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Critical raw materials

12–15 Minuten

Raw materials are crucial to Europe's economy. They form a strong industrial base, producing a broad range of goods and applications used in everyday life and modern technologies. Reliable and unhindered access to certain raw materials is a growing concern within the EU and across the globe. To address this challenge, the European Commission has created a list of critical raw materials (CRMs) for the EU, which is subject to a regular review and update. CRMs combine raw materials of high importance to the EU economy and of high risk associated with their supply.

Why critical raw materials are important

- **Link to industry** - non-energy raw materials are linked to all industries across all supply chain stages
- **Modern technology** - technological progress and quality of life rely on access to a growing number of raw materials. For example, a smartphone might contain up to 50 different kinds of metals, all of which contribute to its small size, light weight and functionality.
- **Environment** – raw materials are closely linked to clean technologies. They are irreplaceable in solar panels, wind turbines,

electric vehicles, and energy-efficient lighting.

What the Commission does

- **First list of CRMs** – in 2011, a list of 14 CRMs was published in the communication on raw materials. The list of CRMs was established as a priority action of the EU 'raw materials initiative' of 2008. The Commission is committed to updating the list at least every 3 years to reflect production, market and technological developments.
- **Second list of CRMs** – in 2014, a first revised list of 20 CRMs was published in the communication on the list of critical raw materials 2014.
- **Third list of CRMs** – in 2017, a third list of 27 CRMs was published in the communication on the list of critical raw materials 2017, based on a refined methodology.
- **Fourth list of CRMs -** in 2020, a fourth list of 30 CRMs was published in the communication on critical raw materials
- **Methodology on CRMs** – in July 2017, the Commission published a revised methodology for establishing the EU list of critical raw materials. The synthesised guidelines build on the methodology used for the lists of CRMs in 2011 and 2014. They also integrate the methodological improvements identified by the Commission in the project 'assessment of the methodology on the list of critical raw materials', in areas such as manufacturing applications, trade, substitution, recycling. The 2020 assessment follows the same methodology as in 2017. Additional information regarding the methodology can be found in the background report (PDF, 7 MB) published in September 2020.

- Report on CRMs and the circular economy – in January 2018, the Commission published a report highlighting the potential for a more circular usage of CRMs in our economy. Reviewing important sectors for CRMs, it describes relevant EU policies, refers to key initiatives, presents and gives sources of data, identifies good practices and indicates possible further actions.
- JRC science for policy report: 'Recovery of critical and other raw materials from mining waste and landfills - state of play on existing practices' – in May 2019, the Commission issued a report. It shows existing practices to recover critical and other raw materials from extractive waste and landfill. The report outlines technological processes for the recovery of different materials from mining tailings and industrial waste as well as best practices for improving the knowledge base on the availability of secondary materials. Furthermore, it provides potential recovery estimates of certain materials and outlines prerequisites for recovery practices on a larger scale than today.
- Report on raw materials for strategic technologies and sectors – in September 2020, the Commission presented this foresight report. Specifically, it estimates material needs for growing technologies such as clean energy technologies (photovoltaic, wind, storage), electric mobility and digital technologies (ICT, robotics, 3D printing) based on the EU's 2050 climate-neutrality scenarios and other forecasts. It provides an outlook to 2030 and 2050 of material demand for these sectors and identifies supply risks and bottlenecks at different levels of the supply chains.
- European Raw Materials Alliance – The 2020 Communication on Critical Raw Materials announces the launch of an industrial

alliance dedicated to securing a sustainable supply of raw materials in Europe. By bringing together all relevant stakeholders along strategic value chains and industrial ecosystems, the alliance will initially focus on the most pressing needs, namely to increase EU resilience in the rare earth elements and permanent magnet value chains. This is vital to key EU industrial ecosystems, such as automotive, renewable energy, defence and aerospace. Later, the alliance will expand to address other critical raw material and base metal needs, including projects supporting the circular economy and addressing the EU Green Deal. There will be an industry-driven process led by EIT RawMaterials, whose task will be to identify opportunities, barriers and create relevant investment cases with stakeholders and industry partners. EIT RawMaterials will publish details of how to join the alliance.

The list of CRMs should help

- strengthen the competitiveness of European industry in line with the renewed industrial strategy for Europe
- stimulate the production of CRMs by enhancing new mining and recycling activities in the EU
- foster efficient use and recycling of critical raw materials, a priority area in the EU circular economy action plan
- increase awareness of potential raw material supply risks and related opportunities among EU countries, companies and investors
- negotiate trade agreements, challenge trade distortion measures, develop research and innovation actions and implement the 2030 ‘agenda on sustainable development and its sustainable development goals’

The methodology to identify CRMs

The Commission carries out a criticality assessment at EU level on a wide range of non-energy and non-agricultural raw materials. The 2020 criticality assessment was carried out for 66 candidate materials (63 individual materials and 3 material groups: heavy rare earth elements, light rare earth elements, platinum group metals, amounting to 83 materials in total). In 2011, 41 materials were assessed, 54 materials were assessed in 2014, and 78 in 2017.

The main parameters used to determine the criticality of the material for the EU are

- **Economic importance -** aims at providing insight into the importance of a material for the EU economy in terms of end-use applications and the value added (VA) of corresponding EU manufacturing sectors at the NACE rev.2 (2-digit level). The economic importance is corrected by the substitution index (SIEI) related to technical and cost performance of the substitutes for individual applications.
- **Supply risk -** reflects the risk of a disruption in the EU supply of the material. It is based on the concentration of primary supply from raw materials producing countries, considering their governance performance and trade aspects. Depending on the EU import reliance (IR), proportionally the 2 sets of the producing countries are taken into account — the global suppliers and the countries from which the EU is sourcing the raw materials. SR is measured at the ‘bottleneck’ stage of the material (extraction or processing), which presents the highest supply risk for the EU. Substitution and recycling are considered risk-reducing measures.

Fifth list 2023 of critical raw materials for the EU

In 2023, a fifth list of 34 CRMs was published in the Annex II of the Regulation proposal COM(2023) based on the Study on the Critical Raw Materials for the EU 2023 – Final Report

The assessment screened 70 candidate raw materials, comprising 67 individual materials and three materials groups: ten heavy (HREEs) and five light (LREEs) rare earth elements, and five platinum group metals (PGMs). Four new materials were assessed: neon, krypton, xenon and roundwood. Titanium metal has been assessed in addition to titanium. Aluminium and bauxite have been merged for consistency reasons. Copper and nickel do not meet the CRM thresholds but are included on the CRM list as **strategic raw materials** in line with the Critical Raw Materials Act.

Bauxite	**Coking Coal**	**Lithium**	**Phosphorus**
Antimony	**Feldspar**	Light rare earth elements	Scandium
Arsenic	Fluorspar	Magnesium	Silicon metal
Baryte	Gallium	**Manganese**	Strontium
Beryllium	Germanium	Natural Graphite	Tantalum
Bismuth	Hafnium	Niobium	Titanium metal
Boron/ Borate	**Helium**	Platinum group metals	Tungsten
Cobalt	Heavy rare earth elements	Phosphate Rock	Vanadium

		Copper	**Nickel**

An EU foresight report complements the criticality assessment with the forward-looking perspective focused on selected strategic technologies and sectors. In 2023, a second foresight study assesses 15 technologies mapped to 5 strategic sectors. The update of the study gives a current picture of the technologies' materials demand in 2030 and 2050,and provides a more complete picture of the technologies needed to reach the EU's strategic goals. The study also served as supporting evidence in the development of the Critical Raw Materials Act and the list of **strategic raw materials**.

See the SCRREEN project website for more on each critical raw material: Raw materials factsheets by SCRREEN project

Main global and domestic producers of CRMs

The EU's industry and economy are reliant on international markets to provide access to many important raw materials since they are produced and supplied by third countries. Although the domestic production of certain critical raw materials exists in the EU, notably hafnium, in most cases the EU is dependent on imports from non-EU countries.

The supply of many critical raw materials is highly concentrated. For example, China provides 100 % of the EU's supply of heavy rare earth elements (REE), Turkey provides 99% of the EU's supply of boron, and South Africa provides 71% of the EU's needs for platinum and an even higher share of the platinum group metals iridium, rhodium, and ruthenium.

The risks associated with the concentration of production are in

many cases compounded by low substitution and low recycling rates.

The Critical Raw Materials Act is a comprehensive response to the risks of critical raw materials supply disruption and the structural vulnerabilities of EU critical raw materials supply chains. Therefore, the Critical Raw Materials Act (CRM Act) will ensure EU access to a secure and sustainable supply of critical raw materials, enabling Europe to meet its climate and digital objectives, keeping EU industrial competitiveness and ensuring the well-functioning of the single market.

See our Critical Raw Materials Act (CRMA) page

Material system analysis (MSA)

Material system analysis (MSA) consists of a map of the flows of materials through the EU economy, as raw materials or as parts of components or products. It shows their movement from entry into the economy (extraction and import), along the value chain (production, additions to stock) to exit (consumption, exports), and end-of-life through either disposal or recovery.

Relevant links

- European Raw Materials Alliance website
- Rare earth elements, permanent magnets, and motors web page
- Communication - Critical raw materials resilience: Charting a path towards greater sustainability and security, September 2020
- Final report: Study on the EU's list of critical raw materials, September 2020 (PDF, 7 MB)

- Critical raw materials factsheets, September 2020 (PDF, 21 MB)
- Non-critical raw materials factsheets, September 2020 (PDF, 15 MB)
- Foresight report: Critical raw materials for strategic technologies and sectors, September 2020
- Study on the review of the list of critical raw materials 2017
- Critical raw materials factsheets 2017
- Non-critical raw materials factsheets 2017
- Executive summaries: list of critical raw materials 2017 (627 KB)
- Report on critical raw materials for the EU 2014 (1 MB)
- Annex to the report on critical raw materials for the EU 2014 (577 kB)
- Critical materials profiles 2014 (4 MB)
- Non-critical materials profiles 2014 (2 MB)
- Study on critical raw materials at EU Level 2014 (10 MB)
- Report on critical raw materials 2010 (2 MB)
- Report on US-Japan-EU trilateral workshop on critical raw materials 2013 (725 kB)

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