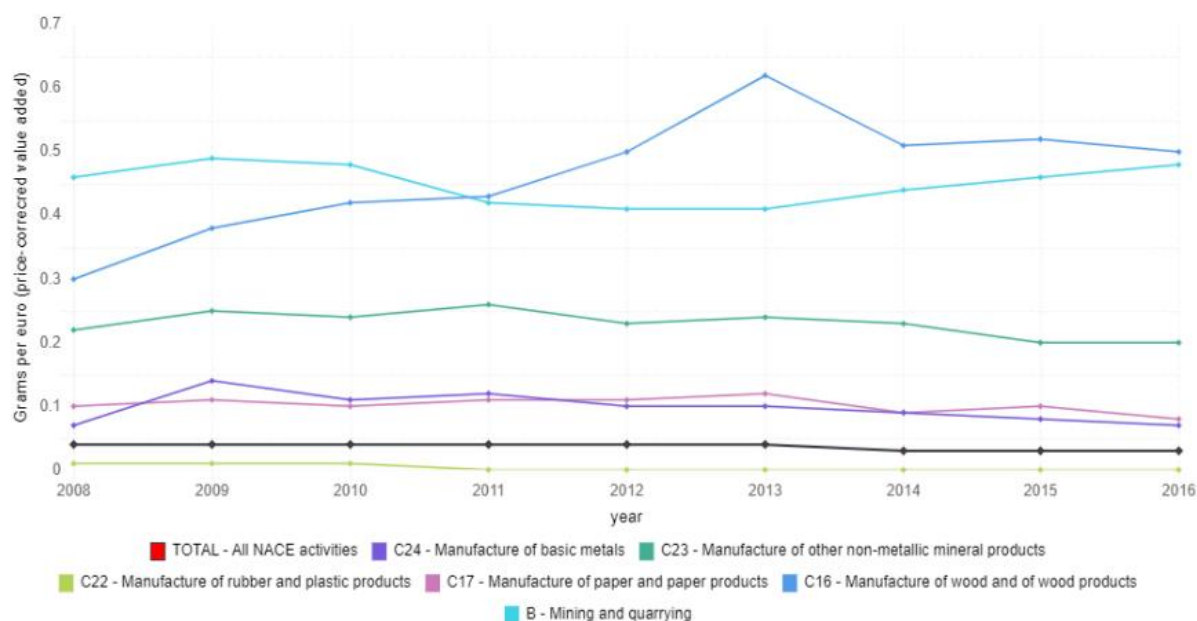
[60]   Eurostat, Air emissions accounts by NACE Rev. 2 activity, code: *env_ac_ainah_r2*
[61]   Eurostat, Air emissions intensities by NACE Rev. 2 activity, code: *env_ac_aeint_r2*

9.4   Generation of waste by raw materials sector

Definition: Generation of waste by economic sector following the NACE Rev.2 classification as reported by Member States. Waste is considered as any substance or object that the holder discards or intends or is required to discard. The sludges (including the dredging spoils) are measured in dry matter. These data include all typologies of hazardous and non-hazardous waste.

Figure 27. Non-hazardous waste [62]
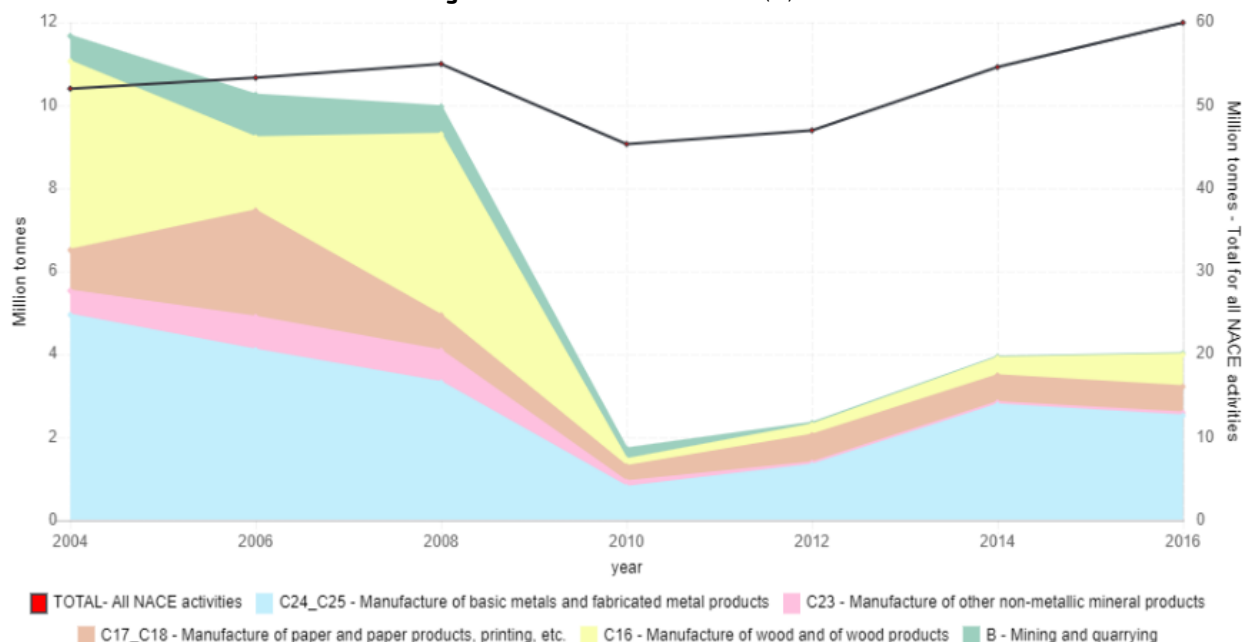
Figure 28. Hazardous waste [63]

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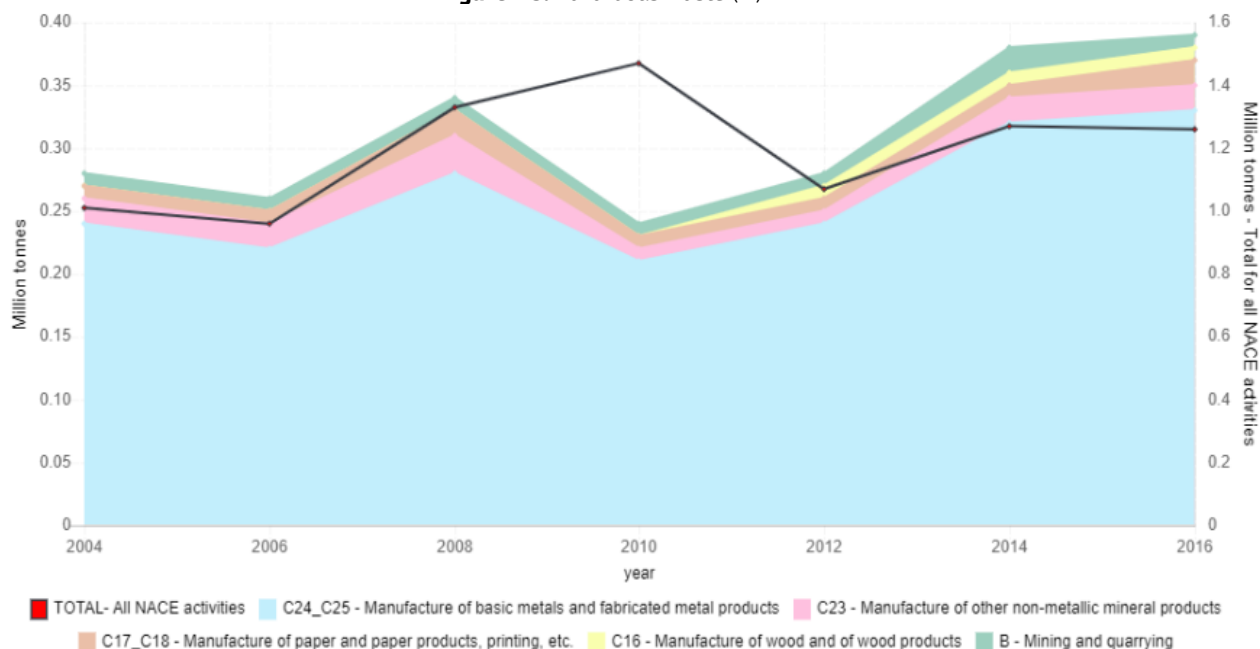
[62]   Eurostat, Generation of waste by waste category, hazardousness and NACE Rev. 2 activity, dataset code *env_wasgen*
[63]   Eurostat, Generation of waste by waste category, hazardousness and NACE Rev. 2 activity, dataset code *env_wasgen*

9.5   Waste of Electrical and Electronic Equipment (WEEE) management

Eurostat reports statistics of on WEEE collected (total and from households) based on data reported by Member States. Statistics also include the amounts of total WEEE 'recycled and prepared for re-use', and the detail of WEEE prepared for re-use. Target on WEEE collection from households: the Directive 2012/19/EU on WEEE established (article 7) that, from 2016, the minimum collection rate in a given year in a Member State shall be 45 % of the EEE placed on the market, expressed as a percentage of the average weight of EEE placed on the market in the three preceding years in that Member State.

Figure 29 - Waste of Electrical and Electronic Equipment (WEEE) management [64]

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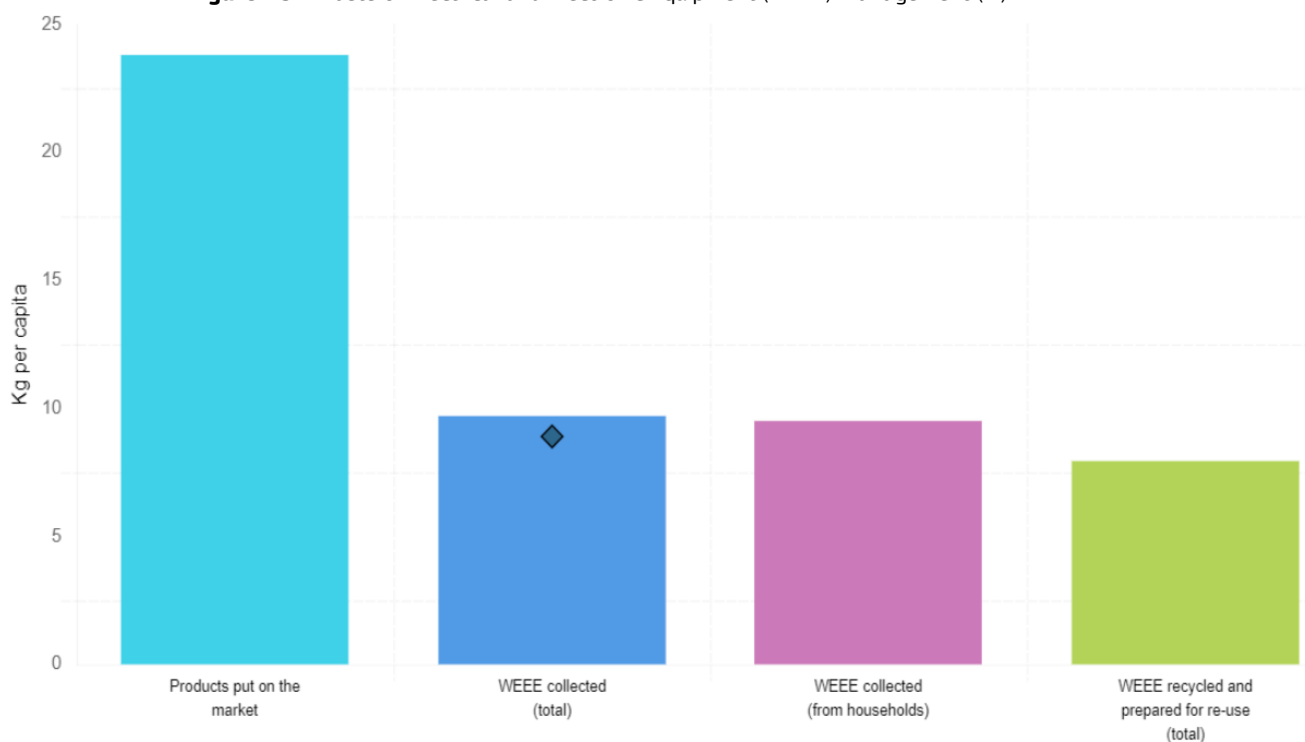
[64]   Eurostat, Waste electrical and electronic equipment (WEEE) by waste operations [*env_waselee*].

10 Social & Policy

10.1 Worldwide Governance Indicators

Definition: The *Worldwide Governance Indicators* cover over 200 countries and territories, measuring six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The aggregate indicators are based on several hundred individual underlying variables, taken from a wide variety of existing data sources. The data reflect the views on governance of survey respondents and public, private, and NGO sector experts worldwide. The WGI also explicitly report margins of error accompanying each country estimate. These reflect the inherent difficulties in measuring governance using any kind of data. Even after taking these margins of error into account, the WGI permit meaningful cross-country and over-time comparisons ([65]).

Table 12. Worldwide Governance Indicators (2017) ([66])

Indicator	Score*	Percentile rank
Voice and accountability	1.34	93.60
Political Stability and Absence of Violence/Terrorism	1.04	86.19
Government Effectiveness	1.46	91.83
Regulatory Quality	1.44	90.87
Rule of Law	1.81	96.15
Control of Corruption	1.53	90.87

*Highest performance: +2.5; Lowest performance: -2.5

Percentile range: ▮ 0-10th ▮ 10-25th ▮ 25-50th ▮ 50-75th ▮ 75-90th ▮ 90-100th

10.2 Policy Perception Index

Definition: The Policy Perception Index assesses the public regulatory framework that affects investment, i.e. how government policy affects attitudes towards exploration investment in each mining jurisdiction, ranking jurisdictions based on the responses to the Annual Survey of Mining Companies done be the Fraser Institute.

It measures the overall policy attractiveness of 91 jurisdictions through annual survey of mining and exploration companies ([67]).

Austria: n.a.

10.3 Country risk: INFORM index

Definition: INFORM is a global, open-source risk assessment for humanitarian crises and disasters. It is developed by JRC and can support decisions about prevention, preparedness, and response. It builds up a picture of risk by bringing together around 50 different indicators that measure three dimensions of risk:
1. Hazard and exposure (events that could occur and the people or assets potentially affected by them);
2. Vulnerability (the susceptibility of communities to those hazards);
3. Lack of capacity (lack of resources available that can help absorb the shock).

([65]) Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682130
([66]) World Bank (2017): Worldwide Governance Indicators. Internet: http://info.worldbank.org/governance/wgi/#reports
([67]) https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2017.pdf

Table 13. Country risk: INFORM index (2019) ([68])

Components	Score*	Risk class
INFORM index	1.6	
Hazard and exposure	1.2	
Vulnerability	2.5	Very Low
Lack of capacity	1.4	

* a lower value (closer to 0) represents a lower risk and a higher value (closer to 10) represents a higher risk.

10.4 Occupational safety: rate of fatal accidents at work

Definition: The incidence rates express the number of accidents at work in relation to the number of persons employed, in economic activities related to raw materials sectors.

Figure 30. Occupational safety: rate of fatal accidents at work (incidents per 100k employees;2016) ([69])
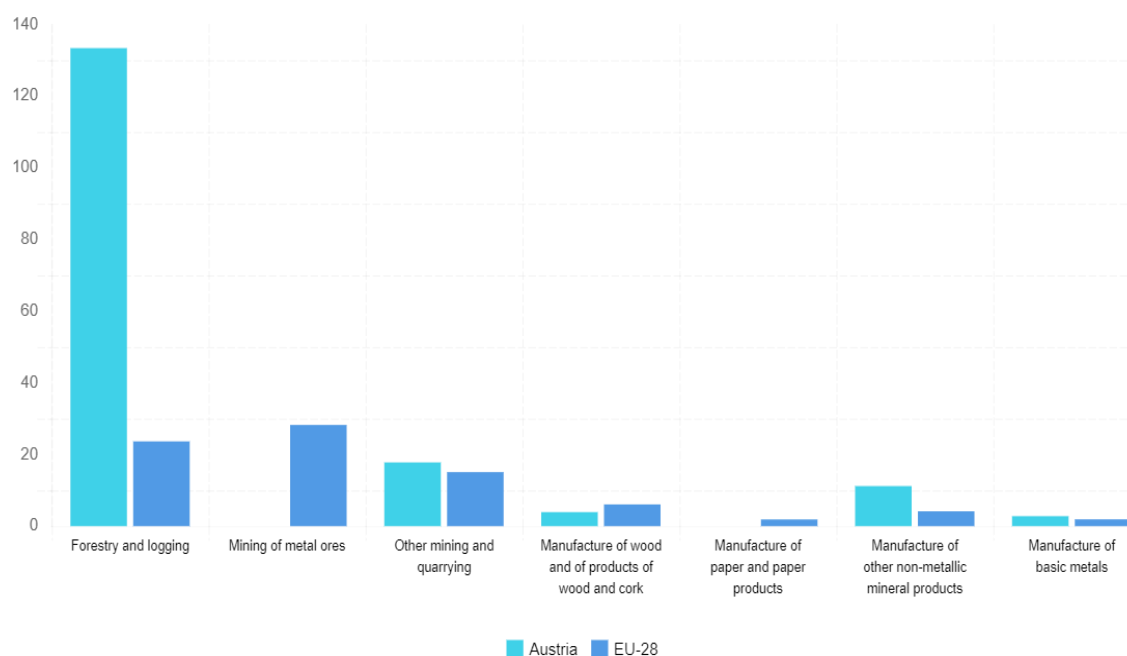
([68]) https://ec.europa.eu/jrc/en/scientific-tool/index-risk-management-inform ; http://www.inform-index.org/ ; Austria country profile: https://drmkc.jrc.ec.europa.eu/inform-index
([69]) Eurostat, Accidents at work (ESAW, 2008 onwards) (hsw_acc_work), [hsw_n2_02] https://ec.europa.eu/eurostat/cache/metadata/en/hsw_acc_work_esms.htm

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