



RMIS Dashboard

Data Sources

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Joint
Research
Centre

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1 Aggregates

1.1 Reserves

Statistical data for reserve distribution throughout the world are unavailable.

1.2 Production of primary materials

Global production data are not available.

1.3 Production of refined/processed materials

Not applicable.

1.4 Applications

Geographical scope: Europe.

Data source(s): (UEPG, 2021).

Reference Year: 2019.

Notes: Data are related to the end-use sector.

Latest RMIS Dashboard update: August 2021.

1.5 Trade of primary materials

Coverage: Trade data reflect products classified in headings HS 250590 and HS 251710 covering natural sand, pebbles, gravel and broken or crushed stone. Heading HS 250590 includes inter-alia feldspathic sands, clayey sands and kaolinitic sands, which are not used as aggregates. The trade of primary materials of manufactured aggregates produced from industrial wastes (e.g. iron & steel slag) captured by headings HS 251720, HS 251730, HS 261800, and HS 261900 is not included. Finally, the trade of products classified under HS 251749 and HS 250510 is not included as it is more relevant to the supply chains of other raw materials (olivine & dunite and silica, respectively).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Trade of primary materials for some countries with data missing from the WITS dataset (e.g. Oman, Bahrain) is obtained from 'mirror data', i.e. imports and exports declared by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 250590 *Sands; natural, (other than silica and quartz sands), whether or not coloured, (other than metal-bearing sands of chapter 26)*; HS 251710 *Pebbles, gravel, broken or crushed stone; of a kind commonly used for concrete aggregates, for road metalling or for railway or other ballast, shingle and flint, whether or not heat-treated*.

Latest RMIS Dashboard update: August 2021.

1.6 Trade of refined/processed materials

Not applicable.

1.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): JRC calculation based on background data from (UEPG, 2021).

Reference Year: 2019.

Notes: The indicator is calculated as the share in total production of Recycled & Re-used aggregates derived from EOL products. Secondary materials from industrial waste (manufactured aggregates) are not considered.

Latest RMIS Dashboard update: October 2022.

1.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).

2 Aluminium

2.1 Reserves

Data source(s): JRC elaboration based on (S&P, 2022) and other sources.

Reference Year: 2021.

Notes: Data for Australia are acquired from (Britt, 2018), for Guinea from (Traoré *et al.*, 2014), for Greece and Romania from (Tzeferis, 2015) and (Minerals4EU, 2015), respectively. Data for the above countries are adjusted with the deduction of the cumulative bauxite production from the reporting year to 2021.

Latest RMIS Dashboard update: August 2023.

2.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Data reflect the production of bauxite.

Latest RMIS Dashboard update: August 2023.

2.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Production data refer to primary aluminium, i.e. the molten metal tapped from electrolytic cells or pots during the electrolytic reduction of metallurgical alumina.

Latest RMIS Dashboard update: August 2023.

2.4 Applications

Geographical scope: EU.

Data source(s): (European Aluminium, 2018).

Reference Year: 2017.

Notes: Data reflect end-use sectors.

Latest RMIS Dashboard update: August 2021.

2.5 Trade of primary materials

Coverage: Bauxite's trade of primary materials is represented by HS 260600.

Data source(s): (UN Comtrade, 2022) is used instead of (WITS, 2021) due to the observed discrepancies in the latter.

Reference Year: 2019.

Notes: Exports originating from Guinea, Solomon Islands and Sierra Leone, are deduced from reported imports by trade partners. Trade flows of Iran, Guyana, Mozambique and Ukraine for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 260600 *Aluminium ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

2.6 Trade of refined/processed materials

Coverage: Trade data for refined/processed aluminium products are linked to the product aggregate of HS 760110 and HS 760120 covering unwrought aluminium (primary and secondary aluminium). The trade of refined alumina products is not included in the aggregate as it is presented in bauxite. Trade of aluminium powders and flakes (HS 760310, HS 760320), as well as of semi-finished products, is excluded.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports and imports of Azerbaijan, Bahrain, Montenegro, Oman, Cameroon, Qatar, and Venezuela are derived from data reported by their trade partners. In the same way, Iran's, Mozambique's and Ukraine's trade data for 2019 are deduced from declared imports and exports by their trade partners.

Relevant Harmonized System (HS) Codes: HS 760110 Aluminium; unwrought, (not alloyed); HS 760120 Aluminium; unwrought, alloys

Latest RMIS Dashboard update: August 2021.

2.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: Europe.

Data source(s): JRC calculation based on background data from (IAI, 2023).

Reference Year: 2021.

Notes: Data are sourced from Alucycle, the International Aluminium Institute's global material flow model built on aluminium industry's data (Bertram *et al.*, 2017).

Latest RMIS Dashboard update: July 2021.

2.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are reported by (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The calculation of CAGR is based on primary aluminium production (2012-2021).

3 Antimony

3.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

3.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: It is deducted from the compiled information that production data reflect the antimony content of Sb-bearing ores and concentrates (e.g. of antimony, lead).

Latest RMIS Dashboard update: August 2023.

3.3 Production of refined/processed materials

Production data of commercial forms of refined antimony are not available.

3.4 Applications

Geographical scope: Europe.

Data source(s): (European Commission, 2014a), data from Roskill (2012).

Reference Year: N/A.

Notes: End uses of antimony. Data for antimony's applications in the EU by end-use sectors/markets are also provided by the EC MSA study (BIO by Deloitte, 2015).

Latest RMIS Dashboard update: August 2021.

3.5 Trade of primary materials

Coverage: Data correspond to HS heading 261710. Trade of primary materials of Sb-bearing residues from non-ferrous metallurgy used to extract antimony or manufacture its chemical compounds is not included; the related heading HS 262091 refers to slag ashes and residues containing many metals.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: As no data are available for exports originating from Tajikistan, Bolivia and Myanmar despite being among the top producers worldwide, these countries' exports are derived from reported imports by destination countries in the UN Comtrade database (UN Comtrade, 2022). Mozambique's trade flows are derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 261710 *Antimony ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

3.6 Trade of refined/processed materials

Coverage: Aggregate of HS 282580 and HS 811010 covering antimony oxides and unwrought antimony metal and powders, respectively. Trade of various antimony compounds (e.g. sulphides in HS 283090, chlorides in HS281219) are not included as they are reported together with several compounds of other materials. Wrought antimony in article forms (HS 811090) and antimonial lead (HS 780191) are also not counted in the aggregate.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Myanmar and Bolivia are derived from imports reported by destination countries. Iran's and Ukraine's trade for 2019 is deduced from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 282580 *Antimony oxides*; HS 811010 *Antimony and articles thereof; unwrought antimony, powders*.

Latest RMIS Dashboard update: August 2021.

3.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data provided by the source according with the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

3.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016–2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012–2021).

4 Arsenic

4.1 Reserves

World reserve data are unavailable. The commercial production of arsenic is closely tied to the extraction of ores containing other metals such as copper and gold.

4.2 Production of primary materials

No data are available as arsenic is primarily produced as a by-product. The extraction of arsenic mostly relies on the extraction of ores containing copper and gold; the by-products of smelting are then processed and refined to extract the arsenic.

4.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: As deduced from background information provided by data sources, production data are associated with the output of arsenic trioxide and other compounds of elemental arsenic as As_2O_3 equivalent.

Latest RMIS Dashboard update: August 2023.

4.4 Applications

Geographical scope: EU.

Data source(s): (ECHA, 2010).

Reference Year: Annual average 2008-2010.

Notes: Applications are derived from data on volumes of As_2O_3 placed on the European market provided by the industry (the REACH Arsenic and Arsenic Compounds Consortium) during the public consultation on the recommendation to include diarsenic trioxide in Annex XIV of REACH Regulation. Figures are related to the end uses of arsenic.

Latest RMIS Dashboard update: August 2021.

4.5 Trade of primary materials

Trade data for arsenic's primary materials are not available in the HS nomenclature. Arsenic is mostly extracted as a by-product from copper and lead smelting and refining. HS 262060 addresses trade of flue dusts from copper or lead smelting containing arsenic. However, this heading also covers the trade of slag, ashes and residues containing mercury and thallium; therefore, trade flows of As-rich materials cannot be identified. Furthermore, the trade of natural arsenic sulphides (realgar, orpiment, arsenopyrite) cannot be accounted, as the relevant HS heading 253090 aggregates many minerals.

4.6 Trade of refined/processed materials

Coverage: HS 280480 is considered covering common arsenic (so-called 'metallic') and yellow arsenic. Arsenic compounds such as arsenic acid, diarsenic trioxide and pentoxide, gallium arsenide etc., and Pb-As alloys are not included due to the high aggregation of the relevant HS headings (HS 281119, HS 281129, HS 281390, HS 780199) with compounds of other materials.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 280480 *Arsenic*.

Latest RMIS Dashboard update: August 2021.

4.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC assessment based on (UNEP, 2011).

Reference Year: N/A.

Notes: No quantitative data are available for the EU or globally related to arsenic's flows of secondary raw materials. Arsenic's EOL-RIR is deduced from (UNEP, 2011), and it is supposed to be applicable also in the EU.

Latest RMIS Dashboard update: August 2023.

4.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (2012-2021).

5 Baryte

5.1 Reserves

Comprehensive information is not available (the dataset reported by (USGS, 2024) has a partial country coverage).

5.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Data refer to the first marketable baryte product that includes crude barite (run-of-mine) and products of simple beneficiation methods. Along with baryte minerals (barium sulphate), data may include small quantities of witherite (barium carbonate).

Latest RMIS Dashboard update: August 2023.

5.3 Production of refined/processed materials

Statistics on the production of processed forms of barium minerals (e.g. various barium compounds) are unavailable.

5.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: Data are relevant to products 'used' (end uses).

Latest RMIS Dashboard update: August 2021.

5.5 Trade of primary materials

Coverage: Data concern the trade of natural barium sulphate (barytine) (HS 251110). The trade of natural barium carbonate (witherite) (HS 251120) is not considered.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Guyana's, Mozambique's and Ukraine's Trade of primary materials flows for 2019 is derived from declared imports and exports by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 251110 *Barium sulphate (barytes); natural*

Latest RMIS Dashboard update: August 2021.

5.6 Trade of refined/processed materials

Coverage: Trade data cover precipitated barium sulphate (HS 283327) and precipitated barium carbonate (HS 283660). Trade data for other barium compounds such as oxides, hydroxides, and peroxides (HS 281640),

sulphides (HS 283090), and barium metal (HS 280519) are excluded as barium compounds are reported together with compounds of other materials in the respective HS headings.

Data source(s): (WITS, 2021)

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 283327 *Sulphates; of barium*; HS 283660 *Carbonates; barium carbonate*.

Latest RMIS Dashboard update: August 2021.

5.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data reported by the source along with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

5.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is about primary (mining) production (2012-2021).

6 Bentonite

6.1 Reserves

Available country-specific data are incomplete to allow a thorough global coverage.

6.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Chinese production is sourced from (USGS myb-Clays, 2022).

Latest RMIS Dashboard update: August 2023.

6.3 Production of refined/processed materials

No data are available for activated bentonites.

6.4 Applications

Geographical scope: Europe.

Data source(s): (IMA Europe, 2018);(IMA Europe, 2019).

Reference Year: 2017.

Notes: Data relate to end-use applications.

Latest RMIS Dashboard update: August 2021.

6.5 Trade of primary materials

Coverage: HS 250810.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Guyana's, Mozambique's, and Ukraine's Trade of primary materials data originate from declared imports and exports by reporting partners (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 250810 *Bentonite*.

Latest RMIS Dashboard update: August 2021.

6.6 Trade of refined/processed materials

The trade of acid activated bentonite and organophilic bentonites is not considered as these products are classified in highly aggregated HS headings (HS 380290 and HS 382499, respectively).

6.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data in order to calculate the EOL-RIR of bentonite are missing.

6.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are reported by (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

7 Beryllium

7.1 Reserves

Global reserves of beryllium are not closely documented. Available information is incomplete as data only for selected countries are available in publications such as (Trueman, D.L. and Sabey, 2014).

7.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS myb-Be, 2022).

Notes: -

Latest RMIS Dashboard update: August 2023.

7.3 Production of refined/processed materials

7.3.1 Refined beryllium

Coverage: World countries.

Reference Year: 2018.

Data source(s): JRC estimate based on (USGS myb-Be, 2018).

Notes: Data on the production of refined beryllium are limited. US production of refined beryllium products is estimated from the annual consumption of beryllium ores and concentrates (as calculated from mine shipments, net trade, and industry stocks) and a metallurgical yield assumption of 70%. Japan's production level is estimated on the basis of information in (BRGM, 2016). Kazakhstan's production uses as feedstock stockpiles of beryllium concentrates.

Latest RMIS Dashboard update: August 2023.

7.4 Applications

Geographical scope: EU28.

Data source(s): Data from BeST in EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2014.

Notes: End uses of beryllium by industrial segment.

Latest RMIS Dashboard update: August 2021.

7.5 Trade of primary materials

Data on the international trade of primary beryllium materials are not available as Be-bearing ores and concentrates, and metallurgical residues from which beryllium can be extracted or recovered as a by-product, are classified in headings HS 261790 and HS 262091, respectively, that comprise several materials along with beryllium.

7.6 Trade of refined/processed materials

Coverage: HS 811212 covering beryllium in all of its forms, i.e. unwrought and powders and beryllium articles. Beryllium oxides & hydroxides and other compounds (e.g. beryllium fluoride) are not included due to the high aggregation of the HS headings they are classified in (e.g. HS 282590, HS 282619). Be-Cu master alloys and wrought cupro-beryllium alloys are excluded as semi-fabricated products.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes:

Relevant Harmonized System (HS) Codes: HS 811212 *Beryllium and articles thereof; unwrought beryllium, powders.*

Latest RMIS Dashboard update: August 2021.

7.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data delivered by the source and using the methodology described in (Peiró *et al.*, 2018) .

Latest RMIS Dashboard update: August 2021.

7.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

8 Bismuth

8.1 Reserves

Data source(s): (USGS, 2017).

Reference Year: 2015.

Notes: Reserves are defined according to the USGS classification system (USGS, 1980). More recent publications of USGS do not report estimates of world reserves of bismuth. Bismuth reserves are evaluated on the basis of bismuth content of lead reserves.

Latest RMIS Dashboard update: August 2023.

8.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: It is deduced from background information that data refer to both by-product production and production from bismuth minerals as principal product. The reported output of Japan is not considered as it relates to metal production.

Latest RMIS Dashboard update: August 2023.

8.3 Production of refined/processed materials

8.3.1 Refined bismuth

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS myb-Bi, 2023)

Notes: Production of Peru is sourced from (BGS, 2023). Belgium's production is assumed equal to its average production in 2000-2007.

Latest RMIS Dashboard update: August 2023.

8.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes:

Latest RMIS Dashboard update: August 2021.

8.5 Trade of primary materials

Data in international trade statistics (HS) on bismuth's primary raw materials are not available. Ores and concentrates in which bismuth is the principal constituent are classified under HS 261790; however, the heading does not exclusively refer to bismuth minerals as it covers ores and concentrates of several materials. Most important, bismuth is predominantly a by-product of Pb metallurgy (as well of W and Sn

processing). International statistics do not provide the required detail to identify the trade of Bi-bearing raw materials in their host commodities.

8.6 Trade of refined/processed materials

Coverage: Data are linked to HS 810600 covering unwrought bismuth metal and powders, bismuth articles such as fusible alloys, and bismuth waste and scrap. Data relating to the trade of various bismuth inorganic compounds such as bismuth nitrate, bismuth carbonate and bismuth oxides such as dibismuth trioxide, are not included due to the high aggregation of the relevant HS headings (HS 283699, HS 282499, HS 282590). Similarly, trade of Bi-bearing unrefined lead bullion cannot be tracked by international statistics (HS 780199).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: No 'mirror' trade data are employed.

Relevant Harmonized System (HS) Codes: 810600 *Bismuth; articles thereof, including waste and scrap*.

Latest RMIS Dashboard update: August 2021.

8.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

8.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR relates to refinery production (2012-2021).

9 Boron

9.1 Reserves

Data source(s): (Helvacı, 2005), (Helvacı, 2017).

Reference Year: N/A.

Notes: Known economic reserves. Data of partial coverage are also provided by (USGS mcs, 2023).

Latest RMIS Dashboard update: August 2021.

9.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)..

Notes: Data concern the production of boron minerals (borates).

Latest RMIS Dashboard update: August 2023.

9.3 Production of refined/processed materials

9.3.1 Refined borates

Available information on the production of refined borates and boron compounds worldwide is little. Data for EU production is sourced from (Eurostat Prodcom, 2023b).

9.4 Applications

Geographical scope: EU.

Data source(s): (IMA Europe, 2016).

Reference Year: 2012.

Notes: Figures relate to demand from the EU manufacturing industries using borates.

Latest RMIS Dashboard update: August 2021.

9.5 Trade of primary materials

Coverage: HS 252800 covering natural borates (sodium and non-sodium boron minerals). The heading records trade of only natural borate minerals as extracted, concentrates (whether or not calcined) of such materials, and natural boric acid as obtained by evaporation of natural vapours.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Guyana's, Mozambique's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 252800 Natural borates and concentrates thereof (whether or not calcined), but not including borates separated from natural brine; natural boric acid containing not more than 85 % of H_3BO_3 calculated on the dry weight.

Latest RMIS Dashboard update: August 2021.

9.6 Trade of refined/processed materials

Coverage: Data represent boric acid produced either by acid decomposition of natural borates, or by physicochemical treatment of crude boric acid (HS 281000), and borates obtained by crystallization or by a chemical process from natural borates or by evaporating brines in salt lakes (aggregate of HS 284011, HS 284019, HS 284020, HS 284030). Boron is not included as it is reported within heading HS 280450 alongside tellurium.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 281000 Oxides of boron; boric acids; HS 284011 Borates; disodium tetraborate (refined borax), anhydrous; HS 284019 Borates; disodium tetraborate (refined borax), other than anhydrous; HS 284020 Borates; n.e.c. in heading no. 2840; HS 284030 Peroxoborates (perborates).

Latest RMIS Dashboard update: August 2021.

9.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

9.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

10 Cadmium

10.1 Reserves

Quantitative estimates of cadmium reserves are not readily available. As cadmium is primarily produced as a by-product of zinc mining and refining, the distribution of zinc reserves worldwide (see 98.1) is also indicative for cadmium.

10.2 Production of primary materials

Cadmium production is closely tied to the production of zinc, with most of the cadmium primary supply coming from the same mines and refineries that produce zinc metal. Due to its by-product nature, mine production statistics are not available.

10.3 Production of refined/processed materials

10.3.1 Refined cadmium

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: -

Latest RMIS Dashboard update: August 2023.

10.4 Applications

Geographical scope: World.

Data source(s): (ICdA, 2021).

Reference Year: 2019.

Notes: End uses of cadmium. EU-specific data are unavailable. It is assumed that figures are also applicable to the EU.

Latest RMIS Dashboard update: August 2021.

10.5 Trade of primary materials

No data are available on the international trade of cadmium's primary materials. Cadmium is not mined directly from one particular ore, but is instead recovered as by-product of zinc's metallurgy. The trade of cadmium-bearing metallurgical residues cannot be traced by the Harmonised System's nomenclature as the relevant HS heading (HS 262091) comprises compounds of many materials.

10.6 Trade of refined/processed materials

Coverage: HS 810720 is used for cadmium's world trade that refers to unwrought cadmium and cadmium powders. Cadmium compounds (e.g. cadmium oxide in HS 282590, sulphates of cadmium in HS 283329, cadmium sulphide in HS 283090) are not included due to the high aggregation of the relevant HS headings. Wrought cadmium and articles are excluded (HS 810790) as considered to be downstream products.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Mexico are derived from reported imports by trade partners.

Relevant Harmonized System (HS) Codes: HS 810720 *Cadmium; unwrought, powders*.

Latest RMIS Dashboard update: August 2021.

10.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC estimate based on (UNEP, 2011).

Reference Year: N/A.

Notes: Robust data that allow the calculation of cadmium's EOL-RIR are not available. The EOL-RIR is assessed in accordance with the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). It is assumed that the estimated figure is also appropriate for the EU.

Latest RMIS Dashboard update: August 2021.

10.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (2012-2021).

11 Cerium

11.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

11.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and cerium content in REE minerals of each operating mine.

Notes: The mine production of cerium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

11.3 Production of refined/processed materials

Data are not available in the public domain.

11.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data relate to cerium's demand by end use.

Latest RMIS Dashboard update: August 2023.

11.5 Trade of primary materials

No HS codes are representative for the trade of cerium's primary materials. See also the generic notes provided for REEs.

11.6 Trade of refined/processed materials

Coverage: Data refer to HS 284610 covering ceric oxide and cerium salts. The trade of intermixtures/interalloys containing cerium such as 'mischmetal' (containing Ce, La, etc.) is not included as the relevant trade code (HS 280530) is highly aggregated. Trade of ferro-cerium is also not possible to be accounted for the same reason (HS 360690).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Malaysia are deduced by declared imports by destination countries. Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 284610 *Cerium compounds*

Latest RMIS Dashboard update: August 2021.

11.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data are insufficient to calculate a figure for the EOL-RIR in the EU.

11.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

12 Chromium

12.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

12.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Production of Finland is derived from (BGS, 2023) using reserve grade when production is reported as gross weight of chromium ore, and the average Cr_2O_3 content of chromium concentrates in Finland when production is reported in gross weight of chromium concentrates.

Latest RMIS Dashboard update: August 2023.

12.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data reflect the production of chromium ferroalloys in gross weight, comprising ferro-chrome (FeCr) and ferro-silico-chrome (FeSiCr).

Latest RMIS Dashboard update: August 2023.

12.4 Applications

Geographical scope: World.

Data source(s): (ICDA, 2017).

Reference Year: 2017.

Notes: First uses of chromium. It is regarded that figures are applicable in the EU. The EC MSA study also provides data for chromium's applications in 2013 in the EU (BIO by Deloitte, 2015).

Latest RMIS Dashboard update: August 2021.

12.5 Trade of primary materials

Coverage: HS 261000 addressing trade of chromite.

Data source(s): (WITS, 2021)

Reference Year: 2019.

Notes: Iran's, Ukraine's and Mozambique's trade is derived from declared imports and exports by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 261000 *Chromium ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

12.6 Trade of refined/processed materials

Coverage: Aggregate of HS 281910, HS 281990, HS 284130, HS 284150, HS 720241, HS 720249, HS 720250 and HS 811221. Products covered comprise chromium traded in the form of oxides, chromates, in all types of ferrochrome, chromium alloys and chromium metal.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Mozambique's and Ukraine's trade for 2019 is estimated from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 281910 *Chromium trioxide*; HS 281990 *Chromium oxides and hydroxides; excluding chromium trioxide*; HS 284130 *Salts; sodium dichromate*; HS 284150 *Salts; chromates, dichromates, peroxochromates; n.e.c. in heading no. 2841*; HS 720241 *Ferro-alloys; ferro-chromium, containing by weight more than 4% of carbon*; HS 720249 *Ferro-alloys; ferro-chromium, containing by weight 4% or less of carbon*; HS 720250 *Ferro-alloys; ferro-silico-chromium*; HS 811221 *Chromium and articles thereof; unwrought chromium, powders*.

Latest RMIS Dashboard update: August 2021.

12.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: Consistent with the methodology described in (Peiró *et al.*, 2018), the indicator is calculated from background data delivered by the source.

Latest RMIS Dashboard update: August 2021.

12.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is based on chromite mine production (2012-2021).

13 Cobalt

13.1 Reserves

Coverage: World countries.

Data source(s): (S&P, 2022).

Reference Year: 2020.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2021.

13.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes:-

Latest RMIS Dashboard update: August 2023.

13.3 Production of refined/processed materials

13.3.1 Refined cobalt

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures include the production of cobalt metal plus the cobalt content of refined compounds (oxides, carbonates, sulphates and other). Data comprise production from both primary and secondary raw materials. The split in refined cobalt production between Belgium and China is assessed through capacity data.

Latest RMIS Dashboard update: August 2023.

13.4 Applications

Geographical scope: World.

Data source(s): (CI, 2023).

Reference Year: 2022.

Notes: Figures show cobalt's end uses. The breakdown of demand is supposed to be applicable to the EU. The EC MSA study (Matos, Ciacci, *et al.*, 2020) provides EU-specific information for the end uses of cobalt in 2016.

Latest RMIS Dashboard update: August 2023.

13.5 Trade of primary materials

Coverage: Data are associated with HS 260500 that covers cobalt ores and concentrates, i.e. ores and concentrates in which cobalt is the primary commodity. The trade of Co-bearing copper and nickel ores, concentrates and intermediates is not possible to be captured by international trade statistics. Cobalt intermediates, such as cobalt mattes destined for cobalt refining, produced after the initial metallurgical

processing of Co-bearing ores are not included as they are reported along with refined cobalt products in the relevant HS heading (HS 810520), and the code is allocated to processed/refined materials of cobalt. Similarly, the heading HS 282200, which covers inter-alia crude cobalt hydroxides obtained from the metallurgical processing of Co-bearing copper ores, is not included as refined Co oxides are reported within the HS heading, and the code is assigned to processed/refined materials. Finally, the trade of contained cobalt in nickel intermediates, such as mixed nickel sulphide precipitate (MSP) and mixed nickel hydroxide precipitate (MHP) captured by headings HS 283090 and HS 282540 correspondingly, is excluded as these codes are allocated to nickel.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports from DRC are derived from reported imports from destination countries (mirror exports). Also, Finland's imports are obtained from the Finish Customs (ULJAS, 2021).

Relevant Harmonized System (HS) Codes: HS 260500 *Cobalt ores and concentrates*

Latest RMIS Dashboard update: August 2021.

13.6 Trade of refined/processed materials

Coverage: For the trade of refined cobalt, the aggregate of HS 282200 and HS 810520 is employed, containing cobalt oxides such as cobalt tetroxide, and unwrought cobalt, cobalt alloys and cobalt powders, respectively. It is noted that the above codes cover inter-alia the Co-rich intermediates obtained from the initial metallurgical processing of Co-bearing ores and concentrates, e.g. crude cobalt hydroxide and cobalt mattes. The trade of other refined cobalt compounds, e.g. cobalt sulphate, cobalt carbonate and cobalt chlorides, is not included as they are reported in HS headings aggregated with compounds of different materials (i.e. HS 283329, HS 282739, and HS 283699, correspondingly). Cobalt articles and cobalt in wrought forms is excluded (HS 810590).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports from DRC, New Caledonia, and Norway are derived from reported imports by destination countries. Trade flows from Finland (imports, exports) are sourced from (UN Comtrade, 2022) in the form of 'mirror' imports and 'mirror' exports based on the declared exports and imports, respectively, of its trade partners. Eurostat does not provide data for Finland, while from the datasets provided by the Finish Customs (ULJAS, 2021) is not possible to separate EU-Extra and EU-Intra trade. Iran's, Mozambique's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Iran's, Mozambique's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 282200 *Cobalt oxides and hydroxides; commercial cobalt oxides*; HS 810520 *Cobalt; mattes and other intermediate products of cobalt metallurgy, unwrought cobalt, powders*.

Latest RMIS Dashboard update: August 2021.

13.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacchi, *et al.*, 2020).

Reference Year: 2016.

Notes: On the basis of the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020), the indicator is calculated from background data provided by the source.

Latest RMIS Dashboard update: August 2021.

13.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The calculation of CAGR is based on refined cobalt production (2012-2021).

14 Coking coal

14.1 Reserves

Data source(s): JRC estimate based on data from (BP, 2020).

Reference Year: 2019.

Notes: Unless statistics are available for particular countries, coking coal's reserves share in total proved reserves of (hard) coal is estimated assuming that it is equal to the share of coking coal in total hard coal production for each country.

Latest RMIS Dashboard update: August 2021.

14.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Data refer to coking coal of various qualities (hard, semi-hard and semi-soft). Coal for Pulverized Coal Injection (PCI) is not included.

Latest RMIS Dashboard update: August 2023.

14.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USEIA, 2023)

Notes: Data address the production of metallurgical coke.

Latest RMIS Dashboard update: August 2023.

14.4 Applications

Geographical scope: EU.

Data source(s): JRC own calculation based on data from (Eurostat, 2022), in (Georgitzikis *et al.*, 2022).

Reference Year: 2020.

Notes: Other uses in the iron & steel industry comprise foundry coke used in ferroalloy and castings production, breeze coke in iron ore sintering, and fuel for heating and operation of coke ovens and blast furnaces.

Latest RMIS Dashboard update: August 2023.

14.5 Trade of primary materials

Coverage: The HS nomenclature does not provide the required granularity for distinguishing coking coal's trade flows. Data are a JRC estimation based on the following approach:

- Exports: Seaborne exports of coking coal are obtained from (Euracoal, 2022) for a number of countries (Australia, Canada, the US, Russia, China). For the rest of the non-EU producing countries, coking coal exports were approximated using WITS data for bituminous coal exports (HS 270112). Coking coal's share in

bituminous coal exports was estimated under the assumption that coking coal's exports are proportional to each country's production share of coking coal in the total coal production (steam+coking coal) and taking into account domestic demand for coking coal in pig iron production in blast furnaces. For EU countries, Eurostat is the source of data (CN 27011210 'Coking coal, whether or not pulverised, non-agglomerated').

- Imports: The approximation is based on data provided by HS 270112, domestic coking coal demand for pig iron production in blast furnaces, domestic coking coal production, and coking coal exports estimated as above. For EU countries, data are obtained from Eurostat (CN 27011210 'Coking coal, whether or not pulverised, non-agglomerated').

Data source(s): JRC estimation based on (Euracoal, 2022), (WITS, 2021), (Eurostat Comext, 2022), (BGS, 2021)

Reference Year: 2019.

Notes: Volumes are converted to value with the annual average price of coking coal in 2019 (TSI, Hard Coking Coal, FOB Australia East Coast). For EU countries, the annual average exchange rate EUR/USD is employed.

Relevant Harmonized System (HS) Codes: HS 270112 *Bituminous coal, whether/not pulverised but not agglomerated*

Latest RMIS Dashboard update: August 2021.

14.6 Trade of refined/processed materials

The trade of metallurgical coke (blast furnace coke) made from coking coal is captured by HS 270400. However, trade data are not shown because the heading, along with metallurgical coke, includes coke and semi-coke made from various qualities of coal used in the manufacture of electrodes (generally intended for the production of ferro-alloys) and other uses than metallurgical coke.

14.7 End-of-Life Recycling Input Rate (EOL-RIR)

Coverage: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015)

Reference Year: 2013.

Notes: According to the methodology described in (Peiró *et al.*, 2018), the indicator is calculated from background data provided by the source.

Latest RMIS Dashboard update: August 2021.

14.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

15 Copper

15.1 Reserves

Data source(s): (Mudd and Jowitt, 2018).

Reference Year: 2015.

Notes: The inventory of the study consists predominantly of code-based reserves (99% of the total deposits of the inventory).

Latest RMIS Dashboard update: August 2021.

15.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: -

Latest RMIS Dashboard update: August 2023.

15.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures relate to both primary and secondary refined copper, whether electrolytic or fire refined. Metal recovered from secondary remelting alone is excluded. The production of Finland is assumed to be equivalent to its 2019 level that is reported in (USGS myb-Cu, 2023). Data for France, Hungary, Taiwan-SAR China, and the Republic of Congo are also based on (USGS myb-Cu, 2023).

Latest RMIS Dashboard update: August 2023.

15.4 Applications

Geographical scope: EU28.

Data source(s): EC MSA study (Passarini *et al.*, 2018).

Reference Year: 2014.

Notes: End-use consumption in the EU (products 'used') by sector.

Latest RMIS Dashboard update: August 2021.

15.5 Trade of primary materials

Coverage: Trade data comprise the aggregate of HS 260300, HS 262030 and HS 740100. These headings encompass copper ores and concentrates, intermediate products of copper metallurgy (mattes and cements), and metallurgical residues containing copper from the treatment of ores or electrolytic, chemical or other processes, respectively. Copper contained as a co- or by-product in ores and concentrates of host metals (e.g. of zinc) and intermediate metallurgical products (e.g. of nickel) of other metals is not possible to be considered.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: DRC's reported trade data are sourced from (UN Comtrade, 2022). Iran's, Ukraine's and Mozambique's trade in 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 260300 *Copper ores and concentrates*; HS 262030 *Slag, ash and residues; (not from the manufacture of iron or steel), containing mainly copper*; HS 740100 *Copper mattes; cement copper (precipitated copper)*.

Latest RMIS Dashboard update: August 2021.

15.6 Trade of refined/processed materials

Coverage: The product aggregate representing processed and refined forms of copper consists of headings HS 282550, HS 282741, HS 283325, HS 740200, HS 740311, HS 740312, HS 740313, HS 740319, HS 740321, HS 740322, HS 740329 and HS 740500. The products covered include copper oxides, chloride oxides and chloride hydroxides of copper, sulphates of copper, unrefined copper (black copper, blister copper) and copper anodes for electrolytic refining, refined copper in various unwrought forms, unwrought brass and bronze, other unwrought copper alloys, and copper master alloys.

Data source(s): (WITS, 2021).

Reference Year: 2021.

Notes: DRC's reported trade data are obtained from (UN Comtrade, 2022). Iran's, Ukraine's and Mozambique's trade in 2019 is derived from reported imports and exports by their trade partners. Equally, the trade flows of Myanmar, Bangladesh, Cuba, DPR Korea, Tajikistan, Venezuela, Bahrain, Dominican Republic, Lebanon, Montenegro and Oman for 2019 is estimated from mirror data on the basis of reported imports/exports by their trade partners.

Relevant Harmonized System (HS) Codes:

HS 282550 *Copper oxides and hydroxides*;

HS 282741 *Chloride oxides and chloride hydroxides; of copper*;

HS 283325 *Sulphates; of copper*;

HS 740200 *Copper; unrefined, copper anodes for electrolytic refining*;

HS 740311 *Copper; refined, unwrought, cathodes and sections of cathodes*;

HS 740312 *Copper; refined, unwrought, wire-bars*;

HS 740313 *Copper; refined, unwrought, billets*;

HS 740319 *Copper; refined, unwrought, n.e.c. in item no. 7403.1*;

HS 740321 *Copper; copper-zinc base alloys (brass) unwrought*;

HS 740322 *Copper; copper-tin base alloys (bronze) unwrought*;

HS 740329 *Copper; copper alloys n.e.c. in heading no. 7403 (other than master alloys of heading no. 7405)*;

HS 740500 *Copper; master alloys of copper*.

Latest RMIS Dashboard update: August 2021.

15.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): JRC calculation based on data in (ICA, 2022).

Reference Year: 2018.

Notes: Data originate from Fraunhofer Institute's dynamic copper flow model developed for the International Copper Association (ICA) (Soulé *et al.*, 2018)(Glöser *et al.*, 2013).

Latest RMIS Dashboard update: March 2022.

15.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to the production of refined copper (2012-2021).

16 Diatomite

16.1 Reserves

Reserve data reported by the United States Geological Survey have a partial coverage across world countries (USGS, 2024).

16.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s) : (BGS, 2023)

Notes: Data for Spain include tripolite. Danish production corresponds to 'moler' (an impure diatomite containing a large proportion of clay).

Latest RMIS Dashboard update: August 2023.

16.3 Production of refined/processed materials

No data are available for processed (calcined) diatomite.

16.4 Applications

Geographical scope: World.

Data source(s): (BRGM, 2020c)

Reference Year: 2017.

Notes: Robust data for the breakdown of uses in Europe are unavailable.

Latest RMIS Dashboard update: August 2023.

16.5 Trade of primary materials

Coverage: Trade of diatomite is captured under HS 251200. Apart from diatomite, the heading contains other siliceous earth's minerals (kieselgur, tripolite, moler etc.).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Trade flows of Iran, Guyana, Mozambique and Ukraine's trade for 2019 are approximated from reported imports and exports by their trade partners.

Relevant Harmonized System (HS) Codes: HS 251220 Siliceous fossil meals (e.g. kieselgur, tripolite and diatomite) and similar siliceous earths; whether or not calcined, of an apparent specific gravity of 1 or less.

Latest RMIS Dashboard update: August 2021.

16.6 Trade of refined/processed materials

Trade of calcined diatomite recorded under HS 380290 is not considered as the HS heading contains several activated mineral products.

16.7 End-of-Life Recycling Input Rate (EOL-RIR)

No robust data are available. The EOL-RIR is assessed close to 0%.

16.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

17 Dysprosium

17.1 Reserves

No data have been compiled. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

17.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and dysprosium content in REE minerals of each operating mine.

Notes: The mine production of dysprosium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

17.3 Production of refined/processed materials

Information is not accessible in the public domain.

17.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data refer to dysprosium's demand by end use.

Latest RMIS Dashboard update: August 2023.

17.5 Trade of primary materials

There are no specific codes to dysprosium in international trade statistics (HS). Dysprosium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

17.6 Trade of refined/processed materials

There are no specific codes to dysprosium in international trade statistics (HS). Dysprosium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.5).

17.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2013.

Notes: The indicator is calculated from background data reported by the source in accordance with the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

17.8 Other Indicators

- ✓ The Import Reliance is derived from (European Commission, 2023) and refers to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

18 Erbium

18.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

18.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and erbium content in REE minerals of each operating mine.

Notes: The mine production of erbium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

18.3 Production of refined/processed materials

Data are not publicly available.

18.4 Applications

Geographical scope: Europe

Data source(s): (Wood Mackenzie, 2022a)

Reference Year: 2021

Notes: Data concern erbium's demand by end use.

Latest RMIS Dashboard update: August 2023.

18.5 Trade of primary materials

There are no specific codes to erbium in international trade statistics (HS). Erbium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

18.6 Trade of refined/processed materials

There are no specific codes to erbium in international trade statistics (HS). Erbium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

18.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2013.

Notes: Background data provided by the source were used to calculate the indicator in accordance with the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

18.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and relates to all forms of erbium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

19 Europium

19.1 Reserves

No data have been gathered Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

19.2 Production of primary materials

Coverage: World countries

Reference Year: 2021

Data source(s): JRC analysis based on the total REE production and europium content in REE minerals of each operating mine.

Notes: The mine production of europium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is derived from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

19.3 Production of refined/processed materials

Data are not publicly available.

19.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data are relevant to europium's demand by end use.

Latest RMIS Dashboard update: August 2023.

19.5 Trade of primary materials

There are no specific codes to europium in international trade statistics (HS). Europium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

19.6 Trade of refined/processed materials

There are no specific codes to europium in international trade statistics (HS). Europium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

19.7 End-of-Life Recycling Input Rate (EOL-RIR)

Consistent data for europium's EOL-RIR in the EU are missing. Data provided from the EC MSA study (BIO by Deloitte, 2015) are not taken into account as they are not consistent with supplementary sources of information (the indicator is calculated at 38% for year 2013 on the basis of available data).

19.8 Other Indicators

- ✓ The EU Sourcing (EU supply) originates from (SCRREEN2, 2023) and relates to all forms of europium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

20 Feldspar

20.1 Reserves

Feldspar reserve data have only been assessed for a few countries. Detailed estimates for most countries have not been compiled. (USGS, 2024)(Kogel *et al.*, 2006)

20.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data refer to the aggregated production of feldspar minerals of various grades (crude, ground etc.), and nepheline syenite. Data for Italy and Poland are collected from (WMD, 2023).

Latest RMIS Dashboard update: August 2023.

20.3 Production of refined/processed materials

Not applicable. Marketable feldspar is not processed beyond the typical crushing, grinding and flotation techniques.

20.4 Applications

Geographical scope: Europe.

Data source(s): (IMA Europe, 2018).

Reference Year: 2017.

Notes: Data concern end-use applications.

Latest RMIS Dashboard update: August 2021.

20.5 Trade of primary materials

Coverage: Trade data comprise feldspar (HS 252910) and feldspathoids (leucite, nepheline and nepheline syenite) (HS 252930). The HS headings employed do not include feldspathic sands.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 252910 *Feldspar*; HS 252930 *Leucite; nepheline and nepheline syenite*

Latest RMIS Dashboard update: August 2021.

20.6 Trade of refined/processed materials

Not applicable.

20.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): Expert assessment in (European Commission, 2023).

Reference Year: N/A

Notes: There is insufficient information to calculate feldspar's EOL-RIR.

Latest RMIS Dashboard update: February 2024.

20.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

21 Fluorspar

21.1 Reserves

Data source(s): (USGS, 2024)

Reference Year: 2022

Notes: Reserves are defined according to the USGS classification system (USGS, 1980). Data for Brazil and Thailand are obtained from (USGS, 2023).

Latest RMIS Dashboard update: February 2024.

21.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Figures include all quality grades of fluorspar. Data for Mexico are taken from (BGS, 2023), as well as for Kazakhstan and Kyrgyzstan.

Latest RMIS Dashboard update: August 2023.

21.3 Production of refined/processed materials

Coverage: EU countries.

Reference Year: 2021.

Data source(s): (Eurostat Prodcum, 2023b).

Notes: Data on the global supply of hydrofluoric acid at country level are not available in the public domain.

Latest RMIS Dashboard update: August 2023.

21.4 Applications

Geographical scope: EU28.

Data source(s): Derived from the EC MSA study data (BIO by Deloitte, 2015) in (European Commission, 2017a).

Reference Year: 2012.

Notes: The shares of demand are tied to the consumption of fluorspar by manufacturing sector.

Latest RMIS Dashboard update: August 2021.

21.5 Trade of primary materials

Coverage: Aggregate of data from headings HS 252921 and HS 252922, which comprise metallurgical-ceramic grade and acid grade fluorspar, respectively. The aggregate excludes natural cryolite.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 is derived from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 252921 *Fluorspar; containing by weight 97% or less of calcium fluoride*; HS 252922 *Fluorspar; containing by weight more than 97% of calcium fluoride*

Latest RMIS Dashboard update: August 2021.

21.6 Trade of refined/processed materials

Coverage: Aggregate of data from headings HS 281111, HS 282612, and HS 282630 covering hydrofluoric acid (HF), aluminium fluoride (AlF₃) and synthetic cryolite (Na₃AlF₆), respectively. Fluoroacids, fluorine and other fluor compounds are excluded as downstream products (e.g. HS 280130, HS 281119).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Trade flows for Iran, Mozambique, Ukraine, Bahrein and Oman are deduced from declared trade flows by trade partners.

Relevant Harmonized System (HS) Codes: HS 281111 Hydrogen fluoride (hydrofluoric acid); HS 282612 *Fluorides; of aluminium*; HS 282630 Sodium hexafluoroaluminate (synthetic cryolite).

Latest RMIS Dashboard update: August 2021.

21.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: Background data provided by the source were used to calculate the indicator in accordance with the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

21.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is sourced from (European Commission, 2023) and refers to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

22 Gadolinium

22.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

22.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and gadolinium content in REE minerals of each operating mine.

Notes: The mine production of gadolinium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

22.3 Production of refined/processed materials

The collected information is not publicly available.

22.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data are about gadolinium's demand by end use.

Latest RMIS Dashboard update: August 2023.

22.5 Trade of primary materials

There are no specific codes to gadolinium in international trade statistics (HS). Gadolinium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

22.6 Trade of refined/processed materials

There are no specific codes to gadolinium in international trade statistics (HS). Gadolinium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

22.7 End-of-Life Recycling Input Rate (EOL-RIR)

There is shortage of robust data about gadolinium's EOL-RIR in the EU.

22.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is provided by (SCRREEN2, 2023) and relates to all forms of gadolinium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

23 Gallium

23.1 Reserves

Data source(s): (Han *et al.*, 2024)

Reference Year: 2021

Notes: Gallium reserves are calculated on the basis of the reserves of bauxite and zinc ores.

Latest RMIS Dashboard update: February 2024.

23.2 Production of primary materials

Gallium is not extracted from one particular ore but is obtained mainly as by-product of the metallurgical processing of bauxite to alumina and from zinc metallurgy; as a consequence, production statistics on gallium extracted at the mining stage are not available.

23.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data relate to primary crude gallium. Obtaining reliable figures for actual gallium production (primary and secondary) is challenging due to the small market and the few producing companies. The production of Russia and China are sourced from (WMD, 2023).

Latest RMIS Dashboard update: August 2023.

23.4 Applications

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: Figures apply to end-use products.

Latest RMIS Dashboard update: August 2021.

23.5 Trade of primary materials

Not applicable. Gallium is extracted during the refining stage of bauxite and zinc ores.

23.6 Trade of refined/processed materials

Obtaining data on the worldwide trade in gallium and gallium-rich compounds is not possible using the HS nomenclature. Unwrought gallium and gallium powders are recorded in HS 811292 combined with many other metals. Similarly, gallium arsenide's trade is captured by HS 285390 together with compounds of several materials, etc.

23.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is quantified from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018) .

Latest RMIS Dashboard update: August 2021.

23.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR relates to crude gallium production (2012-2021).

24 Germanium

24.1 Reserves

Estimates of global reserves are typically not available as the recoverable germanium content in zinc and Ge-bearing coal reserves cannot be readily determined.

24.2 Production of primary materials

Data on germanium mine production are not readily available as it is a by-product of zinc mining; germanium is also extracted from coal ash.

24.3 Production of refined/processed materials

Coverage: World countries

Reference Year: 2021

Data source(s): JRC compilation based on (WMD, 2023).

Notes: Data for germanium refinery production are generally of poor quality in terms of coverage of global producers. An estimate for the production of Germany is provided from (European Commission, 2023). Belgium's production is approximated on the basis of wafer capacity. The production of Canada is assumed equal to its 2013 level.

Latest RMIS Dashboard update: August 2023.

24.4 Applications

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: Figures concern end-use products.

Latest RMIS Dashboard update: August 2021.

24.5 Trade of primary materials

Data are not available. Germanium is principally a by-product of zinc metallurgy and international trade statistics do not provide the required detail to identify trade of Ge-bearing raw materials. Moreover, ores and concentrates in which germanium is the principal constituent are classified under HS 261790 together with other ores and concentrates.

24.6 Trade of refined/processed materials

Coverage: Detailed trade data are not available in the HS nomenclature. The heading HS 282560 is used as a proxy as data do not reflect exclusively the trade of germanium oxides (e.g. GeO_2). Unwrought germanium metal and other germanium compounds cannot be recorded due to the high aggregation of the related HS headings (e.g. HS 811292 for unwrought Ge, HS 282739 for GeCl_4).

Data source(s): (WITS, 2021).

Reference Year: 2019

Notes: No 'mirror' trade data are utilised.

Relevant Harmonized System (HS) Codes: HS 282560 *Germanium oxides and zirconium dioxide*

Latest RMIS Dashboard update: August 2021.

24.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28

Data source(s): EC MSA study (BIO by Deloitte, 2015)

Reference Year: 2012

Notes: The indicator is determined from background data reported by the source according to the methodology described in (Peiró *et al.*, 2018)

Latest RMIS Dashboard update: August 2021.

24.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).;
- ✓ The CAGR relates to refined germanium production (2012-2021).

25 Gold

25.1 Reserves

Data source(s): (S&P, 2022)

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

25.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: The mine production of gold may not include an estimate for gold produced by artisanal and small-scale mining (ASM), which is generally informal.

Latest RMIS Dashboard update: August 2023.

25.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2022.

Data source(s): (WGC, 2023).

Notes: Information about the distribution of refined gold production across countries is not available. The figure represents the aggregate of annual primary and recycled gold supply.

Latest RMIS Dashboard update: August 2023.

25.4 Applications

Geographical scope: Europe

Data source(s): Background data from (WGC, 2023).

Reference Year: 2022.

Notes: Data relate to final end-user demand. Investments consist of gold bar & coin. Demand from gold-backed ETFs & similar products as well as from central banks & other institutions is not included.

Latest RMIS Dashboard update: August 2023.

25.5 Trade of primary materials

Coverage: Data correspond to HS 261690. It is noted that PGM-bearing sands are also classified in this heading along with primary gold concentrates. The trade of gold contained as co- or by-product in ores and concentrates of other metals (e.g. Cu, Pb, Ag, Zn) cannot be determined by international trade statistics.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: No 'mirror' trade data are utilised.

Relevant Harmonized System (HS) Codes: HS 261690 *Precious metal ores and concentrates; (excluding silver)*

Latest RMIS Dashboard update: August 2021.

25.6 Trade of refined/processed materials

Coverage: Aggregate of HS 710811 and HS 710812 covering the various unwrought or powder forms of gold or gold alloys. Trade of colloidal gold (HS 284310) and gold amalgams (HS 284390) is not included due to the low granularity of the headings. Trade of semi-manufactured forms of gold is excluded (HS 710813).

Data source(s): (WITS, 2021)

Reference Year: 2019

Notes: Dominican's Republic's, and Mozambique's trade flows for 2019 are derived from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 710811 *Metals; gold, non-monetary, powder*; HS 710812 *Metals; gold, non-monetary, unwrought (but not powder)*.

Latest RMIS Dashboard update: August 2021.

25.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC elaboration based on background data from (WGC, 2023).

Reference Year: 2022.

Notes: The indicator is approximated by the ratio of recycled gold production to total gold supply comprised of mine production, recycling production and producers' net hedging. Data on recycled gold provided by the World Gold Council concern gold recovered from fabricated products, including unused trade stocks (gold sold for cash), which is refined back into bullion. It does not include process scrap or gold traded-in for other gold products (for example, by consumers at jewellery stores). The value of the indicator is assumed to be applicable also in the EU.

Latest RMIS Dashboard update: August 2023.

25.8 Other Indicators

✓ The CAGR relates to the production of refined gold (2013-2022).

26 Gypsum

26.1 Reserves

The available information on world reserves does not provide a thorough coverage across countries worldwide. (USGS, 2024)

26.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: Data concern the production of gypsum and anhydrite minerals. The reported data may also refer to gypsum plaster production. The output of synthetic gypsum is excluded. The production of Kyrgyzstan, United Arab Emirates, and Somalia is obtained from (WMD, 2023).

Latest RMIS Dashboard update: August 2023.

26.3 Production of refined/processed materials

Not applicable. The production of calcined gypsum (plasters) is considered in primary raw materials.

26.4 Applications

Geographical scope: Europe.

Data source(s): Data from (Eurogypsum, 2016) in (European Commission, 2017b).

Reference Year: N/A

Notes: It is assessed that data refer to end-use demand for gypsum products.

Latest RMIS Dashboard update: August 2021.

26.5 Trade of primary materials

Coverage: Trade data correspond to the product aggregate of gypsum and anhydrite (HS 252010) and plasters, i.e. calcined gypsum (HS 252020).

Data source(s): (WITS, 2021).

Reference Year: 2019

Notes: Oman's, Iran's, Guyana's, Mozambique's and Ukraine's trade data for 2019 are estimated from declared imports and exports by their trade partners.

Relevant Harmonized System (HS) Codes: HS 252010 *Gypsum; anhydrite*; HS 252020 *Plasters; (consisting of calcined gypsum or calcium sulphate), whether or not coloured, with or without small quantities of accelerators or retarders*.

Latest RMIS Dashboard update: August 2021.

26.6 Trade of refined/processed materials

Not applicable. The heading HS 252020 covering plasters, i.e. gypsum partly or completely dehydrated by calcination, is allocated to primary materials.

26.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): JRC assessment based on (Eurogypsum, 2021).

Reference Year: 2019.

Notes: The indicator is approximated by the quantity of recycled gypsum used in plasterboard manufacturing as reported by the source, and total primary production in 2019.

Latest RMIS Dashboard update: August 2023.

26.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

27 Hafnium

27.1 Reserves

Quantitative estimates of hafnium reserves are not available. Hafnium is associated in nature with zirconium minerals e.g. zircon and baddeleyite (see 99.1 for countries having significant zirconium resources and reserves).

27.2 Production of primary materials

Hafnium is extracted together with zirconium and data for mined hafnium are not reported. Hafnium is recovered only as a by-product of zirconium refining (production of zirconium tetrachloride and nuclear-grade zirconium sponge metal) at a ratio of about Zr:Hf=50:1.

27.3 Production of refined/processed materials

Coverage: World

Reference Year: 2017

Data source(s): JRC elaboration based on various source such as (Alkane, 2017)(Alkane, 2018)(Alkane, 2020), which provide estimates for a few individual producers in specific years.

Notes: Up-to-date and comprehensive annual production figures for refined hafnium are not readily available. The compiled information provides only a general overview of hafnium production. Figures include secondary production that is presumed to take place entirely in the USA (revert scrap).

Latest RMIS Dashboard update: August 2021.

27.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021) with data from (Alkane, 2017).

Reference Year: 2016.

Notes: Figures correspond to hafnium's end uses. According to the MSA study, the global demand shares reported by (Alkane, 2017) are representative for the use of finished products in the EU.

Latest RMIS Dashboard update: August 2021.

27.5 Trade of primary materials

Coverage: Hafnium is not extracted from one particular ore but is obtained as by-product of zirconium metallurgy. Therefore, data corresponding to the host primary material i.e. HS 261510 *Zirconium ores and concentrates* are used as a proxy. Disaggregated data for Hf-bearing zirconia obtained from zirconium ores and concentrates are not available (HS 282560).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Ukraine's and Mozambique's trade data are obtained from reported trade flows by trade partners.

Relevant Harmonized System (HS) Codes: HS 261510 *Zirconium ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

27.6 Trade of refined/processed materials

No data are available for hafnium's refined/processed products. The international trade of refined hafnium compounds (e.g. hafnium oxide and hafnium tetrachloride in HS 282590 and HS 282739, respectively) and unwrought hafnium metal (HS 811292) cannot be tracked as the relevant HS headings do not have the required detail. Similarly, wrought hafnium products are reported with other materials under HS 811299.

27.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

27.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).

28 Helium

28.1 Reserves

The presentation of the global distribution of helium reserves is not possible due to insufficient data availability for some natural gas-rich countries (e.g. Qatar, Iran).

28.2 Production of primary materials

Not applicable. Helium is a by-product recovered from natural gas extraction.

28.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS mcs, 2023).

Notes: Data address the production of helium gas. Production volumes are to a great extent estimates performed by the data providers. The US output includes withdrawals from helium storage facilities. The small production levels of Germany, Ukraine and India are a JRC estimate based on the output of 2017.

Latest RMIS Dashboard update: August 2023.

28.4 Applications

Geographical scope: Western Europe.

Data source(s): IHS Markit data reported by (Elsner, 2018).

Reference Year: 2015.

Notes: Data relate to the end uses of helium. According to (Matos *et al.*, 2021), figures are also applicable in the EU

Latest RMIS Dashboard update: August 2021.

28.5 Trade of primary materials

Not applicable.

28.6 Trade of refined/processed materials

No data are available in international trade statistics (HS) as the HS nomenclature does not have the required level of detail to allow tracking of helium gas trade flows, which are reported in HS 280429 together with other rare gases.

28.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

28.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The calculation of CAGR is based on the production of helium gas from 2012 to 2021.

29 Heavy Rare Earth Elements (HREE)

29.1 Reserves

Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

29.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC elaboration based on the total REE production (see 67.2)

Notes: The HREE group comprises dysprosium, erbium, europium, gadolinium, holmium, lutetium, terbium, thulium, ytterbium and yttrium. Figures are the aggregate of the estimated production of the each HREE.

Latest RMIS Dashboard update: August 2023.

29.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (Wood Mackenzie, 2022b).

Notes: Data aggregate the estimated production of refined dysprosium, erbium, europium, gadolinium, holmium, lutetium, terbium, thulium, ytterbium and yttrium. Recycling is included.

Latest RMIS Dashboard update: August 2023.

29.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data show HREE demand by end use.

Latest RMIS Dashboard update: August 2023.

29.5 Trade of primary materials

Data are not available in the HS nomenclature (See section 67.5).

29.6 Trade of refined/processed materials

Data are not available in the HS nomenclature (See section 67.6)

29.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data are insufficient for the calculation or estimation of the EOL-RIR in the EU. The EOL-RIR worldwide is estimated to be 14% in 2021 (as the share of EOL recycling in global supply) based on data

from (Wood Mackenzie, 2022a); however, it is assessed that the figure for the indicator is not appropriate for the EU.

29.8 Other Indicators

- ✓ The Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production from 2012 to 2021.

30 Holmium

30.1 Reserves

Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

30.2 Production of primary materials

Coverage: World countries (2021)

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and holmium content in REE minerals of each operating mine.

Notes: The mine production of holmium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

30.3 Production of refined/processed materials

The gathered information is not publicly available.

30.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data relate to holmium's demand by end use.

Latest RMIS Dashboard update: August 2023.

30.5 Trade of primary materials

There are no specific codes to holmium in international trade statistics (HS). Its trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

30.6 Trade of refined/processed materials

There are no specific codes to holmium in international trade statistics (HS). Their trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

30.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to calculate or estimate holmium's EOL-RIR in the EU are lacking.

30.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and relates to all forms of holmium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used are provided by (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

31 Hydrogen

31.1 Reserves

Data source(s): JRC estimate based on (BP, 2022)

Reference Year: 2020

Notes: The country distribution for proved reserves of each of the fossil fuels (natural gas, coal and oil) from which 99.3% of hydrogen production was derived in 2021, was weighted with the hydrogen production mix in 2021 by fossil fuel reported by (IEA, 2022) (natural gas: 62%, coal=19%; oil=18.7%).

Latest RMIS Dashboard update: August 2023.

31.2 Production of primary materials

Not applicable. The production of fossil fuels (natural gas, coal, oil), from which hydrogen is almost entirely produced, is not considered.

31.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2021.

Data source(s): (IEA, 2022), (FCHO, 2022), (Hydrogen Europe, 2022), (HyARC, 2016)

Notes: The total production of hydrogen gas in 2021 is collected from (IEA, 2022). It includes pure hydrogen production and hydrogen with carbon-containing gases in methanol production and steel manufacturing. It excludes by-product hydrogen from the chlor-alkali industry, and hydrogen present in residual gases from industrial processes used for heat and electricity generation. The top EU producers are derived from (HyARC, 2016), (FCHO, 2022) and (Hydrogen Europe, 2022). The EU share in global refined production refers to 2020, and it is estimated on the basis of data provided by (FCHO, 2022) and (IEA, 2022).

Latest RMIS Dashboard update: August 2023.

31.4 Applications

Geographical scope: Europe.

Data source(s): (WITS, 2021).

Reference Year: 2020.

Notes: Data reflect the end uses of hydrogen in the European Union, the European Free Trade Association (EFTA), and the United Kingdom.

Latest RMIS Dashboard update: August 2023.

31.5 Trade of primary materials

Not applicable. Trade of fossil fuels is not considered.

31.6 Trade of refined/processed materials

Coverage: Data for hydrogen gas are associated with heading HS 280410.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes:

Relevant Harmonized System (HS) Codes: HS 280410 *Hydrogen*.

Latest RMIS Dashboard update: August 2021.

31.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available for the calculation or estimation of hydrogen's EOL-RIR. According to expert judgment in (European Commission, 2020a), the EOL-RIR of hydrogen is deduced to be 0%.

31.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016–2020. The figures for the extraction stage of both indicators relate to natural gas. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ Country-specific capacity data in 2016 are used as a proxy for the calculation of the HHI index of refined production.

32 Indium

32.1 Reserves

Data source(s): JRC indicative estimate based on (USGS, 2008) and (USGS, 2024).

Reference Year: N/A.

Notes: Reliable estimates of global indium reserves are generally not available. As indium is mostly recovered as a by-product of zinc metallurgy, estimates of primary indium reserves can be derived from zinc reserves worldwide. The estimate is based on indium reserves reported by (USGS, 2008) (the most recent available USGS estimate of indium reserves, ref. year:2006) and extrapolating to 2022 (zinc reserves reported by (USGS, 2024)) according to the variation of zinc reserves between 2006 and 2022. Indium reserves associated with copper and other than zinc deposits are not accounted for.

Latest RMIS Dashboard update: February 2024.

32.2 Production of primary materials

Indium is principally produced through the extraction and processing of zinc ores. There is scarce information about indium's mine production due to its by-product nature.

32.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Indium is mostly recovered as a by-product of zinc metal production. In light of background information after comparing with additional sources, it is concluded that figures relate to the production of refined indium from primary and secondary feed.

Latest RMIS Dashboard update: August 2023.

32.4 Applications

Geographical scope: World.

Data source(s): (Willis *et al.*, 2012), (Lokanc *et al.*, 2015).

Reference Year: 2011.

Notes: Figures show the distribution of indium's demand by end use.

Latest RMIS Dashboard update: August 2021.

32.5 Trade of primary materials

The trade of indium's primary materials cannot be outlined by international statistics. Indium is not mined directly from one particular ore, but is instead recovered mostly as by-product of zinc metallurgy. The HS nomenclature does not provide the required detail for the zinc ores, concentrates and residues containing indium (HS 260800, HS 262019).

32.6 Trade of refined/processed materials

No data can be extracted from international statistics for refined/processed indium. The HS nomenclature does not offer the adequate disaggregation for unwrought indium and indium powders; the relevant HS heading (HS 811292) contains several metals.

32.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

32.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to refinery production from 2012 to 2021.

33 Industrial Diamonds

33.1 Reserves

Data source(s): (S&P, 2023)

Reference Year: 2022.

Notes: Data refer to natural diamonds (gemstones & industrial). The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

33.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source: (WMD, 2023).

Notes: Data relate to natural industrial diamonds.

Latest RMIS Dashboard update: August 2023.

33.3 Production of refined/processed materials

Not applicable.

33.4 Applications

Quantitative data on the consumption of industrial diamonds by application (e.g. in cutting and drilling tools, abrasives) or by sector (e.g. machinery, drillings, construction) are not available.

33.5 Trade of primary materials

Coverage: The trade of diamond bort and stone (HS 710221) is considered.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: Export flows from Angola are disregarded as they are consistently reported under a different code (HS 720231) by its major trade partners i.e. as non-industrial diamonds (gemstones).

Relevant Harmonized System (HS) Codes: HS 710221 *Diamonds; industrial, unworked or simply sawn, cleaved or bruted, but not mounted or set.*

33.6 Trade of refined/processed materials

Coverage: The trade of worked industrial diamonds (HS 71029) and diamond dust and powders (HS 710510) is considered; the latter code contains synthetic diamonds along with natural.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes: HS 710229 *Diamonds; industrial, (other than unworked or simply sawn, cleaved or bruted), but not mounted or set*; HS 710510 *Stones; precious and semi-precious, dust and powder, of diamonds*.

33.7 End-of-Life Recycling Input Rate (EOL-RIR)

No information is available to calculate the EOL-RIR in the EU.

33.8 Other Indicators

- ✓ Industrial diamonds were not assessed in the 2023 EU assessment of Critical raw materials (European Commission, 2023); therefore, no figures are displayed for the EU Sourcing (EU supply) and Import Reliance indicators;
- ✓ The CAGR refers to primary (mining) production of industrial diamonds (2012-2021).

34 Industrial Roundwood

34.1 Reserves

Data source(s): (FAO, 2020).

Reference Year: 2020.

Notes: The forest area worldwide managed primarily for production (of wood and non-wood forest products) is considered a proxy for reserves. Forests designated for multiple uses, which often includes production, are not included. Forest areas of rubber and cork are subtracted from the dataset. Reporting countries in the background data represent 93% of the total forest area.

Latest RMIS Dashboard update: August 2023.

34.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (FAOSTAT, 2023a).

Notes: Data comprise the aggregate of production of sawlogs and veneer logs (coniferous & non-coniferous), pulpwood (coniferous & non-coniferous), and other industrial roundwood (coniferous & non-coniferous).

Latest RMIS Dashboard update: August 2023.

34.3 Production of refined/processed materials

Coverage: World countries.

Data source(s): JRC elaboration based on (FAOSTAT, 2023a).

Reference Year: 2021.

Notes: Data correspond to the aggregate of processed forms of industrial roundwood (sawnwood, wood-based panels, veneer sheets and wood pulp). Data are harmonised to m³ swe (cubic metres of solid wood equivalent, a unit that corresponds with the wood fibre contained in the product and the roundwood equivalent volume needed to produce the product when there are no losses or wood residues) using the following generic conversion factors in accordance with (UNECE/FAO, 2010): 1 m³ of Sawnwood=1.05; 1 m³ of veneer sheets=1.08; wood-based panels=1.50; 1 t of wood pulp=2.50 m³ of swe.

Latest RMIS Dashboard update: August 2023.

34.4 Applications

Geographical scope: EU.

Data source(s): JRC elaboration based on (Cazzaniga *et al.*, 2021).

Reference Year: 2017.

Notes: Data show the distribution of wood resource consumption by processed products. Recovered paper is not included in the balance.

Latest RMIS Dashboard update: August 2023.

34.5 Trade of primary materials

Coverage: The aggregate of all 'wood-in-the-rough' products (excluding fuelwood) represents the trade of industrial roundwood), i.e. HS 440311; HS 440312; HS 440321; HS 440322; HS 440323; HS 440324; HS 440325; HS 440326; HS 440341; HS 440391; HS 440393; HS 440394; HS 440395; HS 440396; HS 440397; HS 440398; HS 440399; HS 440410; HS 440420.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes:

HS 440311 *Wood; coniferous species, in the rough, whether or not stripped of bark or sapwood, or roughly squared; treated with paint, stains, creosote or other preservatives;*

HS 440312 *Wood; non-coniferous species, in the rough, whether or not stripped of bark or sapwood, or roughly squared; treated with paint, stains, creosote or other preservatives;*

HS 440321 *Wood; coniferous species, of pine (Pinus spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is 15 cm or more;*

HS 440322 *Wood; coniferous species, of pine (Pinus spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is less than 15 cm;*

HS 440323 *Wood; coniferous species, of fir (Abies spp.) and spruce (Picea spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is 15 cm or more;*

HS 440324 *Wood; coniferous species, of fir (Abies spp.) and spruce (Picea spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is less than 15 cm;*

HS 440325 *Wood; coniferous species n.e.c in headings 4403.21 or 4403.23, in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is 15 cm or more;*

HS 440326 *Wood; coniferous species n.e.c in headings 4403.22 or 4403.24, in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is less than 15 cm;*

HS 440341 *Wood, tropical; as specified in Subheading Note 2 to this Chapter, dark red meranti, light red meranti and meranti bakau, in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated;*

HS 440349 *Wood, tropical; other than dark red meranti, light red meranti and meranti bakau, in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated;*

HS 440391 *Wood; oak, in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated;*

HS 440393 *Wood; of beech (Fagus spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is 15 cm or more;*

HS 440394 *Wood; of beech (Fagus spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is less than 15 cm;*

HS 440395 *Wood; of birch (Betula spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is 15 cm or more;*

HS 440396 *Wood; of birch (Betula spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, of which any cross-sectional dimension is less than 15 cm;*

HS 440397 *Wood; of poplar and aspen (Populus spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated;*

HS 440398 Wood; of eucalyptus (*Eucalyptus* spp.), in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated;

HS 440399 Wood; in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, n.e.c. in heading no. 4403;

HS 440410 Wood; coniferous, split poles, piles, pickets, stakes, pointed but not sawn lengthwise; sticks for umbrellas, tool handles etc, roughly trimmed but not turned or bent; chipwood etc, hoopwood;

HS 440420 Wood; non-coniferous, split poles, piles, pickets, stakes, pointed but not sawn lengthwise; sticks for umbrellas, tool handles etc, roughly trimmed but not turned or bent; chipwood etc, hoopwood.

Latest RMIS Dashboard update: August 2023.

34.6 Trade of refined/processed materials

Coverage: The trade of processed products of industrial roundwood is derived from the aggregate of trade codes relating to sawnwood, veneer sheets, wood-based panels, and wood pulp. Tropical timber is included.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes:

HS 440500 Wood; wood wool and wood flour;

HS 440611 Wood; railway or tramway sleepers (cross-ties), not impregnated, coniferous;

HS 440612 Wood; railway or tramway sleepers (cross-ties), not impregnated, non-coniferous;

HS 440691 Wood; railway or tramway sleepers (cross-ties), impregnated, coniferous;

HS 440692 Wood; railway or tramway sleepers (cross-ties), impregnated, non-coniferous;

HS 440712 Wood; coniferous species, of fir (*Abies* spp.) and spruce (*Picea* spp.), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or finger-jointed, of a thickness exceeding 6mm;

HS 440719 Wood; coniferous species, other than of pine (*Pinus* spp.) or fir (*Abies* spp.) or spruce (*Picea* spp.), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or finger-jointed, of a thickness exceeding 6mm;

HS 440721 Wood, tropical; as specified in Subheading Note 2 to this Chapter, mahogany (*Swietenia* spp.), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440722 Wood, tropical; virola, imbuia and balsa, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440725 Wood, tropical; dark red meranti, light red meranti and meranti bakau, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440726 Wood, tropical; white lauan, white meranti, white seraya, yellow meranti and alan, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440728 Wood, tropical; iroko, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440729 Wood, tropical, n.e.c. in item no. 4407.2, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness exceeding 6mm;

HS 440791 Wood; oak (*Quercus* spp.), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440792 Wood; beech (*Fagus* spp.), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440793 Wood; maple (*Acer spp.*), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440794 Wood; cherry (*Prunus spp.*), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440795 Wood; ash (*Fraxinus spp.*), sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm;

HS 440796 Wood; of birch (*Betula spp.*), sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6mm, whether or not planed, sanded or finger-jointed;

HS 440797 Wood; of poplar and aspen (*Populus spp.*), sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6mm, whether or not planed, sanded or finger-jointed;

HS 440799 Wood; sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6mm, whether or not planed, sanded or finger-jointed, n.e.c. in heading no. 4407;

HS 440810 Wood; coniferous, sheets for veneering (including those obtained by slicing laminated wood), for plywood or similar laminated wood and other wood, sawn lengthwise, sliced or peeled, planed or not, sanded, spliced or end-jointed, not over 6 mm thick;

HS 440831 Wood, tropical; as specified in Subheading Note 2 to this Chapter, dark red meranti, light red meranti, meranti bakau, sheets for veneer, plywood or other wood, sawn lengthwise, sliced or peeled, planed or not, sanded or end-jointed, not thicker than 6mm;

HS 440839 Wood, of tropical wood; as in Subheading note 2 to this Chapter, n.e.c. in heading no. 4408.31, sheets for veneer or plywood, other wood sawn length wise, sliced or peeled, whether or not planed, sanded or end-jointed, not thicker than 6mm;

HS 440890 Wood; n.e.c. in heading no. 4408, sheets for veneer or plywood, other wood sawn lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, not exceeding 6mm in thickness;

HS 440910 Wood; coniferous (including unassembled strips and friezes for parquet flooring), continuously shaped along any edges, ends or faces, whether or not planed, sanded or end-jointed;

HS 440921 Wood; bamboo (including unassembled strips and friezes for parquet flooring), continuously shaped along any edges, ends or faces, whether or not planed, sanded or end-jointed;

HS 440922 Wood; tropical (including unassembled strips and friezes for parquet flooring), continuously shaped along any edges, ends or faces, whether or not planed, sanded or end-jointed;

HS 440929 Wood; non-coniferous, other than bamboo or tropical wood, (including unassembled strips and friezes for parquet flooring), continuously shaped along any edges, ends or faces, whether or not planed, sanded or end-jointed;

HS 441011 Particle board of wood, whether or not agglomerated with resins or other organic binding substances;

HS 441012 Oriented strand board (OSB) of wood, whether or not agglomerated with resins or other organic binding substances;

HS 441019 Wafer board and similar board of wood n.e.c. in item no. 4410.1, whether or not agglomerated with resins or other organic binding substances;

HS 441090 Particle board, oriented strand board (OSB) and similar board of ligneous materials other than wood, whether or not agglomerated with resins or other organic binding substances;

HS 441112 Medium density fibreboard (MDF), of a thickness not exceeding 5 mm;

HS 441113 Medium density fibreboard (MDF), of a thickness exceeding 5 mm but not exceeding 9 mm;

HS 441114 Medium density fibreboard (MDF), of a thickness exceeding 9 mm;

HS 441192 Fibreboard (other than MDF) of a density exceeding 0.8g/cm³, of wood or other ligneous materials, bonded or not with resins or other organic substances;

HS 441193 Fibreboard (other than MDF) of a density exceeding 0.5g/cm³ but not 0.8g/cm³, of wood or other ligneous materials, bonded or not with resins or other organic substances;

HS 441194 *Fibreboard (other than MDF) of a density not exceeding 0.5g/cm³, of wood or other ligneous materials, bonded or not with resins or other organic substances;*

HS 441210 *Plywood, veneered panels and similar laminated wood; of bamboo;*

HS 441231 *Plywood; consisting only of sheets of wood (not bamboo), each ply 6mm or thinner, with at least one outer ply of tropical wood;*

HS 441233 *Plywood; with sheets of wood only; not bamboo; each ply 6mm or less, with at least one outer ply of alder, ash, beech, birch, cherry, chestnut, elm, eucalyptus, hickory, horse chestnut, lime, maple, oak, plane, poplar, aspen, robinia, tulipwood or walnut;*

HS 441234 *Plywood; consisting only of sheets of wood (not bamboo), each ply 6mm or thinner, with at least one outer ply of non-coniferous wood not listed in subheading 4412.33;*

HS 441239 *Plywood; consisting only of sheets of wood (not bamboo), each ply 6mm or thinner, with both outer plies of coniferous wood;*

HS 441294 *Blockboard, laminboard and battenboard (not bamboo, and other than plywood consisting only of sheets of wood each ply 6mm or thinner);*

HS 441299 *Plywood, veneered panels and similar laminated wood (other than blockboard, laminboard and battenboard, other than of bamboo, and other than plywood consisting only of sheets of wood each ply 6mm or thinner);*

HS 441300 *Wood; densified wood, in blocks, plates, strips or profile shapes;*

HS 470200 *Chemical wood pulp, dissolving grades;*

HS 470311 *Chemical wood pulp, soda/sulphate, other than dissolving grades, unbleached, coniferous;*

HS 470321 *Chemical wood pulp, soda/sulphate, other than dissolving grades, semi-bleached/bleached, coniferous;*

HS 470329 *Chemical wood pulp, soda/sulphate, other than dissolving grades, semi-bleached/bleached, non-coniferous;*

HS 470411 *Chemical wood pulp, sulphite, other than dissolving grades, unbleached, coniferous;*

HS 470419 *Chemical wood pulp, sulphite, other than dissolving grades, unbleached, non-coniferous;*

HS 470421 *Chemical wood pulp, sulphite, other than dissolving grades, semi-bleached/bleached, coniferous;*

HS 470429 *Chemical wood pulp, sulphite, other than dissolving grades, semi-bleached/bleached, non-coniferous;*

HS 470500 *Wood pulp obt. by a combination of mechanical & chemical pulping processes;*

HS 470610 *Cotton linters pulp;*

HS 470620 *Pulps of fibres derived from recovered (waste & scrap) paper/paperboard;*

HS 470630 *Pulps of fibres derived from recovered (waste & scrap) paper/paperboard/of other cellulosic material, of bamboo.*

Latest RMIS Dashboard update: August 2023.

34.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): JRC elaboration based on data from (FAOSTAT, 2023a).

Reference Year: 2021.

Notes: The calculation is based on recovered paper & post-consumer wood production divided by the total supply (industrial roundwood production plus recovered paper & post-consumer wood production). Data for recovered paper & post-consumer wood were converted to m³ of swe (1 t of post-consumer wood=2.40 swe,

1 t of recovered paper = 3.60 m³ of swe). It is assumed that post-consumer wood production is not destined for heat & power applications.

Latest RMIS Dashboard update: August 2023.

34.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is taken from (European Commission, 2023). The indicator relates to the material '*Roundwood*' and refers to the average 2016-2020;
- ✓ The CAGR is derived from primary production (extraction) (2012-2021).

35 Iridium

35.1 Reserves

Data source(s): JRC assessment based on background data from (Mudd *et al.*, 2018) and (Heraeus - SFA Oxford, 2020).

Reference Year: 2015.

Notes: -

Latest RMIS Dashboard update: August 2021.

35.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS myb-PGM, 2023).

Notes: Production figures indicate the location of initial mining (rather than the location of subsequent refining).

Latest RMIS Dashboard update: August 2023.

35.3 Production of refined/processed materials

Data are not available for secondary supply; therefore, the total annual production cannot be determined.

35.4 Applications

Geographical scope: World.

Data source(s): (BRGM, 2020a), data from SFA Oxford.

Reference Year: 2019

Notes: Data demonstrate end-use demand by industrial segment. Information on the European or the EU demand is not available. It is assumed that the global distribution is also applicable to the EU.

Latest RMIS Dashboard update: August 2021.

35.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely assigned to gold ores and concentrates in RMIS database.

35.6 Trade of refined/processed materials

Coverage: Trade data pertain to HS 711041 covering not only iridium and its alloys (unwrought and powders), but also ruthenium (and osmium). The trade of iridium compounds (HS 284390) is not included as compounds of other metals are also classified within the heading. Semi-manufactured forms of iridium are not taken into account.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes:

Relevant Harmonized System (HS) Codes: to HS 711041 Metals; iridium, osmium, ruthenium, unwrought or in powder form.

Latest RMIS Dashboard update: August 2021.

35.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC estimate based on (UNEP, 2011).

Reference Year: N/A.

Notes: Available data for the calculation of iridium's EOL-RIR are insufficient. A rough estimate for the EOL-RIR is 16% (ranging from 12% to 20%), derived according with the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). The estimated EOL-RIR is obtained from the median recycled content (RC) and the median old scrap ratio (OSR) of the ranges reported by (UNEP, 2011) (80-100% for the OSR and 15-20% for the RC). The derived value of the indicator is expected to be applicable also in the EU.

Latest RMIS Dashboard update: August 2021.

35.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is assumed 100% as there is no mine production in the EU. The EU Sourcing (EU supply) for the extraction stage (primary materials) is derived from (SCREEN2, 2023) and (European Commission, 2023). It represents the average global supply in 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is calculated on the basis of primary (mining) production (2012-2021).

36 Iron & Steel

36.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

36.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data pertain to the production of iron ore. The Chinese production is adjusted with information from (WorldSteel, 2022) so that the Fe content of iron ore is comparable to world average.

Latest RMIS Dashboard update: August 2023.

36.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2022.

Data source(s): (WorldSteel, 2023).

Notes: The figures relate to crude steel. The output of crude steel comprises production from scrap. Data include all qualities (carbon, stainless, and other alloy).

Latest RMIS Dashboard update: August 2023.

36.4 Applications

Geographical scope: EU.

Data source(s): (Eurofer, 2022).

Reference Year: 2021.

Notes: The distribution of demand corresponds to finished steel demand per end-use sector.

Latest RMIS Dashboard update: August 2023.

36.5 Trade of primary materials

Coverage: Aggregate of trade flows in headings HS 260111 and HS 260112, which cover the trade of iron ore (hematite, limonite, magnetite, siderite, manganiferous iron ore) in coarse form and the trade of pellets, briquettes and sinter of iron ore, respectively.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Oman's, Bahrain's, Sierra Leone's, Iran's, Mozambique's and Ukraine's trade is derived from declared imports and exports by reporting partners. Also exports of producers that do not report in international trade

statistics are derived with the same approach of 'mirror exports' i.e. Algeria, Bolivia, Bosnia Herzegovina, Colombia, Lao People's Dem. Rep., Liberia, and Venezuela.

Relevant Harmonized System (HS) Codes: HS 260111 *Iron ores and concentrates; non-agglomerated*; HS 260112 *Iron ores and concentrates; agglomerated (excluding roasted iron pyrites)*.

Latest RMIS Dashboard update: August 2021

36.6 Trade of refined/processed materials

Coverage: Aggregate of HS headings comprising pig iron, direct reduced iron, sponge iron, powders and crude steel (non-alloy steel, alloy steel, stainless steel). Downstream finished steel products are excluded (long, flat).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes:

HS 720110 *Iron; non-alloy pig iron containing by weight 0.5% or less of phosphorus, in pigs, blocks or other primary forms;*

HS 720120 *Iron; non-alloy pig iron containing by weight more than 0.5% of phosphorus, in pigs, blocks or other primary forms;*

HS 720150 *Iron; alloy pig iron, spiegeleisen, in pigs, blocks or other primary forms;*

HS 720310 *Ferrous products; obtained by direct reduction of iron ore, in lumps, pellets or similar forms;*

HS 720390 *Ferrous products; spongy ferrous products and iron having a minimum purity by weight of 99.94%, in lumps, pellets or similar forms;*

HS 720510 *Iron or steel, pig iron, spiegeleisen; granules thereof;*

HS 720521 *Alloy steel powders;*

HS 720529 *Iron or steel, pig iron, spiegeleisen; powders (excluding alloy steel);*

HS 720610 *Iron or non-alloy steel; ingots (excluding iron of heading no. 7203);*

HS 720690 *Iron or non-alloy steel; primary forms (excluding ingots and iron of heading no. 7203);*

HS 720711 *Iron or non-alloy steel; semi-finished products of iron or non-alloy steel; containing by weight less than 0.25% of carbon, of rectangular (including square) cross-section, width less than twice thickness;*

HS 720712 *Iron or non-alloy steel; semi-finished products of iron or non-alloy steel; containing by weight less than 0.25% of carbon, of rectangular (other than square) cross-section;*

HS 720719 *Iron or non-alloy steel; semi-finished products of iron or non-alloy steel, containing by weight less than 0.25% of carbon, other than rectangular or square cross-section;*

HS 720720 *Iron or non-alloy steel; semi-finished products of iron or non-alloy steel, containing by weight 0.25% or more of carbon;*

HS 721810 *Steel, stainless; ingots and other primary forms;*

HS 721891 *Steel, stainless; semi-finished products, of rectangular (other than square) cross-section;*

HS 721899 *Steel, stainless; semi-finished products, other than of rectangular cross-section;*

HS 722410 *Steel, alloy; ingots and other primary forms;*

HS 722490 *Steel, alloy; semi-finished products.*

Latest RMIS Dashboard update: August 2021.

36.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (Passarini *et al.*, 2018).

Reference Year: 2015.

Notes: Following the methodology outlined in (Peiró *et al.*, 2018), the indicator is calculated from background data provided by the source.

Latest RMIS Dashboard update: August 2021.

36.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The calculation of CAGR is based on crude steel production (2013-2022).

37 Kaolin

37.1 Reserves

Country-specific data are not available.

37.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Available production statistics refer to kaolin (China-clay), whether natural for direct use, beneficiated or washed. Kaolinitic clays (ball and plastic clays) may not be included in the dataset.

Latest RMIS Dashboard update: August 2023.

37.3 Production of refined/processed materials

Not applicable. Calcined kaolin is considered as primary raw material.

37.4 Applications

Geographical scope: EU28.

Data source(s): (IMA Europe, 2018)(IMA Europe, 2019).

Reference Year: 2017.

Notes: Data reflect kaolin's demand by end use.

Latest RMIS Dashboard update: August 2021.

37.5 Trade of primary materials

Coverage: Data reflect HS 250700 that comprises kaolin (calcined or not) and other kaolinitic clays. Kaolinitic sand classified within HS 250590 is not included, as well other clays (fireclay under HS 250830 and various common clays classified in HS 250840).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, and Guyana's trade data for 2019 is derived from reported imports and exports by trade partners. For Ukraine, 'mirror' exports are preferred over reported exports due to significant differences in quantity (about 950 kt are reported as exports by Ukraine, while, according to its partners data, the volume of imports from Ukraine was 2,100 kt). Unit values derived from reported exports are used to estimate Ukraine's export value. Data for Egypt in 2019 are obtained from (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 250590 *Kaolin and other kaolinic clays; whether or not calcined*.

Latest RMIS Dashboard update: August 2021.

37.6 Trade of refined/processed materials

Not applicable.

37.7 End-of-Life Recycling Input Rate (EOL-RIR)

Absence of data for the calculation of the EOL-RIR of kaolin in the EU.

37.8 Other Indicators

- ✓ The EU Import Reliance for extraction (primary materials) is sourced from (European Commission, 2023) and refers to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

38 Krypton

38.1 Reserves

Not applicable. Krypton is only present in the air in trace amounts and is recovered as by-product in air separation units.

38.2 Production of primary materials

Not applicable. Krypton is obtained from air in air separation units by fractional separation of liquefied air.

38.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2017.

Data source(s): (Elsner, 2018)

Notes: Publicly-available and country-specific data on the production of krypton gas are insufficient to present the global distribution by countries.

Latest RMIS Dashboard update: August 2023.

38.4 Applications

Geographical scope: World.

Data source(s): (Elsner, 2018).

Reference Year: 2017.

Notes: Data reflect the distribution of demand by end uses. EU-specific information is unavailable.

Latest RMIS Dashboard update: August 2023.

38.5 Trade of primary materials

Not applicable.

38.6 Trade of refined/processed materials

No data are available in international trade statistics. Available data do not have the required level of disaggregation to identify trade flows of krypton, which is reported in HS 280429 together with other rare gases.

38.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available to allow the calculation/estimation of the indicator.

38.8 Other Indicators

✓ The calculation of CAGR concerns the production of krypton between 2008 and 2017.

39 Lanthanum

39.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

39.2 Production of primary materials

Coverage: World countries (2021), World total (2000-2020).

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and lanthanum content in REE minerals of each operating mine.

Notes: The mine production of lanthanum is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

39.3 Production of refined/processed materials

The collected information is not publicly available.

39.4 Applications

Geographical scope: Europe

Data source(s): (Wood Mackenzie, 2022a)

Reference Year: 2021

Notes: Data associate with end-use demand.

Latest RMIS Dashboard update: August 2023.

39.5 Trade of primary materials

There are no specific codes to lanthanum in international trade statistics (HS). Lanthanum's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

39.6 Trade of refined/processed materials

There are no specific codes to lanthanum in international trade statistics (HS). Lanthanum's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

39.7 End-of-Life Recycling Input Rate (EOL-RIR)

Information to calculate or estimate the EOL-RIR in the EU is scarce.

39.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and associates to all forms of lanthanum. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

40 Lead

40.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

40.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: Mine production of lead.

Latest RMIS Dashboard update: August 2023.

40.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures relate to both primary and secondary production of refined lead and include the lead content of antimonial lead.

Latest RMIS Dashboard update: August 2023.

40.4 Applications

Geographical scope: Europe.

Data source(s): (Oakdene Hollins, 2017a).

Reference Year: 2015.

Notes: Data refer to first & end uses of lead in 13 EU countries + UK + Norway (accounting for >90% of lead use in the EU and EFTA region).

Latest RMIS Dashboard update: August 2021.

40.5 Trade of primary materials

Coverage: Data comprise the headings HS 260700 (lead ores and concentrates) and HS 262029 (Pb-containing metallurgical residues used in industry either for the extraction of lead, or as a basis for the manufacture of its chemical compounds). The trade of lead contained as co- or by-product in ores, concentrates and metallurgical residues of other metals (e.g. copper, zinc, silver) is not taken into account.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from Bolivia, Cuba, Myanmar and Tajikistan are derived from the declared imports from destination countries. Iran's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 260700 *Lead ores and concentrates*; HS 262029 *Ash & residues (excl. from the manufacture of iron/steel) containing lead (excl. of 2620.21)*.

Latest RMIS Dashboard update: August 2021.

40.6 Trade of refined/processed materials

Coverage: The product aggregate of HS 282410, HS 282490, HS 780110, HS 780191, HS 780199 and HS 780420 is employed for refined/processed lead. The headings considered in the aggregate cover lead monoxide (litharge), lead oxides (red lead and orange lead), unwrought lead at its different degrees of purity (from impure bullion or argentiferous lead to electrolytically refined lead), unwrought antimonial lead, cast anodes for electrolytic refining and cast rods for further processing, and lead powders and flakes. The trade of other lead chemical compounds such as lead sulphide and carbonate and the trade of lead-containing alloys of other metals (e.g. tin alloys) is not included due to the restricted detail of the relevant HS headings. Wrought lead products are excluded (HS 780411; HS 780419; HS 780600).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners. Equally, the trade flows of Bolivia, Honduras, Dominican Republic, Sri Lanka, Dominican Republic, DPR Korea, Algeria, Costa Rica, Lebanon, Venezuela, and Bangladesh are approximated from imports/exports reported by their trade partners.

Relevant Harmonized System (HS) Codes: HS 282410 *Lead; lead monoxide (litharge, massicot)*; HS 282490 *Lead oxides; n.e.c. in heading no. 2824*; HS 780110 *Lead; unwrought, refined*; HS 780191 *Lead; unwrought, unrefined, containing by weight antimony as the principal other element*; HS 780199 *Lead; unwrought, unrefined, not containing by weight antimony as the principal other element*; HS 780420 *Lead; powders and flakes*.

Latest RMIS Dashboard update: August 2021.

40.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): JRC calculation based on (USGS myb-Pb, 2022).

Reference Year: 2019.

Notes: The EOL-RIR is estimated from the ratio "secondary refined lead production/total refined lead production" based on data reported by the source. The output of secondary lead is multiplied by the average Old Scrap Ratio (OSR) for lead reported by (UNEP, 2011) to account for new scrap that may contribute to secondary production.

Latest RMIS Dashboard update: August 2023.

40.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to the production of refined lead (2012-2021).

41 Limestone

41.1 Reserves

World reserves of limestone suitable for lime and cement manufacture are very large. The global distribution is not available.

41.2 Production of primary materials

Production data with a global coverage are not available.

41.3 Production of refined/processed materials

Production data with a global coverage are not available.

41.4 Applications

Geographical scope: EU.

Data source(s): Expert judgment in (European Commission, 2020b) by (IMA Europe, 2019).

Reference Year: N/A.

Notes: The definition of 'Limestone' is very broad covering product categories such as such limestone flux for industrial uses and agriculture, limestone for cement, lime, (precipitated) calcium carbonate, chalk. Robust data for the distribution of demand of each product category are not available.

Latest RMIS Dashboard update: August 2023.

41.5 Trade of primary materials

Coverage: The trade of calcareous materials (e.g. chalk, limestone flux) used for industrial and/or construction applications is considered.

Data source(s): (WITS, 2023)

Reference Year: 2021

Notes: -

Relevant Harmonized System (HS) Codes: HS 250900 *Chalk*; HS 251741 *Granules, chippings & powder, of marble, whether/not heat-treated*; HS 252100 *Limestone flux; limestone & other calcareous stone, of a kind used for the manufacture of lime/cement*.

Latest RMIS Dashboard update: August 2023

41.6 Trade of refined/processed materials

Coverage: The aggregate of trade flows of lime (construction & industrial), cement clinker, cement and calcium carbonate is considered to represent the trade of processed products of limestone.

Data source(s): (WITS, 2023)

Reference Year: 2021

Notes: -

Relevant Harmonized System (HS) Codes: HS 252210 Quicklime; HS 252220 Slaked lime; HS 252230 Hydraulic lime, other than calcium oxide & hydroxide of 28.25; HS 252310 Cement clinkers; HS 252321 White cement, whether/not artificially coloured; HS 252329 Portland cement (excl. white cement, whether/not artificially coloured), whether/not coloured; HS 252330 Aluminous cement, whether/not coloured/in the form of clinkers; HS 252390 Hydraulic cements (e.g., slag cement, supersulphate cement), whether/not coloured/in the form of clinkers (excl. cement clinkers, Portland cement & aluminous cement); HS 283650 Calcium carbonate.

Latest RMIS Dashboard update: August 2023

41.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data in order to calculate the indicator or make an informed estimate are insufficient.

41.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).

42 Lithium

42.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

42.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: -

Latest RMIS Dashboard update: August 2023.

42.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2020.

Data source(s): (JRC, 2021) .

Notes: Production statistics of refined lithium compounds are not published. The data shown are a JRC estimate, based on several sources and information, of the global output of lithium chemicals (carbonate, hydroxide, chloride) via chemical conversion of lithium concentrates and brine processing at integrated refineries.

Latest RMIS Dashboard update: August 2023.

42.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The distribution of demand relates to products 'used' in the EU, i.e. to end uses.

Latest RMIS Dashboard update: August 2021.

42.5 Trade of primary materials

There is no individual HS code that contains only lithium primary materials. Trade of lithium minerals is classified within HS 253090, which is not exclusively associated with lithium minerals as it linked to a variety of raw materials.

42.6 Trade of refined/processed materials

Coverage: Aggregate of HS 282520 and HS 283691, covering lithium carbonate, lithium hydroxide and synthetic lithium oxide. Lithium metal is not included as the relevant heading (HS 280519) contains several metals.

Data source(s): (WITS, 2021)

Reference Year: 2019

Notes: Argentinian exports were derived from 'mirror' imports in (UN Comtrade, 2022). Iran's and Ukraine's trade flows are also derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 282520 *Lithium oxide and hydroxide*; HS 283691 *Lithium carbonates*

Latest RMIS Dashboard update: August 2021.

42.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The indicator is calculated from background data reported by the source in accordance with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

42.8 Other Indicators

- ✓ The EU Sourcing (EU supply) for processing (refined materials), and the Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

43 Light Rare Earth Elements (LREE)

43.1 Reserves

No data have been compiled. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

43.2 Production of primary materials

Coverage: World countries (2021), World total (2000-2020).

Reference Year: 2021.

Data source(s): JRC elaboration based on the total REE production (see 67.2).

Notes: The LREE group comprises lanthanum, cerium, praseodymium, neodymium and samarium. Figures are the aggregate of the estimated production of each LREE.

Latest RMIS Dashboard update: August 2023.

43.3 Production of refined/processed materials

Coverage: World countries

Reference Year: 2021

Data source(s): (Wood Mackenzie, 2022b)

Notes: Data aggregate the estimated production of refined lanthanum, cerium, praseodymium, neodymium and samarium. Recycling is included.

Latest RMIS Dashboard update: August 2023.

43.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021

Notes: Data correspond to end-use demand.

Latest RMIS Dashboard update: August 2023.

43.5 Trade of primary materials

Data are not available in the HS nomenclature (See section 67.5).

43.6 Trade of refined/processed materials

Data are not available in the HS nomenclature (See section 67.6).

43.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data are incomplete in order to allow the calculation or estimation of the EOL-RIR in the EU. The EOL-RIR globally is estimated to be 14% (as the ratio of post-consumer recycling to global supply) in 2021 on

the basis of data sourced from (Wood Mackenzie, 2022a); nevertheless, it is considered that the figure is not applicable to the EU.

43.8 Other Indicators

- ✓ The Import Reliance indicators for extraction and processing (primary and refined materials, respectively) are acquired from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production from 2012 to 2021.

44 Lutetium

44.1 Reserves

No data have been compiled. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

44.2 Production of primary materials

Coverage: World countries (2021), World total (2000-2020).

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and lutetium content in REE minerals of each operating mine.

Notes: The mine production of lutetium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

44.3 Production of refined/processed materials

The gathered information is not accessible in the public domain.

44.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data refer to lutetium's demand by end use.

Latest RMIS Dashboard update: August 2023.

44.5 Trade of primary materials

There are no specific codes to lutetium in international trade statistics (HS). Their trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

44.6 Trade of refined/processed materials

There are no specific codes to lutetium in international trade statistics (HS). Its trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

44.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to calculate the EOL-RIR in the EU are missing.

44.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and relates to all forms of lutetium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used are provided by (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

45 Magnesite

45.1 Reserves

Data source(s): (USGS, 2024).

Reference Year: 2022.

Notes: Reserves are defined according to the USGS classification system (USGS, 1980).

Latest RMIS Dashboard update: February 2024.

45.2 Production of primary materials

Coverage: World.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Background information from additional sources suggests that data do not include the production of magnesium chloride and other magnesium-bearing compounds recovered from seawater or brines.

Latest RMIS Dashboard update: August 2023.

45.3 Production of refined/processed materials

Production data on processed magnesia compounds (caustic-calcined, dead-burned and fused magnesia) are not available.

45.4 Applications

Geographical scope: World

Data source(s): (Euromines, 2020), data from Industrial Minerals Forum and Research (IMFORMED).

Reference Year: Average over 2012-2016.

Notes: Data relate to the main end uses of magnesia and it is presumed to be also applicable in the EU.

Latest RMIS Dashboard update: August 2021.

45.5 Trade of primary materials

Coverage: Data refer to HS 251910 covering crude magnesite.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Brazil, Australia and Saudi Arabia are derived from reported imports by country destinations in (UN Comtrade, 2022). Mozambique's, Iran's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 251910 *Magnesium carbonate (magnesite); natural*

Latest RMIS Dashboard update: August 2021.

45.6 Trade of refined/processed materials

Coverage: Data from HS 251990 are used. The heading covers the various types of magnesia (caustic-calcined, dead-burned and fused).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's and Ukraine's trade for 2019 is derived from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 251990 *Magnesia, fused or dead-burned (sintered); whether or not containing small quantities of other oxides added before sintering, other magnesium oxide, whether or not pure, (not natural magnesium carbonate).*

Latest RMIS Dashboard update: August 2021.

45.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

45.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are acquired from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ Country-specific data related to production capacity in 2021 are used as a proxy for the calculation of the HHI index of refined production;
- ✓ The CAGR refers to primary (mining) production (2012-2021).

46 Magnesium

46.1 Reserves

See section 45.1 for magnesite reserves, one of the raw materials used for magnesium production.

46.2 Production of primary materials

Dolomite (calcium–magnesium carbonate), magnesite (magnesium carbonate), and brines (magnesium chloride) are the most commonly used mineral resources for the metallurgical extraction of magnesium. Data on the quantities of the above minerals destined for the production of magnesium metal are not available. Magnesite producing countries are presented in the Raw Material *Magnesite*.

46.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: Data refer to magnesium metal production from primary sources. Data for Russia, Ukraine and Kazakhstan are collected from (USGS myb-Mg, 2023) and represent the magnesium used within the process of titanium sponge production.

Latest RMIS Dashboard update: August 2023.

46.4 Applications

Geographical scope: EU28.

Data source(s): (Oakdene Hollins, 2017b).

Reference Year: 2012.

Notes: The reported figures are associated with end-use demand.

Latest RMIS Dashboard update: August 2021.

46.5 Trade of primary materials

No data are available for the trade of magnesium's primary raw materials. Primary magnesium metal is produced from dolomite (85%), carnallite and Mg-rich brines (15%) (Schmitz, 2019). The HS nomenclature does not provide the required detail to distinguish the flows of minerals destined for magnesium primary production, among their other uses.

46.6 Trade of refined/processed materials

Coverage: Data involve the aggregate of HS 810411, HS 810419 and HS 810430 covering unwrought magnesium, and magnesium raspings, turnings, granules and powders. The trade of magnesium compounds is excluded (hydroxide, chloride, sulphate etc.).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's and Ukraine's trade for 2019 is deduced from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 810411 *Magnesium; unwrought, containing at least 99.8% by weight of magnesium*; HS 810419 *Magnesium; unwrought, containing less than 99.8% by weight of magnesium*; HS 810430 *Magnesium; raspings, turnings and granules, graded according to size, powders*.

Latest RMIS Dashboard update: August 2021.

46.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): (Oakdene Hollins, 2017b).

Reference Year: 2012.

Notes: Data from the (Oakdene Hollins, 2017b) study are prioritised over (BIO by Deloitte, 2015) due to a more precise consideration of specific streams.

Latest RMIS Dashboard update: August 2021.

46.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to the production magnesium metal between 2012 and 2021.

47 Manganese

47.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023

47.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Data concern the production of manganese ore.

Latest RMIS Dashboard update: August 2023.

47.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2020.

Data source(s): (USGS myb-ferroalloys, 2023).

Notes: Data present the aggregated production of manganese ferroalloys, consisting of ferro-manganese (FeMn) and silico-manganese (SiMn).

RMIS Dashboard update: August 2023.

47.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020)

Reference Year: 2016.

Notes: The distribution of demand relates to products 'used' in the EU, i.e. to end uses.

Latest RMIS Dashboard update: August 2021.

47.5 Trade of primary materials

Coverage: Data are linked to HS 260200 covering manganese ore and concentrates, including manganiferous iron ore. Ferruginous manganese ores and concentrates with a Mn content of less than 20% (dry weight) are not covered by HS 260220 but by iron ores and concentrates (HS 2601). The trade of pyrolousite for use in dry batteries is not included as it is classified under HS heading 253090 of inadequate level of detail.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from Australia, Gabon, Mexico, Myanmar and other countries are derived from the declared imports by destination countries. Mozambique's, Guyana's, Iran's, Oman's and Ukraine's trade for 2019 is determined from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 260200 *Manganese ores and concentrates, including ferruginous manganese ores and concentrates with a manganese content of 20% or more, calculated on the dry weight*

Latest RMIS Dashboard update: August 2021.

47.6 Trade of refined/processed materials

Coverage: The trade of refined/processed manganese is determined by the product aggregate of HS 282010, HS 282090, HS 284161, HS 284169, HS 720211, HS 720219, HS 720230 and HS 811100. The product aggregate considered covers manganese dioxide and other manganese oxides, permanganates, manganates and manganites, high-carbon ferromanganese (HCFMn), refined ferromanganese (MCFMn) and low-carbon ferromanganese (LCSiMn), ferrosilicomanganese and unwrought manganese (Mn articles included in the relevant HS heading). Pig iron alloyed with manganese (spiegeleisen) is excluded (HS 720150).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Gabon exports are acquired from reported imports by destination countries. Ukraine's and Iran's trade for 2019 is determined from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 282010 *Manganese dioxide*; HS 282090 *Manganese oxides; excluding manganese dioxide*; HS 284161 *Salts; of oxometallic or peroxometallic acids, manganites, manganates and permanganates, potassium permanganate*; HS 284169 *Salts; of oxometallic or peroxometallic acids, manganites, manganates and permanganates, other than potassium permanganate*; HS 720211 *Ferro-manganese, containing by weight >2% of carbon, in granular/powder form*; HS 720219 *Ferro-alloys; ferro-manganese, containing by weight 2% or less of carbon*; HS 720230 *Ferro-alloys; ferro-silicomanganese*; HS 811100 *Manganese; articles thereof, including waste and scrap*.

Latest RMIS Dashboard update: August 2021.

47.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source in accordance with the methodology defined by (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

47.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR is associated with the output of manganese ore between 2012 and 2021.

48 Mica

48.1 Reserves

No figures are displayed because available data are limited and have a partial country coverage.

48.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source: (BGS, 2023).

Notes: Data relate to all grades of mica (crude, concentrates, ground, scrap & waste) and minerals of the mica group (e.g. biotite). Data for Austria, Nigeria and Peru are gathered from (USGS myb-mica, 2022).

Latest RMIS Dashboard update: August 2023.

48.3 Production of refined/processed materials

No data are available for processed products of mica.

48.4 Applications

Geographical scope: United States.

Data source: (USGS myb-mica, 2022).

Reference Year: 2021.

Notes: No data are available for the breakdown of mica's demand worldwide or in the EU. Data show the breakdown of consumption by end uses, which is assumed to also apply in the EU.

Latest RMIS Dashboard update: August 2023.

48.5 Trade of primary materials

Coverage: Data reflect the trade of unworked (crude) mica, split block mica, mica splittings, flake mica and mica waste.

Data source: (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes: HS 252510 *Crude mica & mica rifted into sheets/splittings*; HS 252520 *Mica powder*; HS 252530 *Mica waste*.

Latest RMIS Dashboard update: August 2023.

48.6 Trade of refined/processed materials

Coverage: Figures show the trade of worked mica products made from mica sheets or splittings.

Data source: (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes: HS 681410 *Plates, sheets and strips of agglomerated or reconstituted mica, whether or not on a support of paper, paperboard or other materials, in rolls or merely cut into square or rectangular shapes*; HS 681490 *Worked mica and articles of mica (excl. electrical insulators, insulating fittings, resistors and capacitors, protective goggles of mica and their glasses, mica in the form of Christmas tree decorations, and plates, sheets and strips of agglomerated or reconstituted mica, whether or not on supports)*.

Latest RMIS Dashboard update: August 2023.

48.7 End-of-Life Recycling Input Rate (EOL-RIR)

There are no data to calculate the EOL-RIR in the EU.

48.8 Other Indicators

- ✓ No data are presented for the Import Reliance and the EU Sourcing as mica was not among the candidate materials in the 2023 EU assessment of Critical raw materials (European Commission, 2023);
- ✓ The CAGR refers to primary (mining) production between 2012 and 2021.

49 Molybdenum

49.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

49.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Data indicate the mine production of molybdenum.

Latest RMIS Dashboard update: August 2023.

49.3 Production of refined/processed materials

Coherent data on a worldwide scale are not available for all refined forms of molybdenum (ferromolybdenum, molybdenum oxides & hydroxides, molybdenum metal) to enable the aggregation of production.

49.4 Applications

Geographical scope: World.

Data source(s): (IMO, 2023).

Reference Year: 2021.

Notes: First uses of molybdenum. Figures relate to molybdenum produced from mined ore, not to scrap material recycled by chemical processes or remelting. EU-related data are not available. It is supposed that the figures are also applicable for the EU.

Latest RMIS Dashboard update: August 2023.

49.5 Trade of primary materials

Coverage: Data are the aggregate of HS 261310 and HS 261390 comprising of molybdenite concentrates (molybdenite and wulfenite) and technical molybdic oxide (MTO) obtained by roasting molybdenite concentrates (intermediate product). Molybdenite concentrates for non-metallurgical uses are not included as they are classified under the highly aggregated heading HS 253090 *Mineral substances; n.e.c. in chapter 25*.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from Mexico are derived from the declared imports from destination countries. Iran's, and Ukraine's trade for 2019 is obtained from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 261310 *Molybdenum ores and concentrates; roasted*; HS 261390 *Molybdenum ores and concentrates; other than roasted*.

Latest RMIS Dashboard update: August 2021.

49.6 Trade of refined/processed materials

Coverage: To reflect the global trade of refined/processed products of molybdenum, the aggregate of headings HS 282570, HS 284170, HS 720270, HS 810210 and HS 810294 is used. The product aggregate includes molybdenum compounds (oxides & hydroxides, molybdates), ferro-molybdenum, molybdenum powders, and unwrought molybdenum metal in compact forms. The trade of molybdenum scrap, and molybdenum bars and rods obtained by sintering is also contained within in the product aggregate.

Data source(s): (WITS, 2021)

Reference Year: 2019

Notes: Iran's, Mozambique's and Ukraine's trade for 2019 is deduced from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 282570 *Molybdenum oxides and hydroxides*; HS 284170 *Salts; molybdates*; HS 720270 *Ferro-alloys; ferro-molybdenum*; HS 810210 *Molybdenum; articles thereof, including waste and scrap, powders*; HS 810294 *Molybdenum; unwrought, including bars and rods obtained simply by sintering*.

Latest RMIS Dashboard update: August 2021.

49.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC elaboration based on data in (IMOA, 2013) and the global primary production for the reference year reported by (WMD, 2023).

Reference Year: 2011.

Notes: Data used for old scrap include Mo units that come from a different scrap source than the product for which it is intended. Revert and new scrap was excluded from the calculation. It is assumed that the indicator's value is also applicable for the EU.

Latest RMIS Dashboard update: August 2023.

49.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for the extraction stage (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR relates to primary (extraction) production in 2012-2021.

50 Natural cork

50.1 Reserves

Data source(s): (APCOR, 2021)

Reference Year: Varies per country. The background data used by the source for each country are: Portugal: Inventário Florestal Nacional (IFN6), 2019; Spain: MARM, 2012; Italy: FAO, 2005; France: IM Liège, 2005; Morocco: HCEF Maroc, 2011; Algeria: EFI, 2009; Tunisia: Ben Jamaa, 2011.

Notes: The area covered by Cork oak forests worldwide is considered to represent reserves.

Latest RMIS Dashboard update: October 2022

50.2 Production of primary materials

Coverage: World countries.

Reference Year: 2020.

Data source(s): (APCOR, 2021).

Notes: The production figures are average estimates of extracted raw natural cork.

Latest RMIS Dashboard update: October 2022.

50.3 Production of refined/processed materials

Data for processed forms of natural cork unavailable at the global level.

50.4 Applications

Geographical scope: World

Data source(s): (APCOR, 2021).

Reference Year: 2020

Notes: The breakdown of demand by end use sector is based on the structure of Portuguese sales worldwide. Data for the EU are not available, but it is assumed that the figures are also representative of the EU demand.

Latest RMIS Dashboard update: October 2022.

50.5 Trade of primary materials

Coverage: Aggregate of HS 450110 and HS 450190 of natural cork raw materials, as well as of HS 450200 that entails a higher degree of natural cork preparation for the manufacture of downstream products.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Import data for some countries that are missing from the WITS dataset (e.g. Ukraine) are obtained from 'mirror data', i.e. exports declared by reporting partners in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 450110 *Cork; natural cork, raw or simply prepared*; HS 450190 *Cork; waste cork, crushed, granulated or ground cork*; HS 450200 *Cork; natural cork, debarked or roughly squared, or in rectangular (including square) blocks, plates, sheets or strip, (including sharp-edged blanks for corks or stoppers)*.

50.6 Trade of refined/processed materials

Several products made from natural cork such as cork stoppers, articles made of natural cork, agglomerated cork products etc., are classified as semi-finished or finished products (downstream in the value chain).

50.7 End-of-Life Recycling Input Rate (EOL-RIR)

Recent and robust data for the EOL-RIR of natural cork are not available. According to data from (Amorim, 2008), 8% of the raw extracted cork used by a Portuguese producer of cork stopper was recovered for energy use in 2005.

50.8 Other Indicators

- ✓ The EU Sourcing (EU supply) for extraction (primary materials) is derived from (European Commission, 2023) and (SCREEN2, 2023) and refers to the average 2016-2020. The Import Reliance for extraction (primary materials) is acquired from (European Commission, 2023) and relates to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary production (extraction) in 2013-2020.

51 Natural graphite

51.1 Reserves

Data source(s): JRC elaboration based on data from (S&P, 2022) and (Robinson *et al.*, 2017).

Reference Year: 2021.

Notes: Data from two different sources are analysed in order to achieve a more comprehensive coverage of the world's graphite reserves (flake, amorphous and vein).

Latest RMIS Dashboard update: August 2023.

51.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Production data concern all forms of mined natural graphite (flake, amorphous, vein). Data for China are obtained from (USGS myb-graphite, 2023). Data for Pakistan and Tanzania are collected from (BGS, 2023). Data for Uzbekistan are derived from (USGS myb-graphite, 2023).

Latest RMIS Dashboard update: August 2023.

51.3 Production of refined/processed materials

Production statistics concerning the refined forms of natural graphite (e.g. spherical graphite) are not readily available.

51.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The distribution of demand relates to products 'used' in the EU, i.e. to end uses.

Latest RMIS Dashboard update: August 2021.

51.5 Trade of primary materials

Coverage: Data correspond to the product aggregate of HS 250410 and HS 250490. Intermediate and processed forms of natural graphite, i.e. when it has been heat treated to remove impurities, remain in these headings. According to (Zhou and Damm, 2020), HS 250410 corresponds to flake graphite and HS 250490 to amorphous graphite.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Trade flows of Iran, Mozambique, and Ukraine for 2019 are deduced from reported imports and exports by trade partners. Also, exports of Sri Lanka and Tanzania for 2019 are derived from declared imports by destination countries.

Relevant Harmonized System (HS) Codes: HS 250410 *Graphite; natural, in powder or in flakes*; HS 250490 *Graphite; natural, in other forms, excluding powder or flakes*

Latest RMIS Dashboard update: August 2021.

51.6 Trade of refined/processed materials

No specific codes exist in the HS nomenclature for refined/processed forms of natural graphite. Spherical graphite may be reported under heading HS 250410, which is allocated to primary materials of natural graphite. Colloidal and semi-colloidal graphite (HS 380120) are excluded as they are assessed being downstream products.

51.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020)

Latest RMIS Dashboard update: August 2021.

51.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR related to natural graphite mine production in 2012-2021.

52 Natural rubber

52.1 Reserves

Data source(s): (FAOSTAT, 2023b).

Reference Year: 2020.

Notes: The area harvested (measured in hectares) is assumed an equivalent indicator for reserves.

Latest RMIS Dashboard update: August 2023.

52.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (FAOSTAT, 2023b).

Notes: Data relate to the production of natural rubber in primary forms.

Latest RMIS Dashboard update: August 2023.

52.3 Production of refined/processed materials

No publicly available data exist for the production of natural rubber in processed forms.

52.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The distribution of demand relates to products 'used' in the EU, i.e. to end uses.

Latest RMIS Dashboard update: August 2021.

52.5 Trade of primary materials

Coverage: The trade of natural rubber's primary materials is described by HS 400110 comprising natural rubber latex, whether or not pre-vulcanised.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Guyana's, Iran's, and Ukraine's trade are derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 400110 Rubber; natural rubber latex, whether or not pre-vulcanised, in primary forms or in plates, sheets or strip.

Latest RMIS Dashboard update: August 2021.

52.6 Trade of refined/processed materials

Coverage: The trade of natural rubber's processed materials is provided by the aggregate of HS 400121, HS 400122 and HS 400129. These headings address the trade of processed latex into different natural rubber products and grades such as ribbed smoked sheets.

Data source(s): (WITS, 2021)

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 400121 *Rubber; natural (excluding latex), in smoked sheets*; HS 400122 *Rubber; technically specified natural rubber (TSNR), in primary forms or in plates, sheets or strip (excluding latex and smoked sheets)*; HS 400129 *Rubber; natural (excluding latex, technically specified natural rubber and smoked sheets), in primary forms or in plates, sheets or strip*.

Latest RMIS Dashboard update: August 2021.

52.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2017.

Notes: The indicator is calculated from background data provided by the source in line with the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020)

Latest RMIS Dashboard update: August 2021.

52.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary production (extraction).

53 Neodymium

53.1 Reserves

No data have been gathered. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

53.2 Production of primary materials

Coverage: World countries

Reference Year: 2021

Data source(s): JRC analysis based on the total REE production and neodymium content in REE minerals of each operating mine.

Notes: The mine production of neodymium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

53.3 Production of refined/processed materials

The collected information is not publicly available.

53.4 Applications

Geographical scope: Europe

Data source(s): (Wood Mackenzie, 2022a)

Reference Year: 2021

Notes: Data reflect neodymium's end-use demand.

Latest RMIS Dashboard update: August 2023.

53.5 Trade of primary materials

There are no specific codes to neodymium in international trade statistics (HS). Neodymium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

53.6 Trade of refined/processed materials

There are no specific codes to neodymium in international trade statistics (HS). Neodymium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

53.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2013.

Notes: The indicator is derived from background data provided by the source according to the methodology outlined in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

53.8 Other Indicators

- ✓ The EU Sourcing (EU supply) originates from (SCREEN2, 2023) and associates to all forms of neodymium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

54 Neon

54.1 Reserves

Not applicable. Neon is only present in the air in trace amounts and is recovered as by-product in air separation units.

54.2 Production of primary materials

Not applicable. Neon is obtained from air in air separation units by fractional separation of liquefied air.

54.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2017.

Data source(s): (Elsner, 2018) .

Notes: Publicly-available and country-specific data of the production of neon gas are insufficient for having the global distribution by countries.

Latest RMIS Dashboard update: August 2023.

54.4 Applications

Geographical scope: World.

Data source(s): (Elsner, 2018) .

Reference Year: 2017.

Notes: Data relate to the distribution of demand by end uses. EU-specific information is missing.

Latest RMIS Dashboard update: August 2023.

54.5 Trade of primary materials

Not applicable.

54.6 Trade of refined/processed materials

No data are available in international trade statistics. The level of detail in the HS nomenclature is inadequate to identify trade flows of neon, which is reported in HS 280429 alongside other rare gases.

54.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to allow the calculation/estimation of the indicator are lacking.

54.8 Other Indicators

✓ The calculation of CAGR concerns the production of neon between 2008 and 2017.

55 Nickel

55.1 Reserves

Coverage: World countries.

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

55.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: It is deduced from the various data sources that nickel mine statistics represent the recoverable mine production of nickel or the nickel content of a more highly processed form (as an indication of the magnitude of mine output where actual mine output is not available).

Latest RMIS Dashboard update: August 2023.

55.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021

Data source(s): (BGS, 2023)

Notes: Smelter/refinery production of nickel. Data relate to refined nickel metal plus the nickel content of ferronickel, nickel oxide and nickel salts.

Latest RMIS Dashboard update: August 2023.

55.4 Applications

Geographical scope: World.

Data source(s): JRC elaboration based on background data from (Fraser *et al.*, 2021).

Reference Year: 2019.

Notes: Data shown refer to world demand for nickel by first uses, i.e. the conversion of nickel products into intermediate products that form the basis for nickel-containing end-use products. The EC MSA study (Matos, Ciacci, *et al.*, 2020) provides EU-specific data concerning the end uses of nickel by industrial sector in 2016.

Latest RMIS Dashboard update: March 2022.

55.5 Trade of primary materials

Coverage: Aggregate of HS 260400, HS 750110 and HS 750120. Except for ores and concentrates (HS 260400), intermediate products of nickel metallurgy (nickel mattes, nickel oxide sinters, crude nickel oxides and others classified in headings HS 750110 and HS 750120) are considered as primary Ni-bearing materials. The trade of nickel intermediates in the form of mixed nickel sulphide precipitate (MSP) in HS

283090 is not included as the heading contains several substances. Moreover, the trade of nickel intermediates in the form of mixed nickel hydroxide precipitate (MHP) captured by HS 282540 is considered in the trade of processed/refined materials as the heading also contains pure nickel oxides and hydroxides. Metallurgical by-products containing nickel classified under HS 262099 are not included due to the code's high aggregation. Finally, the trade of nickel-bearing copper ores & concentrates is also not possible to be captured by international trade statistics.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Cuba, Papua New Guinea, New Caledonia and Zimbabwe are estimated from imports reported by trade partners. Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 260400 *Nickel ores and concentrates*; HS 750110 *Nickel; nickel mattes*; HS 750120 *Nickel; oxide sinters and other intermediate products of nickel metallurgy*.

Latest RMIS Dashboard update: August 2021.

55.6 Trade of refined/processed materials

Coverage: The selected commodities representing the aggregated trade of refined/processed nickel are HS 282540 (Nickel oxides and hydroxides), HS 282735 (Nickel chloride), HS 283324 (Nickel sulphate), HS 720260 (Ferronickel), HS 750210 (Unwrought nickel, consisting of unrefined anodes and refined nickel cathodes and other refined forms such as briquettes), HS 750220 (Unwrought nickel alloys), and HS 750400 (Nickel powders). Trade of nickel pig iron (NPI) covered by HS 720150 is excluded as the HS heading contains several forms of alloy pig iron.

Data source(s): (WITS, 2021).

Reference Year: August 2021.

Notes: Exports of New Caledonia, Cuba and Myanmar, are obtained from reported imports by destination countries. Dominican Republic's, Mozambique's, Iran's and Ukraine's trade for 2019 is determined from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 282540 *Nickel oxides and hydroxides*; HS 282735 *Chlorides; of nickel*; HS 283324 *Sulphates; of nickel*; HS 720260 *Ferro-alloys; ferro-nickel*; HS 750210 *Nickel; unwrought, not alloyed*; HS 750220 *Nickel; unwrought, alloys*; HS 750400 *Nickel; powders and flakes*

Latest RMIS Dashboard update: August 2021.

55.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos, Ciacci, *et al.*, 2020).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

55.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The calculation of CAGR is based on the combined refined nickel & ferronickel output (2012-2021).

56 Niobium

56.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023

56.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Based on information in other data sources,, it is inferred that data refer to concentrates of Nb-bearing minerals, e.g. columbite, tantalite, pyrochlore.

Latest RMIS Dashboard update: August 2023.

56.3 Production of refined/processed materials

Coverage: World countries

Reference Year: 2021

Data source(s): (USGS myb-Nb, 2022)

Notes: Figures are associated to ferroniobium. The total EU production is derived from (Eurostat Prodcum, 2023b).

Latest RMIS Dashboard update: August 2023.

56.4 Applications

Geographical scope: World.

Data source(s): (CBMM, 2019).

Reference Year: 2018.

Notes: Figures represent sales by end-use industrial sector as reported by the largest producer in the world in equivalent units of ferro-niobium. Published EU-specific data are missing and thee figures are assessed as applicable to the EU.

Latest RMIS Dashboard update: August 2021.

56.5 Trade of primary materials

The trade of niobium-bearing concentrates and niobium-rich metallurgical slags and residues cannot be distinguished in the HS nomenclature as the relevant HS headings (HS 261590, HS 262099) do not have the required granularity.

56.6 Trade of refined/processed materials

Coverage: Data refer to HS 720293 that entails the trade of ferroniobium. Trade of niobium metal and other niobium compounds such as niobium oxides is not included due to the high level of aggregation with other commodities in the relevant HS headings (HS 811292, HS 282590).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 originates from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 720293 *Ferro-alloys; ferro-niobium*.

Latest RMIS Dashboard update: August 2021.

56.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2013.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018). It is noted that the study considered recycling of Nb-containing steels as non-functional. An alternative estimate for the EOL-RIR is 25% (ranging from 12% to 50%), derived according to the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). The EOL-RIR is approximated by the median recycled content (RC) and the median old scrap ratio (OSR) of the ranges reported by (UNEP, 2011) (35% is assumed for OSR and 75% for RC in the estimation).

Latest RMIS Dashboard update: August 2021.

56.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is calculated on the basis of primary (mine) production between 2012 and 2021.

57 Ornamental and building stones

57.1 Reserves

Comprehensive data at country level are not available for the various ornamental and building stones. World reserves are adequate but can be limited on a local or regional level for certain special types of stones (USGS, 2024).

57.2 Production of primary materials

Complete data for each country are not readily available on a global scale.

57.3 Production of refined/processed materials

Information about the global production of worked ornamental and building stones on a country-by-country basis is not available.

57.4 Applications

Geographical scope: Europe.

Data source: JRC estimate.

Reference Year: N/A.

Notes: The estimate is relevant to the end-use market(s).

Latest RMIS Dashboard update: August 2023.

57.5 Trade of primary materials

Coverage: Aggregate of HS 250620, HS 251400, HS 251511, HS 251512, HS 251520, HS 251611, HS 251612, HS 251620, and HS 251690.

Data source: (WITS, 2023)

Reference Year: 2023

Notes: -

Relevant Harmonized System (HS) Codes:

HS 250620 *Quartzite; whether or not roughly trimmed or merely cut, by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape;*

HS 251400 *Slate; whether or not roughly trimmed or merely cut, by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape;*

HS 251511 *Marble and travertine; having a specific gravity of 2.5 or more, crude or roughly trimmed by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape;*

HS 251512 *Marble and travertine; merely cut, by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape, having a specific gravity of 2.5 or more;*

HS 251520 *Ecaussine and other calcareous monumental or building stone; alabaster, having a specific gravity of 2.5 or more;*

HS 251611 *Granite; crude or roughly trimmed;*

HS 251612 *Granite; merely cut, by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape;*

HS 251620 *Sandstone; whether or not roughly trimmed, cut, by sawing etc, into blocks or slabs of a rectangular (including square) shape;*

HS 251690 *Monumental or building stone; n.e.c. in heading no. 2516, whether or not roughly trimmed or merely cut, by sawing or otherwise, into blocks or slabs of a rectangular (including square) shape.*

Latest RMIS Dashboard update: August 2023.

57.6 Trade of refined/processed materials

Coverage: Aggregate of HS 680100, HS 680210, HS 680221, HS 680223, HS 680229, HS 680291, HS 680292, HS 680293, HS 680293, HS 680299, HS 680299, HS 680300, and HS 680300.

Data source: (WITS, 2023)

Reference Year: 2023

Notes:

Relevant Harmonized System (HS) Codes:

HS 680100 *Stone; setts, curbstones and flagstones, of natural stone (except slate);*

HS 680210 *Tiles, cubes and similar articles; whether or not rectangular (including square), largest surface area of which is capable of being enclosed in square, side less than 7cm, coloured granules, chippings, powder;*

HS 680221 *Marble, travertine and alabaster; simply cut or sawn, with a flat or even surface;*

HS 680223 *Granite; articles thereof, simply cut or sawn, with a flat or even surface;*

HS 680229 *Stone; monumental or building stone, n.e.c. in item no. 6802.2, articles thereof, simply cut or sawn, with a flat or even surface;*

HS 680291 *Marble, travertine and alabaster; articles thereof, (other than simply cut or sawn, with a flat or even surface);*

HS 680292 *Stone; calcareous (excluding marble, travertine, alabaster) articles thereof, (other than simply cut or sawn, with a flat or even surface);*

HS 680293 *Granite; articles thereof, (other than simply cut or sawn, with a flat or even surface);*

HS 680299 *Stone; natural (excluding marble, travertine, alabaster, other calcareous stone or granite), monumental or building stone, (other than simply cut or sawn, with a flat or even surface);*

HS 680300 *Slate, worked; and articles of slate or of agglomerated slate.*

Latest RMIS Dashboard update: August 2023.

57.7 End-of-Life Recycling Input Rate (EOL-RIR)

There is insufficient information to calculate the EOL-RIR in the EU.

57.8 Other Indicators

- ✓ The ornamental and building stones were not screened in the 2023 assessment of critical raw materials for the EU (European Commission, 2023); thus, no figures are displayed for EU Sourcing (EU supply) and Import Reliance;
- ✓ The CAGR refers to the production of primary materials (crude, roughly trimmed, simply cut, or in rough blocks and slabs) in 2012-2021.

58 Palladium

58.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

58.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Production figures are allocated to where the initial mining took place rather than the location of refining. Russia's production includes sales from stocks. Data for Australia are acquired from (WMD, 2023).

Latest RMIS Dashboard update: August 2023.

58.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2021.

Data source(s): (JM, 2022).

Notes: Figures refer to the total production of refined palladium (primary & secondary). Comprehensive data for palladium production by world countries (location of refining) are not available.

Latest RMIS Dashboard update: August 2023.

58.4 Applications

Geographical scope: Europe.

Data source(s): Data are obtained from (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The distribution of demand relates to end-use applications/industrial segments. Investment is excluded as negative in 2021 in Europe.

Latest RMIS Dashboard update: August 2023.

58.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely allocated to gold ores and concentrates in RMIS database.

58.6 Trade of refined/processed materials

Coverage: Trade data cover palladium, unwrought or in powder form (HS 711021). Trade of palladium compounds reported under HS 284390 is not included as compounds of other metals are also classified within the heading. Trade of wrought palladium and its alloys, in semi-manufactured forms, is excluded (HS 711029).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 711021 *Metals; palladium, unwrought or in powder form*.

Latest RMIS Dashboard update: August 2021.

58.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC calculation based on data from (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The EOL-RIR is derived as total recycling (from autocatalysts, electronics, and jewellery) divided by the total input of material consisting of primary supply, recycling and movement in stocks (gross demand). Closed-loop recycling is not included. It is assumed that the figure of the EOL-RIR is applicable in the EU.

Latest RMIS Dashboard update: November 2022.

58.8 Other Indicators

- ✓ The EU Sourcing (EU supply) for the extraction stage (primary materials) is derived from (SCREEN2, 2023) and (European Commission, 2023). It represents the average global supply in 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (primary & secondary) between 2012 and 2021.

59 Perlite

59.1 Reserves

Reserve data reported by (USGS, 2024) do not have a comprehensive country coverage; therefore, no figures are displayed for perlite's global reserves.

59.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data relate to perlite production.

Latest RMIS Dashboard update: August 2023.

59.3 Production of refined/processed materials

Information is scarce on the production of expanded perlite.

59.4 Applications

Geographical scope: Europe.

Data source(s): Data provided by IMA Europe (2016) in (European Commission, 2017b).

Reference Year: N/A.

Notes: Figures demonstrate end-use market shares. Data for miscellaneous uses are missing from the dataset.

Latest RMIS Dashboard update: August 2021.

59.5 Trade of primary materials

Coverage: Data from heading HS 253010 are used for the estimation of perlite-specific flows.

Data source(s): JRC estimation based on background data from (WITS, 2021)

Reference Year: 2019.

Notes: The split of perlite flows from other materials contained within HS 253010 is achieved after assessing production for perlite and vermiculite reported by the British Geological Survey (BGS, 2021) and unit prices. Iran's, Mozambique's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 253010 *Vermiculite, perlite and chlorites; unexpanded*.

Latest RMIS Dashboard update: August 2021.

59.6 Trade of refined/processed materials

No data are obtainable from international statistics. The trade of expanded perlite is reported under headings HS 680620 (hollow granules not burst) and HS 380290 (hollow granules burst to concave lamellae), which in addition to perlite contain more expanded or exfoliated mineral products.

59.7 End-of-Life Recycling Input Rate (EOL-RIR)

Recent and robust data allowing the calculation or estimation of perlite's EOL-RIR are missing.

59.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

60 Phosphate rock

60.1 Reserves

Data source(s): (USGS, 2024)

Reference Year: 2022.

Notes: Reserves are defined according to the USGS classification system (USGS, 1980).

Latest RMIS Dashboard update: February 2024.

60.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: -

Latest RMIS Dashboard update: August 2023.

60.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2020.

Data source(s): (IFASTat, 2023).

Notes: Data refer to processed phosphate products, which relate to fertilisers and other industrial products. Data shown on a nutrient basis comprise the aggregate of basic slag, ground phosphate rock directly applicable, single superphosphate, triple superphosphate, other P straight fertilisers, ammonium phosphate (DAP), PK compound fertiliser, other NP compound fertilisers, NPK compound fertilisers.

Latest RMIS Dashboard update: August 2023.

60.4 Applications

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015) .

Reference Year: 2012.

Notes: Figures reflect end uses. The disaggregation of industrial uses reported by the source is based on (De Boer *et al.*, 2019).

Latest RMIS Dashboard update: August 2023.

60.5 Trade of primary materials

Coverage: Data shown are the aggregate of HS 251010 and HS 251020 involving unground and ground natural phosphates.

Data source(s): (WITS, 2021).

Reference Year: 2021.

Notes: Egypt's exports are deduced from declared imports by trade partners.

Relevant Harmonized System (HS) Codes: HS 251010 *Natural calcium phosphates, natural aluminium calcium phosphates and phosphatic chalk; unground*; HS 251020 *Natural calcium phosphates, natural aluminium calcium phosphates and phosphatic chalk; ground*.

Latest RMIS Dashboard update: August 2021.

60.6 Trade of refined/processed materials

Coverage: Data shown are the aggregate of HS codes covering Phosphoric acid, P fertilisers and PN fertilisers.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes: HS 280920 *Phosphoric acid & polyphosphoric acids, whether/not chemically defined*; HS 310311 *Superphosphates containing by weight => 35 % of diphosphorus pentaoxide "P2O5" (excl. such products in tablets or similar forms, or in packages with a gross weight of <= 10 kg)*; HS 310390 *Mineral/chemical fertilisers, phosphatic(excl. of 3103.10)*; HS 310530 *Diammonium hydrogenorthophosphate (diammonium phosphate)*; HS 310540 *Ammonium dihydrogenorthophosphate (monoammonium phosphate) & mixtures thereof with diammonium hydrogenorthophosphate (diammonium phosphate)*.

Latest RMIS Dashboard update: August 2023.

60.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The EOL-RIR is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020). The indicator illustrates the recycling of biogenic waste flows (e.g., food waste, vegetal waste, manure, sludges) that substitute the use of mineral phosphate fertilisers (i.e. primary input material).

Latest RMIS Dashboard update: August 2021.

60.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

61 Phosphorus

61.1 Reserves

The raw material for phosphorus production is phosphate minerals (see *Phosphate rock*).

61.2 Production of primary materials

Phosphate rock is the raw material for the production of elemental phosphorus (see *Phosphate rock*).

61.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2018.

Data source(s): JRC estimate based on (HDIN Research, 2019), (Statista, 2022).

Notes: Data reflect the production of elemental (yellow) phosphorus.

Latest RMIS Dashboard update: August 2023.

61.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2018.

Notes: Data concern the end uses of phosphorus (P₄).

Latest RMIS Dashboard update: August 2021.

61.5 Trade of primary materials

No data are shown in terms of phosphorous primary materials. Phosphorus is obtained by treating mineral phosphates in electric furnaces, and phosphate rock is classified in headings HS 251010 and HS 251020. However, trade data in the HS nomenclature do not make a distinction between mineral phosphates destined for phosphorous production from those employed in fertilisers and/or other uses.

61.6 Trade of refined/processed materials

Coverage: Data from HS 280470 are employed covering the trade of elemental phosphorous (white and red). Phosphorous chemicals such as phosphorus chlorides (HS 281213), phosphoric acid (thermal process) and polyphosphoric acids (HS 280920), hypophosphites and other compounds derived from elemental phosphorous are not included.

Data source(s): (WITS, 2021)

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 280470 *Phosphorus*.

Latest RMIS Dashboard update: August 2021.

61.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2017.

Notes: The indicator is calculated from background data reported by the source according to the methodology outlined in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

61.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are collected from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).

62 Platinum

62.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

62.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Production figures are assigned to the location where the initial mining took place (rather than the location of refining).

Latest RMIS Dashboard update: August 2023.

62.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2021.

Data source(s): (JM, 2022).

Notes: Figures refer to the total production of refined platinum (primary & secondary). Thorough information on refined platinum production at national level (location of refining) is not available.

Latest RMIS Dashboard update: August 2023

62.4 Applications

Geographical scope: Europe.

Data source(s): Data are collected from (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: Data show the distribution of demand by end-use applications/industrial segments.

Latest RMIS Dashboard update: August 2023.

62.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely allocated to gold ores and concentrates in RMIS database.

62.6 Trade of refined/processed materials

Coverage: Trade data cover platinum, unwrought or in powder form (HS 711011). Trade of colloidal platinum and platinum compounds reported under HS 284310 and HS 284390, respectively, is not included as

compounds of other metals are also classified within these headings. Trade of wrought platinum and its alloys, in semi-manufactured forms, is excluded (HS 711019).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 711019 *Metals; platinum, unwrought or in powder form*

Latest RMIS Dashboard update: August 2021.

62.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC calculation based on (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The EOL-RIR is derived as total recycling (from autocatalysts, electronics, and jewellery) divided by the total input of material consisting of primary supply, recycling and movement in stocks (gross demand). Closed-loop recycling is not included. It is hypothesised that the figure of the indicator is also relevant for the EU.

Latest RMIS Dashboard update: November 2022

62.8 Other Indicators

- ✓ The EU Sourcing (EU supply) for the extraction stage (primary materials) is derived from (SCRREEN2, 2023) and (European Commission, 2023). It represents the average global supply in 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to refinery production (primary & secondary) between 2012 and 2021.

63 Platinum-Group Metals (PGM)

63.1 Reserves

Data source(s): (Mudd *et al.*, 2018).

Reference Year: 2015.

Notes: The detailed dataset originates from a comprehensive global assessment of PGM reserves on an individual project basis. Almost all reported reserves are code-compliant.

Latest RMIS Dashboard update: August 2021.

63.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC elaboration based on the production of each individual material of the group.

Notes: Production figures are allocated to where the initial mining took place rather than the location of refining.

Latest RMIS Dashboard update: August 2023.

63.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2021.

Data source(s): Sources used for the compilation of primary and secondary production of platinum, palladium, and rhodium, and the primary production of ruthenium and iridium.

Notes: Figures represent the total aggregated production of refined platinum-group metals (primary & secondary). The primary metallurgical production is almost identical to mining production (mine producers report metallurgically produced PGM payable, therefore recoverable). Secondary production (supply) is the quantity of metal recovered from open-loop recycling; closed-loop recycling is excluded.

Latest RMIS Dashboard update: August 2023.

63.4 Applications

Geographical scope: World.

Data source(s): Data are sourced from (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: Data show the distribution of demand by end-use sector.

Latest RMIS Dashboard update: August 2023.

63.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely allocated to gold ores and concentrates in RMIS database.

63.6 Trade of refined/processed materials

Coverage: Data consist of the product aggregate of HS 711011, HS 711021, HS 711031, and HS 711041 covering platinum, palladium, rhodium, iridium and ruthenium in unwrought or in powder form. The trade of PGM in colloidal form and the trade of PGM compounds reported under HS 284310 and 284390, respectively, is not included as compounds of other precious metals are also classified within these headings. Wrought PGM and their alloys in semi-manufactured forms is excluded.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Mozambique's and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 711011 Metals; platinum, unwrought or in powder form; HS 711021 Metals; palladium, unwrought or in powder form; HS 711031 Metals; rhodium, unwrought or in powder form; HS 711041 Metals; iridium, osmium, ruthenium, unwrought or in powder form.

Latest RMIS Dashboard update: August 2021.

63.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC calculation based on data from (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The EOL-RIR is calculated from combined data for platinum (see 62.7), palladium (see 58.7), and rhodium (see 70.7). Data of similar coverage and quality are unavailable for ruthenium (see 71.7) and iridium (see 35.7); therefore, iridium and ruthenium are excluded for the overall calculation of the indicator. The indicator is derived as the ratio of total recycling from post-consumer products to the total input of material that consists of primary supply, recycling and movement in stocks (gross demand). Closed-loop recycling is not covered in the data. It is assumed that the figure is also appropriate for the EU.

Latest RMIS Dashboard update: November 2022.

63.8 Other Indicators

- ✓ The Import Reliance is sourced from (European Commission, 2023). It is allocated to the extraction stage and refers to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (primary & secondary) between 2012 and 2021.

64 Potash

64.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

64.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: In light of the background information from additional data sources, it can be concluded that data relate to the production of concentrates of various forms of potash and potassium-rich minerals such as potassium chloride, potassium sulphate, potassium nitrate and crude chloride salts (e.g. carnallite, sylvite).

Latest RMIS Dashboard update: August 2023.

64.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2020.

Data source(s): (IFAStat, 2023).

Notes: Data used concern the production of processed potash products. Data reported on a nutrient basis are associated with straight & compound potassium-related fertilisers, as well as products for animal feed and industrial uses. Potash products covered include muriate of potash (MOP) (potassium chloride), sulphate of potash (SOP) (potassium sulphate), PK compounds, NK compounds, NPK compounds, NK compounds, and other K straight fertilisers.

Latest RMIS Dashboard update: August 2023.

64.4 Applications

Geographical scope: World.

Data source(s): JRC elaboration based on background data from IFAStat (Georgitzikis and D'Elia, 2022).

Reference Year: 2019.

Notes: Country data for the EU consumption are not publicly available. The distribution of global consumption by end uses is assessed to be applicable also to the EU.

Latest RMIS Dashboard update: April 2022.

64.5 Trade of primary materials

Coverage: Trade data refer to the aggregate of HS 283421, HS 310420, HS 310430 and HS 310490, covering potassium nitrate, potassium chloride, potassium sulphate and other potassic salts. Potassium sulphate (HS 310430) is taken into account even though it can be also synthesised by treating potassium chloride. The aggregate also includes HS 310490 containing, among others, crude natural potassium salts.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is deduced from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 283421 *Nitrates; of potassium*; HS 310420 *Fertilizers, mineral or chemical; potassic, potassium chloride*; HS 310430 *Fertilizers, mineral or chemical; potassic, potassium sulphate*; HS 310490 *Fertilizers, mineral or chemical; potassic, n.e.c. in heading no. 3104*.

Latest RMIS Dashboard update: August 2021.

64.6 Trade of refined/processed materials

Data have not been collected.

64.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): Expert opinion in (European Commission, 2014b)(European Commission, 2017b)(European Commission, 2020b).

Reference Year: N/A.

Notes: No data are available for the calculation or estimation of the indicator. As there is no evidence of potash recycling worldwide, the EOL-RIR of potash is expected to be 0% globally and in the EU.

Latest RMIS Dashboard update: August 2021.

64.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are gathered from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

65 Praseodymium

65.1 Reserves

No data have been gathered. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

65.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and praseodymium content in REE minerals of each operating mine.

Notes: The mine production of praseodymium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is collected from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

65.3 Production of refined/processed materials

The gathered information is not publicly available.

65.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data correspond with praseodymium's demand by end use.

Latest RMIS Dashboard update: August 2023.

65.5 Trade of primary materials

There are no specific codes to praseodymium in international trade statistics (HS). Praseodymium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

65.6 Trade of refined/processed materials

There are no specific codes to praseodymium in international trade statistics (HS). Praseodymium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

65.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to calculate or estimate praseodymium's EOL-RIR in the EU are inadequate.

65.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is acquired from (SCREEN2, 2023) and relates to all forms of praseodymium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

66 Pumice

66.1 Reserves

Quantitative estimates of resources and reserves by world countries are not available. Vast resources have been identified on all continents (USGS, 2023).

66.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021

Data source: (USGS myb-pumice, 2022)

Notes: Data cover the production of pumice and pumice-like materials (pozzolan, volcanic tuff & cinder, trass).

Latest RMIS Dashboard update: August 2023.

66.3 Production of refined/processed materials

Not applicable.

66.4 Applications

Geographical scope: United States.

Data source: (USGS myb-pumice, 2022).

Reference Year: 2022.

Notes: Data reflect end-use market shares. EU-specific data are missing; therefore, it is presumed that the shares are also applicable to the EU.

Latest RMIS Dashboard update: August 2023.

66.5 Trade of primary materials

Coverage: Data from heading HS 251310 are used, which represent the trade of pumice stone. No trade data are available for related pumicite materials (such as volcanic tuff, pozzolan, trass and similar) due to the high aggregation of the corresponding HS heading (HS 253090) with several mineral products.

Data source: (WITS, 2023).

Reference Year: 2021.

Notes:

Relevant Harmonized System (HS) Codes: HS 251310 *Pumice stone, whether or not heat treated*.

Latest RMIS Dashboard update: August 2023.

66.6 Trade of refined/processed materials

Not applicable.

66.7 End-of-Life Recycling Input Rate (EOL-RIR)

Information to calculate the EOL-RIR in the EU is missing.

66.8 Other Indicators

- ✓ Information about the EU Sourcing (EU supply) and the Import Reliance is not displayed as pumice was not included in the 2023 EU assessment of Critical raw materials (European Commission, 2023);
- ✓ The CAGR refers to primary (mining) production between 2012 and 2021.

67 Rare Earth Elements (REE)

67.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly compliant with CRIRSCO reporting standards. The dataset covers lanthanides and yttrium.

Latest RMIS Dashboard update: August 2023.

67.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Data indicate the mine production of rare earth concentrates. The dataset is complemented with figures for Thailand and Vietnam) from (USGS, 2023), and the US from S&P, 2023). The undocumented production in China is not quantified by the various data sources.

Latest RMIS Dashboard update: August 2023.

67.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC elaboration from (Wood Mackenzie, 2022b).

Notes: Data aggregate the estimated refinery production of rare earth elements (cerium, dysprosium, erbium, europium, gadolinium, holmium, lanthanum, lutetium, neodymium, praseodymium, samarium, terbium, thulium, yttrium, and ytterbium). Recycling is included.

Latest RMIS Dashboard update: August 2023.

67.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data demonstrate the distribution of demand by end use.

Latest RMIS Dashboard update: August 2023.

67.5 Trade of primary materials

Coverage: The heading HS 284690 is assigned as a proxy for primary materials of REE. It contains oxides and salts of REE or their mixtures, excluding reduced metal and alloys, which are derived generally at the first stages of metallurgical processing (intermediate products). However, it is noted that the heading may contain purified rare earth oxides which cannot be considered as, similar to the mixed REE compounds, intermediate products but as refined REE products, as long as the final separation into single rare earth compounds has been achieved (Machacek and Kalvig, 2016).

The trade of natural compounds of rare earth metals in the form of ores and concentrates e.g. bastnaesite, xenotime, gadolinite etc. is reported under heading HS 253090 aggregated with other minerals. Similarly, trade of monazite (used for the extraction of thorium and/or rare earth metals) is reported under heading HS 261220 aggregated with other compounds; therefore, it is impossible to quantify the trade of REE-bearing concentrated minerals at the detail of the Harmonised System.

Data source(s): (WITS, 2021)

Reference Year: 2019

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 284690 *Compounds, inorganic or organic (excluding cerium), of rare-earth metals, of yttrium, scandium or of mixtures of these metals*

Latest RMIS Dashboard update: August 2021.

67.6 Trade of refined/processed materials

Coverage: The heading HS 280530 is employed as representative of the trade of processed/refined REE, which comprises intermixtures/interalloys and/or separated rare-earth metals of high or low purity. HS 284690 may contain purified rare earth oxides and single rare earth compounds for which separation has been achieved (Machacek and Kalvig, 2016); however, in the current exercise it is allocated to primary materials. Cerium's trade is not included (HS 284610).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Malaysia refer to declared imports by destination countries. Iran's and Ukraine's trade for 2019 is deduced from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 280530 *Earth-metals, rare; scandium and yttrium, whether or not intermixed or interalloyed*

Latest RMIS Dashboard update: August 2021.

67.7 End-of-Life Recycling Input Rate (EOL-RIR)

No recent and robust data are available to allow the calculation or estimation of the EOL-RIR in the EU. The EOL-RIR worldwide is estimated to be 13% (as the ratio of post-consumer recycling to global supply) in 2021 based on data from (Wood Mackenzie, 2022a); however, it is assessed that the figure is not applicable to the EU.

67.8 Other Indicators

- ✓ The Import Reliance for extraction and processing (primary and refined materials, respectively) are derived from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production from 2012 to 2021.

68 Rare Earth Elements for magnets

68.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

68.2 Production of primary materials

Coverage: World countries (2021), World total (2000-2020).

Reference Year: 2021.

Data source(s): JRC elaboration based on the total REE production (see 67.2)

Notes: The REE for magnets group involves cerium, dysprosium, gadolinium, neodymium, praseodymium, samarium, and terbium. Figures reflect the cumulative production of the each of the above REE, with the exception of cerium.

Latest RMIS Dashboard update: August 2023.

68.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (Wood Mackenzie, 2022b).

Notes: Data aggregate the estimated refinery production of dysprosium, gadolinium, neodymium, praseodymium, samarium, and terbium (cerium is excluded). Recycling is included.

Latest RMIS Dashboard update: August 2023.

68.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data demonstrate the distribution of demand by end use.

Latest RMIS Dashboard update: August 2023.

68.5 Trade of primary materials

Data are not available in the HS nomenclature (See section 67.5).

68.6 Trade of refined/processed materials

Data are unavailable in the HS nomenclature (See section 67.6).

68.7 End-of-Life Recycling Input Rate (EOL-RIR)

No recent and adequate data are available to calculate or estimate the EOL-RIR in the EU. The EOL-RIR worldwide in 2021 is estimated to be 35% (as the share of EOL recycling in global supply) based on data from (Wood Mackenzie, 2022a); however, this figure is not considered applicable to the EU.

68.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are derived from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production from 2012 to 2021.

69 Rhenium

69.1 Reserves

Data source(s): (USGS, 2024)(USGS, 2021).

Reference Year: 2022.

Notes: Reserves are defined according to the USGS classification system (USGS, 1980). Data for Peru and Canada are collected from (USGS, 2021). Data for Poland and Uzbekistan are not available. It is assumed that the global total is composed of the sum of available reserve data of individual countries.

Latest RMIS Dashboard update: February 2024.

69.2 Production of primary materials

No data are available for rhenium's mine production. Primary rhenium is predominantly extracted as a by-product from the extraction and processing of molybdenum ores associated with copper deposits.

69.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: In light of background information from supplementary sources, figures are related to recovered rhenium from molybdenite and copper concentrates. Secondary rhenium production is not included, e.g. from Germany, Estonia, USA and Canada. The dataset is complemented with South Korea from (USGS myb-Re, 2022).

Latest RMIS Dashboard update: August 2023.

69.4 Applications

Geographical scope: World.

Data source(s): (Roskill, 2015).

Reference Year: 2014.

Notes: Data demonstrate the end uses of rhenium. The EU-specific distribution of demand is unavailable.

Latest RMIS Dashboard update: August 2021.

69.5 Trade of primary materials

No data can be extracted from international statistics for rhenium's primary materials. Rhenium is not produced from one particular ore, but is instead obtained as by-product of copper and molybdenum metallurgy. The HS nomenclature does not provide in the relevant headings the required disaggregation for rhenium-rich by-products from copper and molybdenum ore processing.

69.6 Trade of refined/processed materials

No data can be collected from international trade statistics for rhenium's refined/processed materials. Unwrought rhenium and powders, perrhenic acid (PRA) and ammonium perrhenate (APR) are classified in the

HS nomenclature in headings HS 811292, HS 281119, and HS 284190, respectively, which contain several metals and compounds of various raw materials.

69.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC calculation based on data from (Roskill, 2015).

Reference Year: 2014.

Notes: The indicator is estimated as the ratio of secondary production to total demand. Secondary production includes recycled Re metal and APR extracted from Re-containing EOL scrap and rhenium contained in engine revert, but excludes the recycling of spent catalyst and foundry revert (closed-loop recycling). It is supposed that the estimate of the indicator is appropriate for the EU as well.

Latest RMIS Dashboard update: August 2023.

69.8 Other Indicators

- ✓ The Import Reliance is obtained from (European Commission, 2023) and refers to the average 2016-2020. More information on the scope, data, and assumptions used are provided by (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (2012-2021).

70 Rhodium

70.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

70.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: It is deduced from complementary information that figures represent sales of primary rhodium by producers and are allocated to where the initial mining took place (rather than the location of subsequent refining).

Latest RMIS Dashboard update: August 2023.

70.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2021.

Data source(s): Data for rhodium's primary production as above and data for secondary production from (JM, 2019a) for 2000-2013, (JM, 2019b) for 2014-2016, and (JM, 2022) for 2017-2021.

Notes: Figures concern the total production of refined rhodium (primary & secondary). Country-specific data, covering also the production from secondary sources, are unavailable.

Latest RMIS Dashboard update: August 2023.

70.4 Applications

Geographical scope: World.

Data source(s): Data provided by (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The distribution of demand links to end-use applications/industrial segments. Figures for Europe or the EU are not available. It is evaluated that the global distribution is also applicable to the EU.

Latest RMIS Dashboard update: August 2023.

70.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely allocated to gold ores and concentrates in RMIS database.

70.6 Trade of refined/processed materials

Coverage: Trade data cover unwrought rhodium or rhodium in powder form (HS 711031). The trade of rhodium compounds (HS 284390) is not included as compounds of other metals are also classified within the heading. Trade of wrought products of rhodium and its alloys in semi-manufactured forms (made by forging, rolling or drawing) is excluded (HS 711039)

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 711031 *Metals; rhodium, unwrought or in powder form*.

Latest RMIS Dashboard update: August 2021.

70.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC calculation based on (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The EOL-RIR is derived as total recycling (from autocatalysts, electronics, and jewellery) divided by the total input of material consisting of primary supply, recycling and movement in stocks (gross demand). Closed-loop recycling is not included. It is assumed that the figure is also applicable in the EU.

Latest RMIS Dashboard update: November 2022.

70.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is assumed 100% as there is no mine production in the EU. The EU Sourcing (EU supply) for the extraction stage (primary materials) is derived from (SCREEN2, 2023) and (European Commission, 2023). It represents the average global supply in 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (primary & secondary) between 2012 and 2021.

71 Ruthenium

71.1 Reserves

Data source(s): JRC elaboration based on background data from (Mudd *et al.*, 2018) and (Heraeus - SFA Oxford, 2020).

Reference Year: 2015.

Notes: -

Latest RMIS Dashboard update: August 2021.

71.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS myb-PGM, 2023)

Notes: Production figures indicate where the initial mining took place (rather than the location of subsequent refining).

Latest RMIS Dashboard update: August 2023.

71.3 Production of refined/processed materials

Data are unavailable for secondary supply; therefore, the total annual production cannot be determined.

71.4 Applications

Geographical scope: World.

Data source(s): Data provided by (Johnson Matthey, 2022).

Reference Year: 2021.

Notes: The distribution of demand relates to end-use industrial segments. Figures for the European or the EU demand are not available. It is assumed that the global distribution is also applicable to the EU.

Latest RMIS Dashboard update: August 2023.

71.5 Trade of primary materials

The HS nomenclature does not provide the required detail for tracing the trade of PGM-bearing ores and concentrates in HS 261690; the code is entirely allocated to gold ores and concentrates in RMIS database.

71.6 Trade of refined/processed materials

Coverage: Trade data are associated with HS 711041 covering not only ruthenium and its alloys (unwrought and powders), but also iridium (and osmium). The trade of ruthenium compounds (HS 284390) is not included as compounds of other metals are also classified within the heading. Semi-manufactured forms of ruthenium are excluded.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes:

Relevant Harmonized System (HS) Codes: to HS 711041 *Metals; iridium, osmium, ruthenium, unwrought or in powder form*

Latest RMIS Dashboard update: August 2021.

71.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC estimate based on (UNEP, 2011).

Reference Year: N/A.

Notes: Sound data that allow the calculation of ruthenium's EOL-RIR are not available. A rough estimate for the EOL-RIR is 6% (ranging from 1% to 12%), derived in accordance with the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). The EOL-RIR is approximated by the median recycled content (RC) and the median old scrap ratio (OSR) of the ranges reported by (UNEP, 2011) (0-20% for the OSR and 50-60% for the RC). The estimate for the indicator is supposed to be suitable for the EU.

Latest RMIS Dashboard update: August 2021.

71.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is assumed 100% as there is no mine production in the EU. The EU Sourcing (EU supply) for the extraction stage (primary materials) is derived from (SCREEN2, 2023) and (European Commission, 2023). It represents the average global supply in 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

72 Salt

72.1 Reserves

Data at country level are unavailable. Continental reserves of rock salt are substantial whereas marine reserves of salt are practically unlimited. (USGS, 2024)(Kogel *et al.*, 2006)

72.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Data include rock salt and evaporated salt (marine and brine). The output of Djibouti, Bonaire, Ecuador, Guinea, Mauritania, Mali, Netherland Antilles and Uzbekistan is compiled from (BGS, 2023).

Latest RMIS Dashboard update: August 2023.

72.3 Production of refined/processed materials

Not applicable. Refined salt products are considered as primary materials.

72.4 Applications

Geographical scope: Europe.

Data source: (Ciech, 2023).

Reference Year: N/A.

Notes: End-use market shares for rock salt and evaporated salt.

Latest RMIS Dashboard update: August 2023.

72.5 Trade of primary materials

Coverage: Data from heading HS 250100 are used for the estimation of global salt trade flows.

Data source: (WITS, 2023).

Reference Year: 2021.

Notes:-

Relevant Harmonized System (HS) Codes: HS 250100 *Salt (including table salt and denatured salt); pure sodium chloride whether or not in aqueous solution; sea water.*

Latest RMIS Dashboard update: August 2023.

72.6 Trade of refined/processed materials

Not applicable. Refined salt products are treated with primary materials under heading HS 250100.

72.7 End-of-Life Recycling Input Rate (EOL-RIR)

Minimal information exists to estimate the EOL-RIR in the EU.

72.8 Other Indicators

- ✓ Information about the EU Sourcing (EU supply) and the Import Reliance is not presented as the 2023 assessment of Critical raw materials for the EU did not cover salt;
- ✓ The CAGR concerns primary (mining) production in 2012-2021.

73 Samarium

73.1 Resources and Reserves

No data have been collected. Information for individual rare earth elements is not readily (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

73.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and samarium content in REE minerals of each operating mine.

Notes: The mine production of samarium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

73.3 Production of refined/processed materials

The compiled information is not publicly available.

73.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data reflect samarium's demand by end use.

Latest RMIS Dashboard update: August 2023.

73.5 Trade of primary materials

There are no specific codes to samarium in international trade statistics (HS). Samarium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

73.6 Trade of refined/processed materials

There are no specific codes to samarium in international trade statistics (HS). Samarium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

73.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available to calculate or estimate samarium's EOL-RIR in the EU.

73.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and relates to all forms of samarium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used is provided by (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

74 Sapele wood

74.1 Reserves

There is lack of information on the harvested area of sapele trees (*Entandrophragma cylindricum*).

74.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC estimate based on (UN Comtrade, 2023).

Notes: Credible information on the global production of sapele wood is missing. Net exports (and exports derived indirectly from reported imports by destination countries) for sapele sawnwood (HS 440727) originating from countries in which the sapele tree is naturally distributed, i.e. West, Central and East Africa (from Ivory Coast to Uganda), are employed as a proxy of world's production of sapele roundwood. Trade data for sapele timber in the natural state (roundwood) are reported under HS 440349, but they cannot be used to approximate production as the trade code includes several species of tropical timber.

Latest RMIS Dashboard update: August 2023.

74.3 Production of refined/processed materials

No data are available for the production of sapele sawnwood worldwide.

74.4 Applications

Geographical scope: N/A.

Data source(s): Expert judgement in (European Commission, 2017b).

Reference Year: N/A.

Notes: Quantitative data for the end uses of sapele wood are missing.

Latest RMIS Dashboard update: August 2021.

74.5 Trade of primary materials

Granular data for sapele roundwood are not available in international databases as the relevant code HS 440349 covers also other tropical timber.

74.6 Trade of refined/processed materials

Coverage: Data refer to HS 440727 that addresses sapele sawnwood's trade.

Data source(s): (WITS, 2021)

Reference Year: 2019.

Notes: Exports originating from Angola, Cameroon, Democratic Republic of Congo, Central African Republic, Ghana and Gabon were estimated on the basis of reported imports by destination countries.

Relevant Harmonized System (HS) Codes: HS 440727 *Wood, tropical; sapelli, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, thicker than 6mm.*

Latest RMIS Dashboard update: August 2021.

74.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available for the calculation or estimation of the indicator. According to expert opinion in (European Commission, 2020b), the EOL-RIR of sapele wood is 0%.

74.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020;
- ✓ The CAGR refers to the estimated primary production (extraction) from 2012 to 2021.

75 Scandium

75.1 Reserves

Available data from (S&P, 2023) are inadequate for a comprehensive coverage of global reserves.

75.2 Production of primary materials

Existing information is insufficient to estimate scandium's primary production by countries.

75.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC estimate based on various sources such as (CM, 2018)(Grandfield, 2019)(USGS, 2023).

Notes: Scandium production statistics are unavailable; the Chinese output is presumed to be stable over 2019-2021. The production of primary intermediate scandium compounds in Philippines is allocated to Japan where it is further refined.

Latest RMIS Dashboard update: August 2023.

75.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: Data indicate scandium's consumption by end uses.

Latest RMIS Dashboard update: August 2021.

75.5 Trade of primary materials

No data can be extracted from international trade statistics for scandium's primary raw materials. Scandium's trade flows are reported in HS headings grouped with other REE without granular detail (see the generic notes for REE's trade of primary materials section 67.5, applicable also for scandium).

75.6 Trade of refined/processed materials

Trade in scandium's refined/processed products tends to be opaque in international trade statistics. Unwrought scandium metal and interalloys/intermixtures of scandium are reported under heading HS 280530, and scandium compounds in HS 284690 clustered with several rare-earth metals and compounds of REE; HS 284690 may contain mixtures of rare-earth metals, yttrium and scandium that are considered a primary raw materials of rare earths (see also section 67.5).

75.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

75.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are collected from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023).

76 Selenium

76.1 Reserves

Data source(s): (USGS, 2024)

Reference Year: 2022.

Notes: Reserves are defined according to the USGS classification system (USGS, 1980). Figures are primarily based on the estimated selenium content of copper reserves.

Latest RMIS Dashboard update: February 2024.

76.2 Production of primary materials

No data are available. Selenium is mostly recovered from anode slimes generated during the electrolytic refining of copper.

76.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Notes: Data relate to refinery output (selenium compounds and elemental selenium).

Latest RMIS Dashboard update: August 2023.

76.4 Applications

Geographical scope: World.

Data source(s): (Anderson, 2020), (STDA, 2023).

Reference Year: 2010

Notes: Figures are associated with the end uses of selenium. EU-specific data are not available.

Latest RMIS Dashboard update: August 2021.

76.5 Trade of primary materials

No data are available in the international trade statistics for selenium's primary materials. Selenium is recovered from the treatment of copper refinery slimes. Hence, the heading HS 262030 *Slag, ash and residues containing mainly copper* covering the trade of sludge from electrolytic baths after copper refining could be potentially used as a proxy. However, the code does not provide the necessary detail to distinguish copper slimes. Similarly, data on copper ores and concentrates trade are excluded (HS 260300) as the heading does not differentiate Se-bearing copper ores and concentrates.

76.6 Trade of refined/processed materials

Coverage: Data refer to HS 280490, which includes several forms of selenium (amorphous, vitreous, and crystallised). Specific trade data for various refined selenium compounds (e.g. selenium dioxide and salts of selenium acids) are unavailable due to the high aggregation with other compounds of the relevant HS headings in which they are classified (e.g. HS 281129, HS 284290).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Trade flows for Iran and Ukraine in 2019 are derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 280490 *Selenium*

Latest RMIS Dashboard update: August 2021.

76.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data allowing a credible calculation or estimation of selenium's EOL-RIR are lacking. According to expert judgment in (European Commission, 2017b), (European Commission, 2020b) and (European Commission, 2023), and taking into account information from (UNEP, 2011), the indicator is estimated at 1%.

76.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is derived from refinery production in 2012-2021.

77 Silica

77.1 Reserves

Country-specific data are unavailable.

77.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (Eurostat Prodcum, 2023a)(USGS myb-Silica, 2022).

Notes: Data for silica production cover silica sand (industrial and quartz sand), quartz, quartzite, and other silica products. For EU countries, priority is given to the dataset provided by Prodcum (PRC code 8121150). Data gaps in the Prodcum dataset are covered by USGS data or are estimated through interpolation.

Latest RMIS Dashboard update: August 2023.

77.3 Production of refined/processed materials

Not applicable.

77.4 Applications

Geographical scope: EU28

Data source(s): (IMA Europe, 2018)(IMA Europe, 2019)

Reference Year: 2017.

Notes: Figures demonstrate the distribution of silica's demand by end use.

Latest RMIS Dashboard update: August 2021.

77.5 Trade of primary materials

Coverage: Data capture the product aggregate of HS 250510 (Silica and quartz sand) and 250610 (naturally occurring quartz).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from Sri Lanka were estimated on the basis of reported imports by destination countries. Also, trade flows in 2019 from/to Oman, Mozambique, Iran, Guyana, and Ukraine (imports-exports) is approximated by mirror trade flows.

Relevant Harmonized System (HS) Codes: HS 250510 *Sands; natural, silica and quartz sands, whether or not coloured*; HS 250610 *Quartz; other than natural sands*.

Latest RMIS Dashboard update: August 2021.

77.6 Trade of refined/processed materials

Not applicable.

77.7 End-of-Life Recycling Input Rate (EOL-RIR)

Lack of data for the calculation or estimation of the EOL-RIR of silica.

77.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are acquired from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023).
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

78 Silicon metal

78.1 Reserves

Data are not readily available for the mineral deposits of silica from which silicon metal could be produced.

78.2 Production of primary materials

No data are available for the output of the particular grades of silica (quartz) required for the production of silicon metal. Information on the production of all forms and qualities of silica are available in the Raw Material *Silica*.

78.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data for South Africa in 2015-2021, and for Bosnia-Herzegovina, Iceland, Kazakhstan, Uzbekistan, and Laos in 2000-2021 are obtained from USGS. The US production from 2011 onwards is a JRC estimate based on an assumption of 40% Si metal in total reported US production of FeSi+Si metal, as derived from historical data in 2000-2010. Publicly-available data for the production of the highly refined form of silicon metal (electrical-grade) are not available.

Latest RMIS Dashboard update: August 2023.

78.4 Applications

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015)

Reference Year: 2012

Notes: The figures show the end-use sectors of products containing silicon.

Latest RMIS Dashboard update: August 2021.

78.5 Trade of primary materials

Metallurgical quartz and quartzite from which silicon metal can be obtained are classified together with other grades of quartz and quartzite in HS headings 250610 and 250620, respectively. The metallurgical grades represent a small share of the total; therefore, available data in the HS nomenclature cannot reflect the trade of quartz and quartzite destined for the production of silicon metal.

78.6 Trade of refined/processed materials

Coverage: Data are derived from the aggregate of HS 280461 and HS 280469 comprising electrical grade silicon and metallurgical grade silicon, correspondingly. Silicon traded in ferro-alloy form (ferro-silicon) is not taken into account.

Data source(s): (WITS, 2021).

Reference Year: 2019

Notes: Mozambique's, Iran's, and Ukraine's trade for 2019 is derived from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 280461 *Silicon; containing by weight not less than 99.99% of silicon*; HS 280469 *Silicon; containing by weight less than 99.99% of silicon*.

Latest RMIS Dashboard update: August 2021.

78.7 End-of-Life Recycling Input Rate (EOL-RIR)

Consistent data on the recycling of silicon metal in the EU are not available. The EC MSA study (BIO by Deloitte, 2015) did not consider the recycling of Al-Si alloys (EOL-RIR=0%).

78.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are obtained from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR is derived from the production of silicon metal between 2012 and 2021.

79 Silver

79.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

79.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: The data pertain to mined silver production.

Latest RMIS Dashboard update: August 2023.

79.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2022.

Data source(s): (The Silver Institute & Metal Focus, 2023)

Notes: The total silver supply (primary & secondary) is used as a proxy for silver's refined production, i.e. production of silver bullion or grain.

Latest RMIS Dashboard update: August 2021.

79.4 Applications

Geographical scope: World.

Data source(s): Data published by (Silver Institute, 2022).

Reference Year: 2021.

Notes: End-use demand of silver. Physical Investment is split into 'Coins & medals' and 'Bars'. EU-related data are unavailable for the reference year.

Latest RMIS Dashboard update: August 2023.

79.5 Trade of primary materials

Coverage: The trade of primary silver ores and concentrates is reported under HS 261610 (e.g. argentite). Primary silver represented about 29% of the total silver supply in 2019 (The Silver Institute and Refinitiv, 2019). It is not possible to account for the trade of silver contained as co- or by-product in ores and concentrates of other metals (e.g. Cu, Pb), and silver-bearing residues (e.g. slag, dross, slime) from the metallurgical processing of ores and concentrates hosting silver.

Data source(s): (WITS, 2021).

Reference Year: 2019

Notes: Exports originating from Argentina, Bolivia, Chile, and Russia are derived from declared imports by destination countries (as well as for India, Serbia, Tajikistan, Indonesia among minor producers).

Relevant Harmonized System (HS) Codes: HS 261610 *Silver ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

79.6 Trade of refined/processed materials

Coverage: The trade of refined/processed silver materials is represented of the aggregate of HS 284321, HS 284329, HS 710610 and HS 710691 covering silver nitrate and other silver compounds (e.g. silver halides and oxides), silver powder, and unwrought silver and its alloys. Trade of colloidal silver (HS 284310) and silver amalgams (HS 284390) is not included due to the low granularity of the HS headings. Wrought products of silver and silver alloys are excluded (HS 710692).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Bolivia (as well as of some minor producers) are derived from reported imports by destination countries. Mozambique's, Iran's, and Ukraine's trade flows for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 284321 Silver compounds; silver nitrates; HS 284329 *Silver compounds; excluding silver nitrates*; HS 710610 *Metals; silver powder*; HS 710691 *Metals; silver, unwrought, (but not powder)*.

Latest RMIS Dashboard update: August 2021.

79.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU

Data source(s): JRC calculation based on background data from (Silver Institute, 2022)

Reference Year: 2021

Notes: The EOL-RIR is derived as the share of recycling in total demand. Data for silver fabrication reported by (The Silver Institute and Refinitiv, 2019) are used to estimate the share of EU in European demand reported by (Silver Institute, 2022). Recycling covers the recovery of silver from fabricated products, including unused trade stocks and excludes scrap generated during manufacturing (new scrap). Recycling is captured in the country where the scrap is generated, which may differ from where it is refined.

Latest RMIS Dashboard update: August 2023.

79.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020; the share of Poland in EU Sourcing is a JRC estimate. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to refinery production (2013-2022), including primary and secondary silver.

80 Strontium

80.1 Reserves

Reserve data provided from (USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024)(USGS, 2024) have a limited coverage of countries worldwide.

80.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: Production data relate to concentrates of strontium minerals (celestite).

80.3 Production of refined/processed materials

Absence of publicly available information on the production of refined materials (e.g. strontium compounds such as strontium carbonate and nitrate).

80.4 Applications

Geographical scope: United States.

Data source(s): (USGS, 2021).

Reference Year: 2020.

Notes: Estimated end-use demand distribution in the United States. It is considered representative for the EU after excluding the use of celestite for oil and gas drilling fluids and redistributing the shares of other applications.

Latest RMIS Dashboard update: August 2021.

80.5 Trade of primary materials

Granular data in the HS nomenclature are unavailable as the trade of strontium primary raw materials (celestite and strontianite) is classified in the highly aggregated heading HS 253090 that comprises many mineral commodities.

80.6 Trade of refined/processed materials

Coverage: Trade data cover precipitated strontium carbonate (HS 283692). Strontium metal (HS 280519) and strontium salts and compounds such as nitrates of strontium, strontium sulphide and strontium oxides, hydroxides and peroxides, are not considered as the respective HS headings contain substances of several other materials.

Data source(s): (WITS, 2021).

Reference Year: 2019

Notes: Iran's, Mozambique's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 283692 *Carbonates; strontium carbonate*.

Latest RMIS Dashboard update: August 2021.

80.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC assessment based on (UNEP, 2011) (USGS mcs, 2023).

Reference Year: 2022.

Notes: Existing data for the calculation/estimation of the EOL-RIR in the EU or globally are insufficient. Strontium's EOL-RIR is inferred from (UNEP, 2011) and (USGS mcs, 2023).

80.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

81 Sulphur

81.1 Reserves

Country-specific information on reserves of elemental sulphur and sulphur associated with fossil fuels (petroleum, natural gas), sulphide ores, gypsum and anhydrite etc., is insufficient. In addition, because petroleum and sulphide ores can be processed long distances from where they are extracted, sulphur production may not be in the country to which the reserves are attributed. In general, reserves of sulphur in crude oil, natural gas, and sulphide ores are large, whereas the sulphur in gypsum and anhydrite is almost infinite (USGS, 2024).

81.2 Production of primary materials

The production of native (elemental) sulphur and pyrites is allocated to refinery production.

81.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: It is deduced from background information in collected sources that data reflect the production of sulphur in all forms, i.e. Frasch sulphur, other native sulphur, pyrites-derived sulphur, by-product sulphur recovered as elemental sulphur or as sulphur compounds from metallurgical operations, petroleum refineries, from extraction of crude oil and natural gas, mined gypsum-derived sulphur and sulphur recovered from oil sands. The production of Belgium, Netherlands and Uzbekistan is sourced from (USGS myb-S, 2023).

Latest RMIS Dashboard update: August 2023.

81.4 Applications

Geographical scope: United States.

Data source(s): JRC elaboration based on (USGS, 2022).

Reference Year: 2018.

Notes: Figures reflect the end-use sectors of products containing sulphur and are assumed to be applicable to the EU.

Latest RMIS Dashboard update: August 2021.

81.5 Trade of primary materials

Coverage: Aggregate of HS 250200 and HS 250300 taking into account unroasted iron pyrite, and crude mineral sulphur/unrefined sulphur, respectively. It is noted that the heading HS 250300 reports also trade of sulphur in refined forms.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from United Arab Emirates (top exporter), Bahrein, Libya, Turkmenistan and Venezuela are derived from declared imports from destination countries. Oman's, Mozambique's, Iran's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 250200 *Iron pyrites; unroasted*; HS 250300 *Sulphur of all kinds; other than sublimed, precipitated and colloidal sulphur*.

Latest RMIS Dashboard update: August 2021.

81.6 Trade of refined/processed materials

Coverage: Aggregate of HS 280200 (sublimed sulphur, precipitated sulphur and colloidal sulphur) and HS 280700 (sulphuric acid and oleum). Several forms of processed sulphur are not encompassed i.e. refined sulphur, micronised sulphur powders and sulphur μ , as they are reported within HS heading 250300 together with crude/unrefined sulphur. Sulphur dioxide and sulphur trioxide are also left out of the aggregate due to the low detail of the HS headings in which these products are classified (HS 281129).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Data for Iran's, Mozambique's, Ukraine's and Myanmar's trade flows are derived from declared imports and exports by reporting partners. DRC's trade data are collected from (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes:

HS 280200 *Sulphur; sublimed or precipitated, colloidal sulphur*; HS 280700 *Sulphuric acid; oleum*.

Latest RMIS Dashboard update: August 2021.

81.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available on the recycling of spent or contaminated sulphuric acid in order to estimate or calculate the EOL-RIR of sulphur in the EU or globally.

81.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR relates to the production all forms of refined sulphur in 2012-2021.

82 Talc

82.1 Reserves

World reserves of talc are abundant; available information from (USGS, 2024) on their distribution by country is partial.

82.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures specify the production of talc, pyrophyllite and other similar minerals (e.g. steatite). The output of Afghanistan is acquired from (USGS myb-talc, 2022).

Latest RMIS Dashboard update: August 2023.

82.3 Production of refined/processed materials

Not applicable.

82.4 Applications

Geographical scope: EU28.

Data source(s): (IMA Europe, 2018)(IMA Europe, 2019).

Reference Year: 2017.

Notes: Figures shown indicate the end uses of talc.

Latest RMIS Dashboard update: August 2021.

82.5 Trade of primary materials

Coverage: Aggregate data are used from headings HS 252610 and HS 252620 covering natural steatite and talc.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Mozambique's, Iran's, Guyana's, and Ukraine's trade flows for 2019 is deduced from reported imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 252610 *Natural steatite, whether or not roughly trimmed or merely cut, by sawing or otherwise, into blocks or slabs of a square or rectangular shape, and talc, uncrushed or unpowdered*; HS 252620 *Natural steatite and talc, crushed or powdered*.

Latest RMIS Dashboard update: August 2021.

82.6 Trade of refined/processed materials

Not applicable.

82.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data are insufficient for the calculation of the EOL-RIR.

82.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are gathered from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production in 2012-2021.

83 Tantalum

83.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

83.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS myb-Ta, 2022).

Notes: Data relate to marketable tantalum mineral concentrates; it is assessed that tantalum-bearing tin slags are not included. The production of Spain, Malaysia and Sierra Leone is obtained from (WMD, 2023). The French production is assumed steady over 2000-2021 based on information from (BRGM, 2012) and (BRGM, 2020b). Zimbabwe's output is collected from (BGS, 2023).

Latest RMIS Dashboard update: August 2023.

83.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2018.

Data source(s): (TIC, 2020).

Notes: Data relate to tantalum product shipments by processors.

Latest RMIS Dashboard update: August 2021.

83.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The distribution of applications concerns products used in the EU (end uses).

Latest RMIS Dashboard update: August 2021.

83.5 Trade of primary materials

The HS nomenclature does not provide the required detail to determine the trade of tantalum's primary materials. Tantalite concentrates and Nb-Ta concentrates are reported under HS 261590 that involves concentrates of other materials. Similarly, the trade of tantalum-rich slags and residues from metallurgical processing is captured in the highly aggregated heading HS 262099.

83.6 Trade of refined/processed materials

Coverage: Data correspond to HS 810320 comprising unwrought and tantalum, powders and its alloys. It is not possible to include in the trade of tantalum's refined/processed products data for fluorotantalates (K₂TaF₇) obtained from tantalum metallurgy, tantalum oxide, and other tantalum compounds (chlorides and carbides) as they are reported in HS headings together with other commodities. Tantalum in wrought forms and shaped tantalum articles are excluded (HS 810390).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: -

Relevant Harmonized System (HS) Codes: HS 810320 *Tantalum; unwrought, including bars and rods obtained simply by sintering, powders.*

Latest RMIS Dashboard update: August 2021.

83.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: Taking into account the methodology provided by (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020), the indicator is calculated from background data provided by the source.

Latest RMIS Dashboard update: August 2021.

83.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR related to primary production of tantalum between 2012 and 2021.

84 Teak wood

84.1 Reserves

Data source(s): JRC estimate based on (Kollert and Cherubini, 2012), (KU-ITTO-TeakNet, 2022)

Reference Year: 2021 for Thailand, Indonesia and Lao People's Democratic Republic, 2010 for Myanmar, 1992 for India.

Notes: Data correspond to natural teak. Estimates of the area covered by productive teak forests is considered a proxy to natural teak reserves. Indonesia is regarded as part of teak's natural distribution as teak has been planted and cultivated for hundreds of years and has since 'naturalised' (Midgley *et al.*, 2015).

Latest RMIS Dashboard update: August 2023.

84.2 Production of primary materials

Coverage: World countries (partial).

Reference Year: 2010.

Data source(s): (Kollert and Cherubini, 2012).

Notes: Minimal data exist on the total commercial teak volume harvested globally from natural and planted teak forests. Several teak-producing countries are not covered by the dataset, e.g. India, a major source of native teak. The estimated total production of natural teak and plantation teak is derived if all teak-growing countries are considered.

Latest RMIS Dashboard update: August 2023.

84.3 Production of refined/processed materials

No data are available for the production of teak sawnwood.

84.4 Applications

Geographical scope: EU.

Data source(s): Expert judgement in (European Commission, 2017b).

Reference Year: N/A.

Notes: Quantitative information on applications of teak wood is sparse.

Latest RMIS Dashboard update: August 2021.

84.5 Trade of primary materials

Trade of teak wood is reported under HS 440349; however, the code covers several species of tropical timber, and, therefore, the individual trade flows of teak roundwood cannot be ascertained.

84.6 Trade of refined/processed materials

Trade of teak wood is reported under HS 440729; though, the code includes several species of tropical timber, and the specific trade flows of teak sawnwood cannot be determined.

84.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available for the calculation or estimation of the indicator. According to expert opinion in (European Commission, 2020a), the EOL-RIR of natural teak wood is 0%.

84.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is taken from (European Commission, 2023) and refers to the average 2016-2020.

85 Tellurium

85.1 Reserves

Data source(s): (USGS, 2024)

Reference Year: 2022.

Notes: The definition of reserves complies with the USGS classification system (USGS, 1980). Figures are based on identified copper deposits and average tellurium content. Data for Poland are collected from (BRGM, 2018a).

Latest RMIS Dashboard update: February 2024

85.2 Production of primary materials

As tellurium is mainly a by-product of copper mining, no data are available for mine production, i.e. tellurium contained in copper ores and concentrates.

85.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC elaboration based on (USGS, 2023).

Notes: Data relate to the countries where tellurium is recovered and refined. Obtaining comprehensive and robust data for the annual output of refined tellurium is challenging due to its by-product nature and the unreported production in major producing countries. The US and Chinese production are sourced from (BGS, 2023). The production of Germany and Belgium is a JRC estimate based on (Nassar *et al.*, 2022) and the production of Finland is approximated from (Eurostat Prodcom, 2023b). The output of Uzbekistan is obtained from (WMD, 2023).

Latest RMIS Dashboard update: August 2023.

85.4 Applications

Geographical scope: World.

Data source(s): (Anderson, 2020), (STDA, 2023).

Reference Year: 2010.

Notes: Figures illustrate the end uses of tellurium. EU-related data are unavailable.

Latest RMIS Dashboard update: August 2021.

85.5 Trade of primary materials

There are no specific codes in international trade statistics (HS) to tellurium's primary raw materials. As the majority of tellurium produced worldwide is a by-product of electrolytic copper refining, the heading HS 262030 *Slag, ash and residues containing mainly copper* covers the trade of sludges from electrolytic baths generated during metals refining. However, the heading's detail for contained tellurium is not adequate. Trade of copper ores and concentrates (HS 260300) and ores and concentrates of other metals that may contain tellurium is also excluded.

85.6 Trade of refined/processed materials

Specific trade data for several tellurium compounds (e.g. salts of tellurium acids under HS 284290) are not available due to the high aggregation of HS headings in which they are classified. HS 280450 contains both tellurium and boron and requires splitting in order to be representative for tellurium.

85.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): Expert judgment in (European Commission, 2017b)(European Commission, 2020b)(European Commission, 2023).

Reference Year: N/A.

Notes: There is no information available to calculate the EOL-RIR in the EU.

Latest RMIS Dashboard update: August 2021.

85.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR relates to refinery production between 2012 and 2021.

86 Terbium

86.1 Reserves

No data have been compiled. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

86.2 Production of primary materials

Coverage: World countries (2021)

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and terbium content in REE minerals of each operating mine.

Notes: The mine production of terbium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is obtained from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

86.3 Production of refined/processed materials

The compiled information is not publicly available.

86.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data show the distribution of demand by end use.

Latest RMIS Dashboard update: August 2023.

86.5 Trade of primary materials

There are no specific codes to terbium in international trade statistics (HS). Terbium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

86.6 Trade of refined/processed materials

There are no specific codes to terbium in international trade. Terbium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

86.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2013.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2023.

86.8 Other Indicators

- ✓ The EU Sourcing (EU supply) originates from (SCREEN2, 2023) and relates to all forms of terbium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

87 Thulium

87.1 Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of reserves of total Rare Earth Elements).

87.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and thulium content in REE minerals of each operating mine.

Notes: The mine production of thulium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

87.3 Production of refined/processed materials

The collected information is not publicly available.

87.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a)

Reference Year: 2021.

Notes: Data relate to thulium's demand by end use.

Latest RMIS Dashboard update: August 2023.

87.5 Trade of primary materials

There are no specific codes for thulium in international trade statistics (HS). Its trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

87.6 Trade of refined/processed materials

There are no specific codes to thulium in international trade statistics (HS). Their trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

87.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to calculate or estimate the EOL-RIR in the EU are missing.

87.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is sourced from (SCRREEN2, 2023) and relates to all forms of thulium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used are provided by (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

88 Tin

88.1 Reserves

Data source(s): (ITA, 2020).

Reference Year: 2020.

Notes: The estimate of mineral reserves includes compliant and non-compliant data with CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

88.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Data reflect the mine production of tin.

Latest RMIS Dashboard update: August 2023.

88.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures relate to tin smelter production and comprise both primary (from ores and concentrates) and secondary metal (tin metal recovered from old scrap).

Latest RMIS Dashboard update: August 2023.

88.4 Applications

Geographical scope: World.

Data source(s): (ITinA, 2021).

Reference Year: 2020.

Notes: Based on International Tin Association's estimates of refined tin use worldwide. Data are not considered applicable to the EU.

Latest RMIS Dashboard update: August 2023.

88.5 Trade of primary materials

Coverage: The heading HS 260900 is employed for international trade (cassiterite and stannite). The trade of metallurgical by-products rich in tin such as tin dross, used either for the extraction of tin or as a basis for the manufacture of its chemical compounds are not included as the relevant HS heading (HS 262099) aggregates various metallurgical residues containing several metals.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports of Myanmar, Bolivia and DRC in 2019 are estimated from reported imports from country destinations in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 260900 *Tin ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

88.6 Trade of refined/processed materials

Coverage: Data are derived from the aggregate of HS 800110 and HS 800120 including unwrought non-alloyed tin and unwrought tin alloys. Bronze and other alloys in which tin is not the principal element are excluded (e.g. HS 740322). Specific data for various tin compounds (e.g. tin oxides and hydroxides, tin chloride, potassium stannate, tin sulphide) are unavailable in the HS nomenclature due to the high aggregation with other compounds within the relevant headings (e.g. in HS 282590; HS 282739; HS 283090; HS 284190). Semi-finished tin products are not accounted in the aggregate (HS 800300, HS 800700).

Data source(s): (WITS, 2021)

Reference Year: 2019

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners. Bolivia's exports are derived from declared imports from destination countries in (UN Comtrade, 2022).

Relevant Harmonized System (HS) Codes: HS 800110 *Unwrought tin, not alloyed*; HS 800120 *Unwrought tin alloys*.

Latest RMIS Dashboard update: August 2021.

88.7 End-of-Life Recycling Input Rate (EOL-RIR)

Insufficient data are available to make reasonable estimates of tin's EOL-RIR. A rough estimate for the EOL-RIR globally is 11%, concluded according with the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). The International Tin Association reported that the RIR (recycled content), i.e. the contribution of recycled tin to total tin use (including tin recovered from manufacturing waste and residues), was 33% in 2020 (ITinA, 2023).

88.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for the processing stage (refined materials) are obtained from (European Commission, 2023) and refer to the average 2008-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is calculated on the basis of refined tin production in 2012-2021.

89 Titanium

89.1 Reserves

Data source(s): (USGS, 2024).

Reference Year: 2022.

Notes: Reserves are compliant with the USGS classification system (USGS, 1980).

Latest RMIS Dashboard update: February 2024.

89.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023)

Notes: The figures refer to the production of titanium concentrates (rutile, ilmenite, leucoxene).

Latest RMIS Dashboard update: August 2023.

89.3 Production of refined/processed materials

Production data of titanium dioxide (TiO₂) pigments are unavailable.

89.4 Applications

Geographical scope: World.

Data source(s): (BRGM, 2017), data from Société Chimique de France.

Reference Year: 2013.

Notes: Figures indicate the end uses of titanium oxide (TiO₂). It is assessed that the distribution is also applicable in the EU.

Latest RMIS Dashboard update: August 2023.

89.5 Trade of primary materials

Coverage: The HS heading considered for titanium's primary raw materials is HS 261400 covering ilmenite and rutile.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: Exports of Sierra Leone, and Norway are derived from reported imports by trade partners.

Relevant Harmonized System (HS) Codes: HS 261400 *Titanium ores and concentrates*.

Latest RMIS Dashboard update: August 2023.

89.6 Trade of refined/processed materials

Coverage: The trade of refined/processed titanium is represented by HS 282300 covering titanium dioxide (unfinished pigments). Preparations of titanium oxide for use as pigments (finished pigments) are excluded

(HS 320611 and HS 320619). Finally, various titanium chemicals (e.g. sulphates) are not included due to the insufficient level of detail of the relevant HS headings.

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes:

Relevant Harmonized System (HS) Codes: HS 282300 *Titanium oxides*.

Latest RMIS Dashboard update: August 2021.

89.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available information for the estimation of the EOL-RIR of titanium oxide in the EU or globally is inadequate.

89.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR is calculated from primary (mining) production from 2012 to 2021.

90 Titanium metal

90.1 Reserves

See section 89.1 on the distribution of titanium mineral reserves.

90.2 Production of primary materials

The production of primary raw materials associated with the extraction of titanium metal is presented in the Raw Material *Titanium*.

90.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (USGS mcs, 2023)

Notes: Data indicate the production of titanium sponge.

Latest RMIS Dashboard update: August 2023.

90.4 Applications

Geographical scope: Europe.

Data source(s): (Louvigné, 2021).

Reference Year: 2019.

Notes: Data designate the end uses of titanium metal.

Latest RMIS Dashboard update: July 2022.

90.5 Trade of primary materials

See section 89.5 regarding titanium minerals.

90.6 Trade of refined/processed materials

Coverage: The trade of refined/processed titanium is represented by the product aggregate of HS 720291 and HS 810820, covering titanium in ferro-alloy form (ferro-titanium & ferro-silico-titanium), and unwrought titanium metal (sponge, powder, ingots and other forms), respectively. Wrought forms (mill products and articles) of titanium are excluded (HS 810890).

Data source(s): (WITS, 2023).

Reference Year: 2021.

Notes: -

Relevant Harmonized System (HS) Codes: HS 720291 *Ferro-alloys; ferro-titanium and ferro-silico-titanium*; HS 810820 *Titanium; unwrought, powders*.

Latest RMIS Dashboard update: August 2023.

90.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC estimate based on (UNEP, 2011).

Reference Year: N/A.

Notes: Recent and reliable data that allow the calculation of titanium metal's EOL-RIR in the EU are unavailable. The approximate value for the EOL-RIR is derived according with the guidance provided in the methodology for establishing the EU List of Critical Raw Materials (Blengini *et al.*, 2017) and data from (UNEP, 2011). It is assumed that the figure is also applicable in the EU. Another rough estimate for the EOL-RIR globally is 3%, derived from data shown by (Roberts, 2018) and considering the recycling of titanium metal and ferrotitanium.

Latest RMIS Dashboard update: August 2021.

90.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for processing (refined materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR refers to titanium sponge production from 2012 to 2021.

91 Tungsten

91.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

91.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Figures present the production of tungsten concentrates.

Latest RMIS Dashboard update: August 2023.

91.3 Production of refined/processed materials

Coverage: EU countries.

Reference Year: 2021.

Data source(s): JRC elaboration based on (Eurostat Prodcom, 2023a) (Eurostat Prodcom, 2023b).

Notes: The dataset comprises the production of tungsten products (unwrought, powders & wrought). PRC code: 24453013 *Tungsten (wolfram) and articles thereof (excluding waste and scrap), n.e.c.* Data concern total production (except Germany for which data available data refer to sold production). Data for France in 2019, and figures for 'Other EU' (including Sweden, Poland, and Czechia) are a JRC estimate.

Latest RMIS Dashboard update: August 2023.

91.4 Applications

Geographical scope: World.

Data source(s): (ITIA, 2018).

Reference Year: 2017.

Notes: First uses of tungsten. The breakdown of EU consumption by end-use applications is available from the EC MSA study (BIO by Deloitte, 2015).

Latest RMIS Dashboard update: August 2021.

91.5 Trade of primary materials

Coverage: The heading HS 261100 is employed for trade data that covers tungsten ores and concentrates (wolframite, scheelite etc.). The trade of metallurgical by-products containing mainly tungsten and used either for its extraction or as a basis for the manufacture of chemical compounds are excluded as the relevant HS heading (HS 262099) contains various by-products containing several metals and compounds.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports originating from Bolivia, DRC, Democratic People's Republic of Korea, and Vietnam are approximated from reported imports by destination countries. Mozambique's, and Ukraine's trade for 2019 is derived from declared imports and exports by reporting partners.

Relevant Harmonized System (HS) Codes: HS 261100 *Tungsten ores and concentrates*.

Latest RMIS Dashboard update: August 2021.

91.6 Trade of refined/processed materials

Coverage: Data shown refer to the product aggregate of HS 284180, HS 720280, HS 810194 and HS 810110. The products coverage extends from tungstates to tungsten ferroalloys, and from unwrought tungsten to tungsten powders and tungsten articles. Data for the trade of tungsten carbides and various tungsten compounds such as tungstic oxide and tungstic acid are not included due to the low granularity of the HS headings they are classified in (HS 282590; HS 282739; HS 284990; HS 285000). Tungsten products in wrought forms are excluded (HS 810196, HS 810699).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's, Mozambique's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 284180 Salts; tungstates (wolframates); HS 720280 *Ferro-alloys; ferro-tungsten and ferro-silico-tungsten*; HS 810194 *Tungsten (wolfram); unwrought, including bars and rods obtained simply by sintering*; HS 810110 *Tungsten (wolfram); articles thereof, including waste and scrap, powders*.

Latest RMIS Dashboard update: August 2021.

91.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU28.

Data source(s): EC MSA study (BIO by Deloitte, 2015).

Reference Year: 2012.

Notes: The indicator is calculated from background data provided by the source according to the methodology described in (Peiró *et al.*, 2018).

Latest RMIS Dashboard update: August 2021.

91.8 Other Indicators

- ✓ The EU Sourcing (EU supply) for processing (refined materials), and the Import Reliance for extraction and processing (primary and refined materials, respectively) are gathered from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR indicates the growth of primary (mining) production between 2012 and 2021.

92 Vanadium

92.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are generally based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

92.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023) .

Notes: Figures include the production of primary ores and co-production from steel slag but exclude vanadium recovered as a by-product from secondary sources and residues e.g. spent catalysts used in crude oil refining.

Latest RMIS Dashboard update: August 2021.

92.3 Production of refined/processed materials

Coverage: World countries (2019), World total (2011-2022).

Reference Year: 2019.

Data source(s): (Perles, 2020) for 2019 (by world countries), (Vanitec, 2023) for 2011-2022 (world total).

Notes: The output of refined vanadium is defined as the V content in all vanadium oxides produced, plus other V-compounds (e.g. V-chemicals) that have not been produced via oxide route, plus ferrovanadium that has not been produced via V₂O₅-route (e.g. from certain recycling processes).

Latest RMIS Dashboard update: August 2023.

92.4 Applications

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2015.

Notes: Figures denote the distribution of consumption by first-use applications.

Latest RMIS Dashboard update: August 2021.

92.5 Trade of primary materials

The trade of vanadiferous concentrates (e.g. titanomagnetite (VTM) ores) and residues from the metallurgical processing of V-bearing iron ore is covered by headings HS 261590 and HS 260299, respectively, which do not have the required granularity. Therefore, no data are shown for the trade of vanadium's primary raw materials.

92.6 Trade of refined/processed materials

Coverage: The trade of refined/processed vanadium is specified by the product aggregate of HS 282530 and HS 720292 covering vanadium pentoxide and ferro-vanadium, respectively. Vanadium metal, vanadates and other vanadium compounds (chloride, chloride oxide, sulphate etc) are not included due to the low granularity of the respective HS headings.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 282530 *Vanadium oxides and hydroxides*; HS 720292 *Ferro-alloys; ferro-vanadium*.

Latest RMIS Dashboard update: August 2021.

92.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: EU.

Data source(s): EC MSA study (Matos *et al.*, 2021).

Reference Year: 2016.

Notes: The indicator is calculated from background data reported by the source in line with the methodology defined by (Peiró *et al.*, 2018) and (Matos, Wittmer, *et al.*, 2020).

Latest RMIS Dashboard update: August 2021.

92.8 Other Indicators

- ✓ The Import Reliance for extraction (primary materials) is assumed 100% as there is no production of vanadium ores and concentrates in the EU;
- ✓ The CAGR refers to refinery production between 2013 and 2022.

93 Vermiculite

93.1 Resources and Reserves

Estimates of global resources are unavailable. The compiled information for global reserves is limited and with a partial country coverage; therefore, no figures are displayed. (USGS, 2024)(Kogel *et al.*, 2006)

93.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source: (BGS, 2023).

Notes: Uzbekistan's production is sourced from (USGS myb-vermiculite, 2022).

Latest RMIS Dashboard update: August 2023.

93.3 Production of refined/processed materials

No information is available on the production of exfoliated vermiculite.

93.4 Applications

Geographical scope: United States.

Data source: (USGS myb-vermiculite, 2022)

Reference Year: 2021.

Notes: End-use market shares. EU-specific data are unavailable; therefore, it is assumed that the figures are applicable in the EU.

Latest RMIS Dashboard update: August 2023.

93.5 Trade of primary materials

Coverage: World countries.

Data source: JRC estimation based on background data from (WITS, 2021)

Reference Year: 2019.

Notes: Data from heading HS 253010 were used for the estimation of vermiculite-specific flows. The split of vermiculite flows from other materials contained within HS 253010 is achieved after assessing production for perlite and vermiculite reported by (BGS, 2023) and unit prices. Iran's, Mozambique's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners. Chlorites' trade is not considered.

Relevant Harmonized System (HS) Codes: HS 253010 *Vermiculite, perlite and chlorites; unexpanded*.

Latest RMIS Dashboard update: August 2023.

93.6 Trade of refined/processed materials

No data are obtainable from international statistics. The trade of exfoliated vermiculite is reported under heading HS 680620 that contains mineral products of several raw materials.

93.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to estimate the EOL-RIR in the EU are missing.

93.8 Other Indicators

- ✓ Vermiculite was not included in the 2023 EU assessment of Critical raw materials (CRMs)(European Commission, 2023); therefore, no figures are shown for the EU Sourcing and Import Reliance;
- ✓ The CAGR refers to primary (mining) production (2012-2021).

94 Wollastonite

94.1 Resources and Reserves

Robust resource and reserve information is unavailable. (USGS, 2024)(Kogel *et al.*, 2006)

94.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: Data may include crude and processed (refined) wollastonite. The production of Canada is obtained from (USGS, 2023).

Latest RMIS Dashboard update: August 2023.

94.3 Production of refined/processed materials

Processed wollastonite of higher purity (refined wollastonite) is classified as a primary raw material.

94.4 Applications

Geographical scope: World

Data source: (Nair and Sairam, 2021)

Reference Year: 2013

Notes: End-use market shares. EU-specific data are not available; therefore, it is hypothesised that the figures are appropriate for the EU.

Latest RMIS Dashboard update: August 2023.

94.5 Trade of primary materials

Data are not available as wollastonite's trade is reported under the generic code HS 253090 that includes multiple mineral commodities.

94.6 Trade of refined/processed materials

Data are unavailable as wollastonite's trade is reported under the generic code HS 253090 that includes multiple mineral commodities.

94.7 End-of-Life Recycling Input Rate (EOL-RIR)

There is lack of information to calculate the EOL-RIR in the EU.

94.8 Other Indicators

- ✓ Wollastonite was not screened in the 2023 EU assessment of Critical raw materials (European Commission, 2023); thus, no figures are displayed for EU Sourcing and Import Reliance;
- ✓ The CAGR refers to primary (mining) production (2012-2021).

95 Xenon

95.1 Resources and Reserves

Not applicable. Xenon is only present in the air in trace amounts and is recovered as by-product in air separation units.

95.2 Production of primary materials

Not applicable. Xenon is obtained from air in air separation units by fractional separation of liquefied air.

95.3 Production of refined/processed materials

Coverage: World total.

Reference Year: 2017.

Data source(s): (Elsner, 2018).

Notes: Publicly-available and country-specific production data of xenon gas are insufficient to present the global distribution of production by countries.

Latest RMIS Dashboard update: August 2023.

95.4 Applications

Geographical scope: World.

Data source(s): (Elsner, 2018) .

Reference Year: 2017.

Notes: Data show the allocation of demand by end uses. EU-specific information is unavailable.

Latest RMIS Dashboard update: August 2023.

95.5 Trade of primary materials

Not applicable.

95.6 Trade of refined/processed materials

No data are available. The HS nomenclature does not provide the required level of detail to allow tracking of xenon trade flows (xenon trade is reported in HS 280429 among other rare gases).

95.7 End-of-Life Recycling Input Rate (EOL-RIR)

No data are available to calculate or estimate the indicator.

95.8 Other Indicators

✓ The calculation of CAGR concerns the production of xenon between 2008 and 2017.

96 Ytterbium

96.1 Resources and Reserves

No data have been collected. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of resources and reserves of total Rare Earth Elements).

96.2 Production of primary materials

Coverage: World countries

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and ytterbium content in REE minerals of each operating mine.

Notes: The mine production of ytterbium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

96.3 Production of refined/processed materials

The gathered information is not publicly available.

96.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data reflect ytterbium's end-use demand.

Latest RMIS Dashboard update: August 2023.

96.5 Trade of primary materials

There are no specific codes for ytterbium in international trade statistics (HS). Their trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

96.6 Trade of refined/processed materials

There are no specific codes to ytterbium in international trade statistics (HS). Their trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

96.7 End-of-Life Recycling Input Rate (EOL-RIR)

Data to calculate or estimate the EOL-RIR in the EU are not available.

96.8 Other Indicators

- ✓ The EU Sourcing (EU supply) is taken from (SCRREEN2, 2023) and relates to all forms of ytterbium. The Import Reliance is derived from (European Commission, 2023). Both indicators refer to the average 2016-2020. More information on the scope, data, and assumptions used are provided by (SCRREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

97 Yttrium

97.1 Resources and Reserves

No data have been gathered. Information for individual rare earth elements is not readily available (see section 67.1 for the distribution of resources and reserves of total Rare Earth Elements).

97.2 Production of primary materials

Coverage: World countries (2021)

Reference Year: 2021.

Data source(s): JRC analysis based on the total REE production and yttrium content in REE minerals of each operating mine.

Notes: The mine production of yttrium is estimated from the allocation of total REE production (see 67.2) to every operating mine over 2000-2021 and the grade of Rare Earth Elements in individual deposits. Information on the relative distribution of in-situ rare-earth oxides in mined REE deposits is collected from several sources such as (Alves Dias *et al.*, 2020), (USGS myb-REE, 2022), (TMR, 2015) etc. Information about the operation and output of individual REE mines is sourced from (S&P, 2023) and other sources.

Latest RMIS Dashboard update: August 2023.

97.3 Production of refined/processed materials

The compiled information is not publicly available.

97.4 Applications

Geographical scope: Europe.

Data source(s): (Wood Mackenzie, 2022a).

Reference Year: 2021.

Notes: Data demonstrate the distribution of yttrium's end-use demand.

Latest RMIS Dashboard update: August 2023.

97.5 Trade of primary materials

No data can be extracted from international trade statistics for yttrium's primary raw materials. Yttrium's trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of primary materials in section 67.5).

97.6 Trade of refined/processed materials

There are no specific codes to yttrium in international trade statistics (HS). Its trade flows are reported in HS headings clustered with other REE without granular detail (see the generic notes for REE's trade of refined/processed materials in section 67.6).

97.7 End-of-Life Recycling Input Rate (EOL-RIR)

Available data from the EC MSA study (BIO by Deloitte, 2015) for yttrium's EOL-RIR are disregarded as they are not consistent with additional sources of information (the indicator is calculated at 31% for year 2013 based on the MSA data).

97.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance are collected from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR concerns primary (mining) production (2012-2021).

98 Zinc

98.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are mostly based on CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023

98.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023)

Other sources checked and/or compiled: (ILZSG, 2022) (2016-2021), (BGS, 2023) (2006-2021).

Notes: Figures present the mine production of zinc.

Latest RMIS Dashboard update: August 2021.

98.3 Production of refined/processed materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (BGS, 2023).

Notes: On the basis of collected background information, data correspond to the production of refined zinc metal by smelters or refineries regardless of the type of source material, i.e. primary (ores and concentrates) or secondary sources (scrap, residues, and slag). Remelted zinc and zinc dust are excluded.

Latest RMIS Dashboard update: August 2023.

98.4 Applications

Geographical scope: Europe.

Data source(s): (Oakdene Hollins, 2017a).

Reference Year: 2015.

Notes: First uses of zinc. Data refer to 13 EU countries + UK + Norway, accounting for more than 90% of zinc use in the EU and EFTA region.

Latest RMIS Dashboard update: August 2021.

98.5 Trade of primary materials

Coverage: Data comprise the aggregated value of HS 260800, HS 262011 and HS 262019. Except for zinc ores and concentrates (HS 260800), metallurgical residues are allocated in the product aggregate of zinc's primary materials, i.e. hard zinc spelter residue from galvanising baths (HS 262011) and residues of zinc metallurgy (HS 262019) destined for zinc recovery or the manufacture of chemical compounds. Zinc contained in copper, lead, silver, and gold ores and concentrates and their metallurgical residues cannot be traced by the HS nomenclature.

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Exports from Algeria, Argentina, Bolivia, Burkina Faso, Cuba, Eritrea, Myanmar and Tajikistan are derived from reported imports by destination countries. Dominican Republic's, Mozambique's, Iran's and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners.

Relevant Harmonized System (HS) Codes: HS 260800 *Zinc ores and concentrates*; HS 262011 *Slag, ash and residues; (not from the manufacture of iron or steel), containing mainly zinc, hard zinc spelter*; HS 262019 *Slag, ash and residues; (not from the manufacture of iron or steel), containing mainly zinc, other than hard zinc spelter*.

Latest RMIS Dashboard update: August 2021.

98.6 Trade of refined/processed materials

Coverage: For the global trade of zinc's refined/processed materials, the product aggregate of HS 281700, HS 790111, HS 790112, HS 790120, HS 790310, and HS 790390 are considered, corresponding to zinc oxides, unwrought zinc and zinc alloys, zinc dust, and zinc powders & flakes, correspondingly. Various zinc compounds such as artificial zinc sulphide, zinc hydroxide and zinc chloride are not included as the HS headings in which they are classified contain several substances. Unwrought brass is excluded from the product aggregate (HS 740321), as it is assigned to copper.

Data source(s): (WITS, 2021).

Reference Year: 2021.

Notes: Iran's, Mozambique's, Guyana's, and Ukraine's trade for 2019 is derived from declared imports and exports by trade partners. Exports from Bangladesh and other producing countries which do not report trade flows to WITS/Comtrade are estimated from the declared imports by destination countries.

Relevant Harmonized System (HS) Codes: HS 281700 *Zinc oxide; zinc peroxide*; HS 790111 *Zinc; unwrought, (not alloyed), containing by weight 99.99% or more of zinc*; HS 790112 *Zinc; unwrought, (not alloyed), containing by weight less than 99.99% of zinc*; HS 790120 *Zinc; unwrought, alloys*; 790310 *Zinc dust*; 790390 *Zinc; powders and flakes*.

Latest RMIS Dashboard update: August 2021.

98.7 End-of-Life Recycling Input Rate (EOL-RIR)

Geographical scope: World.

Data source(s): JRC elaboration based on background data from (Rostek *et al.*, 2022).

Reference Year: 2019.

Notes: It is presumed that the figure is also appropriate for the EU.

Latest RMIS Dashboard update: August 2023.

98.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction and processing (primary and refined materials, respectively) are taken from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCRREEN2, 2023);
- ✓ The CAGR is associated with refined zinc (2012-2021).

99 Zirconium

99.1 Reserves

Data source(s): (S&P, 2022).

Reference Year: 2021.

Notes: The mineral reserves estimates are largely derived from CRIRSCO reporting standards.

Latest RMIS Dashboard update: August 2023.

99.2 Production of primary materials

Coverage: World countries.

Reference Year: 2021.

Data source(s): (WMD, 2023).

Notes: Data concern the mining of zirconium minerals.

Latest RMIS Dashboard update: August 2021.

99.3 Production of refined/processed materials

Production statistics are unavailable for refined zirconium metal and compounds.

99.4 Applications

Geographical scope: World.

Data source(s): (BRGM, 2018b), data from TZMI, Société Chimique de France.

Reference Year: 2015.

Notes: Data relate to end-use applications of zirconium. EU-specific data are not available and figures are assumed to be applicable to the EU.

Latest RMIS Dashboard update: August 2021.

99.5 Trade of primary materials

Coverage: Data refer to HS 261510 covering zircon and zircon sands (zirconium silicates) and baddeleyite (zirconium oxide).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: Ukraine's and Mozambique's trade data are obtained from reported trade flows by trade partners.

Relevant Harmonized System (HS) Codes: HS 261510 *Zirconium ores and concentrates*

Latest RMIS Dashboard update: August 2021.

99.6 Trade of refined/processed materials

Coverage: Data are associated to HS 810920 covering unwrought zirconium and zirconium powders. Fused zirconia (zirconium dioxide), ferro-zirconium and other zirconium compounds are not included due to the

insufficient detail of the relevant HS headings (e.g. HS 282560, HS 720299). Wrought zirconium articles are excluded (HS 810990).

Data source(s): (WITS, 2021).

Reference Year: 2019.

Notes: -

Relevant Harmonized System (HS) Codes: HS 810920 *Zirconium; unwrought, powders*.

Latest RMIS Dashboard update: August 2021.

99.7 End-of-Life Recycling Input Rate (EOL-RIR)

Robust data for the calculation of the EOL-RIR of zirconium are not available. An approximate figure for the EOL-RR (12%) is provided by (European Commission, 2020b).

99.8 Other Indicators

- ✓ The EU Sourcing (EU supply) and the Import Reliance for extraction (primary materials) are sourced from (European Commission, 2023) and refer to the average 2016-2020. More information on the scope, data, and assumptions used can be found in (SCREEN2, 2023);
- ✓ The CAGR refers to primary (mining) production (2012-2021).

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