

Critical Materials Raw as Leverage in Global Geopolitics

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ABSTRACT: The most economically critical and high supply risk raw materials are called critical raw materials and are essential to the functioning and integrity of a wide range of industrial ecosystems. The enormous appetite for resources (energy, food and raw materials) exerts extreme pressure on the planet, being the cause of half of greenhouse gas emissions and more than 90% of biodiversity decline and water stress. Resource access and sustainability are key to the EU's resilience in terms of raw materials. The Critical Raw Materials Act is an essential element of the equation in this generational societal transition. It aims to strengthen all stages of the European value chain of critical raw materials by diversifying EU imports to reduce strategic dependencies, improving the EU's ability to monitor and mitigate the risks of disruption to the supply of critical raw materials, and improving circularity and durability. In this sense, the European Commission proposes a new Regulation on Critical Raw Materials to ensure that the European Union has access to a safe and sustainable source of supply of critical raw materials essential for the transition to clean energy. This article highlights the importance of the critical raw materials in the European Union's pursuit of the Green Deal and the challenges associated with the growing global resource demands.

KEYWORDS: critical materials raw, reduce dependencies, improve efficiency, resilience, European Commission

Introductory considerations

The term "raw material" is used to denote material in a pure, unprocessed or minimally processed state, such as: latex, coal, iron ore, wood, air or

seawater. Metals, minerals and natural materials are inherently related to our daily existence. The most economically critical and high supply risk raw materials are called critical raw materials and are essential to the functioning and integrity of a wide range of industrial ecosystems.

Access to resources is a strategic security issue for achieving Europe's ambitious goal of making the Green Deal a reality (European Commission 2019, Communication COM 2019/640 final). The new industrial strategy for Europe (European Commission 2020a, Communication COM 2020/102 final) proposes to strengthen Europe's open strategic autonomy, warning that Europe's transition to climate neutrality could replace the current dependence on fossil fuels with a dependence on raw materials, many of which come from abroad and being subject to increasingly fierce competition worldwide. Therefore, the EU's open strategic autonomy in these sectors will need to continue to be anchored in diversified and undistorted access to global commodity markets, with global trade and its integrated value chains remaining a major growth driver and essential to Europe's recovery. At the same time, and to reduce external dependencies and environmental pressures, the underlying problem of rapidly increasing global demand for resources must be addressed by reducing and reusing materials before recycling them.

The enormous appetite for resources (energy, food and raw materials) exerts extreme pressure on the planet, being the cause of half of greenhouse gas emissions and more than 90% of biodiversity decline and water stress. Scaling up the circular economy will be vital to achieve climate neutrality by 2050, while decoupling economic growth from resource use and keeping resource use within the planet's resource limits (European Commission 2020b, Communication COM 2020/98 final). Resource access and sustainability are key to the EU's resilience in terms of raw materials. To guarantee the security of resources, actions are needed to diversify the supply, both from primary and secondary sources, to reduce dependencies and to improve the efficiency of the use and circularity of resources, including sustainable design of products. This approach is valid for all raw materials, including base metals, industrial minerals, aggregates and biotic materials, but is more necessary for EU-critical raw materials.

As if this challenge were not enough, the crisis caused by the COVID-19 pandemic has shown how quickly and how deeply global supply chains can be disrupted. The Commission has proposed an ambitious recovery plan following

the COVID-19 pandemic (European Commission 2020d, Communication COM 2020/456 final), to increase resilience and open strategic autonomy and to promote the transition to a green and digital economy. Aiming to ensure resilience through a secure and sustainable supply of critical raw materials, this Communication can contribute substantially to the recovery and long-term transformation of the economy.

Based on the EU Raw Materials Initiative (European Commission 2008, Communication COM 2008/699 final) which established a strategy to reduce dependencies on non-energy raw materials for industrial value chains and societal well-being by diversifying sources of primary raw materials from third countries , strengthening domestic sources and supporting the supply of secondary raw materials through the efficient use and circularity of resources, this communication (European Commission 2020c, Communication COM 2020/474 final) presents: i) the 2020 EU list of critical raw materials; ii) the challenges for a secure and sustainable supply of critical raw materials and actions to increase EU resilience and open strategic autonomy.

2020 EU List of Critical Raw Materials

Some sectors are particularly strategic for the EU's renewable energy, digital, space and defense objectives. Every three years, the Commission reviews the list of critical raw materials for the EU. The Commission published the first list in 2011, updating it in 2014 and 2017 (European Commission 2011, Communications COM (2011) 25 final; European Commission 2014, COM (2014) 297 final; European Commission 2017, COM (2017) 490 final). The assessment is based on data from the recent past and shows how criticality has evolved since the list was first published. As this does not forecast future trends, the Commission also presents a prospective study. The assessment examined 83 materials (5 more than in 2017) and, where possible, looked more closely than in previous assessments at the point where criticality occurs in the value chain: extraction and/or processing.

Economic importance and supply risk are the two main parameters used to determine EU criticality. Economic importance analyzes in detail the allocation of raw materials to end uses based on industrial applications. Supply risk concerns country-level concentration of global production of key raw materials and EU supply, governance of supplier countries- Methodology

for establishing the EU list of critical raw materials (European Union 2017), including environmental aspects, the contribution of recycling (i.e. secondary raw materials), substitution, EU import dependence and trade restrictions in third countries.

The resulting list of critical raw materials provides a factual tool to support EU policy-making. The Commission considers the list when negotiating trade agreements or trying to eliminate trade distortions. The list helps to identify investment needs and guide research and innovation within the EU's Horizon 2020, Horizon Europe and national programs, particularly in new mining technologies, substitution and recycling. This is also relevant for the circular economy (The EU Methodology uses the Worldwide Governance Indicators - WGI: Kaufmann and Kraay 2023). The WGI addresses the environmental aspects provided for in the indicators on the effectiveness of public administration and the quality of the regulatory framework), for the promotion of sustainable and responsible supply, as well as for industrial policy. Member States and businesses can also use it as an EU reference framework for developing their own specific criticality assessments.

The 2020 EU list contains 30 raw materials, up from 14 raw materials in 2011, 20 raw materials in 2014 and 27 raw materials in 2017. 26 raw materials remain on the list. Bauxite, lithium, titanium and strontium are added to the list for the first time. Helium remains a concern in terms of supply concentration, but is removed from the 2020 list of critical commodities due to a decline in its economic importance. The Commission will continue to monitor helium closely, given its relevance to a number of emerging digital applications. The Commission will also closely monitor nickel, given developments related to increased demand for battery raw materials.

From the 34 critical raw materials identified, a specific list of strategic raw materials was created (including 17 strategic critical raw materials: nickel, natural graphite, gallium, manganese, titanium metal, platinum group metals, heavy rare earths, light rare earths, germanium, metallic silicon, cobalt, aluminum/bauxite, lithium, tungsten, bismuth, boron/borate, copper) for raw materials that are expected to grow exponentially in supply, have complex production requirements and, therefore, they face a greater risk of supply problems. Without critical raw materials, most segments of society could not function, as they are found in many everyday appliances and essential products for the economy of each member state. For example: vibrating technology in

telephones – tungsten, electric vehicles – nickel, cobalt and lithium, wind turbines – boron, semiconductors – metallic silicon, glass making and fertilizer production for plant growth – borates, building and piloting airplanes – magnesium and scandium, etc. Globally, some countries produce a large quantity of these materials, such as: – 60%, Mexico, fluorine – 33%, Brazil, niobium – 92%, Chile, lithium – 79%, South Africa, manganese – 48%, Congo, tantalum – 35%, Guinea, aluminum – 63%, Morocco, phosphate rock – 27%, Spain, strontium – 99%, France, hafnium – 76%, Belgium, arsenic – 59%, Norway, metal sicily – 33%, Finland, nickel – 38%, Poland, coking coal – 26% and copper – 19%, Russia, nickel – 29%, Qatar, helium – 35%, Kazakhstan, phosphorus – 65% and titanium metal – 36%, Australia, coal coke – 25%, China, barytine – 45%, bismuth – 65%, gallium – 71%, germanium – 45%, magnesium – 97%, natural graphite – 40%, scandium – 67%, tungsten – 32%, vanadium – 62%, light rare earths: cerium – 85%, neodymium – 85%, praseodymium – 85%, samarium – 85%, heavy rare earths: dysprosium – 100%, erbium – 100%, europium – 100%, gadolinium – 100% , holmium – 100%, lutetium – 100%, terbium – 100%, thulium – 100%, yttrium – 100%.

In terms of strengthening the economy, by reducing dependence in order to obtain access to critical raw materials, the EU has set the following objectives for 2030: i) extraction in the EU, at least 25% of the EU's annual consumption to come from recycling in the EU, ii) processing in the EU, at least 40% of the annual EU consumption to come from processing in the EU, iii) recycling in the EU, at least 25% of the annual EU consumption to come from recycling in the EU, iv) external sources, at most 65% of the Union's annual consumption of each strategic raw material, at any relevant stage of processing, to come from a single third country. To achieve this, the EU will step up trade action, which will include: i) a critical raw materials club for all like-minded countries that want to strengthen global supply chains, ii) strengthening the World Trade Organization, iii) expanding its network of sustainable investment facilitation agreements and free trade agreements, iv) tightening enforcement measures to combat unfair trade practices (SNST 2020).

1. Integrating strategic foresight analysis into the EU policy - making process – an approach by which the European Commission aims to integrate it into the policy-making process in all areas, thus encouraging participatory and forward-looking governance in Europe and beyond its borders.

2. Resilience as a new orientation compass for EU policies

The crisis caused by the COVID-19 pandemic (Rotaru 2020, 71-82) has highlighted a number of vulnerabilities in the EU and its Member States. In this sense, resilience refers not only to the ability to deal with challenges, but also to bring about transformations in a sustainable, equitable and democratic way. The EU's vulnerabilities and resilience capacities are analyzed through the lens of relevant megatrends (Megatrends Hub) – long-term driving forces that are likely to have a significant influence on the future.

3. Cvadri-dimensional analysis of resilience

– *The social and economic dimension of resilience* refers to the ability to cope with economic shocks and achieve long-term structural changes in an equitable and inclusive manner. This translates into creating favorable social and economic conditions for a transition-oriented recovery, promoting social and regional cohesion and supporting the most vulnerable people in society, while taking into account demographic trends and respecting the European Pillar of Social Rights.

– *The geopolitical dimension* - Geopolitical resilience refers to strengthening Europe's "open strategic autonomy" and its global leadership role. This is anchored in the expression of EU values in a world of competing powers with a high degree of interdependence, where COVID-19 has affected geopolitical trends and the balance of power. As the United States increasingly focuses on the domestic situation, it leaves an empty seat on the world stage that other actors such as China (Council on Foreign Relation 2020), are eager to fill it. By mobilizing strategic resources for humanitarian aid and development, and through its efforts to ensure the global availability of a vaccine and medicines for COVID-19, the EU is playing a leading role with a "Team Europe" approach (The objective of the "Team Europe" approach is to combine resources from EU institutions, Member States and financial institutions, in particular the European Investment Bank and the European Bank for Reconstruction and Development).

– *Green Dimension* - Green resilience refers to achieving the goal of climate neutrality by 2050, in parallel with mitigating and adapting to climate change, reducing pollution and restoring the capacity of ecological systems so that we can live well within resource limits our planet. This involves eliminating our dependence on fossil fuels, reducing our impact on natural resources,

conserving biodiversity, developing a clean and circular economy, removing toxic substances from the environment, changing lifestyles, production and consumption patterns, achieving climate-resilient infrastructure, providing new opportunities for healthy living, creating green businesses and jobs, actively pursuing ecosystem restoration, and saving our seas and oceans.

– *The digital dimension* - Digital resilience means ensuring that the way we live, work, learn, interact and think in this digital age respects and strengthens human dignity (Rotaru 2016, 29-43), freedom (Rotaru 2019, 208-215), equality, security, democracy and other fundamental European rights and values. This is an increasingly important aspect as hyperconnectivity continues to accelerate with physical-digital integration, the Internet of Things, smart home technology, the use of big data, augmented and virtual reality, machine learning and other technologies increasingly capable artificial intelligence. Digital technologies are blurring the distinction between physical and virtual worlds, and between people, machines and nature, which has implications for our own selves and policy frameworks. They have been instrumental in keeping our economies and societies running during the pandemic.

4. *The agenda of the strategic prospective analysis*

– *Monitoring resilience* - As resilience becomes a new compass for EU policy-making, appropriate monitoring tools are needed. This communication proposes the transition to resilience dashboards and their joint creation in the framework of the exploratory discussions organized with the Member States and the main stakeholders.

– *Horizontal forward-looking analysis activities aimed at promoting effective EU transition-focused policies*. Prototype dashboards are shown as an example. In cooperation with Member States and other important stakeholders, the Commission will further develop resilience dashboards in a forward-looking perspective. The dashboards will be based on strategic forward-looking analysis, which can help identify emerging challenges and propose new forward-looking indicators for assessing vulnerabilities or capabilities. As resilience is a characteristic that needs to be strengthened over time, this work will focus on a medium- and long-term approach to provide the best conditions so that policies based on forward-looking analysis mitigate vulnerabilities and build capacities. The impact of megatrends and anticipated risks will thus be taken into account.

An EU legislative act on critical raw materials for the future of EU supply chains (European Council, Council of the European Union 2023)

In November 2023, the EU reached a provisional agreement on a European Critical Raw Materials Act, with the aim of strengthening Europe's strategic economy, as the demand for rare earths is expected to grow exponentially in the coming years. Critical raw materials are raw materials of great economic importance for the EU, with a high risk of supply disruption due to the concentration of their sources and the lack of suitable and affordable substitute products. The act aims to: i) increase and diversify the EU's supply of critical raw materials; ii) strengthening circularity, including recycling; iii) supporting research and innovation on resource efficiency and the development of substitutes.

The need to develop an EU legislative act on critical raw materials

Critical raw materials are important for the EU in terms of: i) industrial value chains - non-energy raw materials are linked to all industries along all stages of the supply chain; ii) strategic technologies such as space and defense - technological progress and increased quality of life depend on a variable and increasing number of raw materials; iii) climate, energy and environment - clean technologies require raw materials, which are irreplaceable in the case of solar panels, wind turbines, electric vehicles and energy-efficient lighting.

EU demand for base metals, battery materials, rare earths and more is set to grow exponentially as the EU moves away from fossil fuels and towards clean energy systems that require more minerals. The EU's green transition will require the development of local production of batteries, solar panels, permanent magnets and other clean technologies. To meet the related demand, generous access to a wide range of raw materials will be required. Local production is key to the overhaul of the EU's energy and mobility systems, which is partly driven by the Repower EU plan and the 2035 ban on internal combustion engines.

The Critical Raw Materials Act is therefore an essential element of the equation in this generational societal transition. It aims to strengthen all stages of the European value chain of critical raw materials by: diversifying EU imports to reduce strategic dependencies, improving the EU's ability to monitor and mitigate the risks of disruption to the supply of critical raw materials, and improving circularity and durability. In this sense, the European

Commission proposes a new Regulation on Critical Raw Materials to ensure that the European Union has access to a safe and sustainable source of supply of critical raw materials, essential for the transition to clean energy.

The purpose of the new Regulation is to strengthen the EU's autonomy in the supply of key raw materials, such as those used in batteries, solar panels, wind turbines and digital technology, as the EU is currently vulnerable to supply risks, these raw materials coming from a limited number of countries, such as China, which currently provides 100% of the EU's supply of rare heavy metals such as dysprosium, europium, gadolinium, terbium and yttrium, or Turkey, which provides 99% of the EU's supply of boron, which is used in the production of electric cars and in the renewable energy sector.

European Commission Directives for a US Critical Minerals Agreement

According to Agerpress.ro (Dicu, Marinescu, and Aruștei 2023), on June, the 14th, 2023, the European Commission adopted its negotiating directives for an agreement on critical minerals with the US, as they were shown in a press release from the Community Executive. The objective was to promote EU-US supply chains of critical raw materials needed for the production of batteries for electric vehicles. According to the balance sheets, in 2022 alone, the EU exported €8.3 billion worth of critical raw materials relevant to this industry.

In August 2022, the USA adopted the Inflation Reduction Act (IRA), introducing the subsidy-credit for clean vehicles, in the form of a tax credit for the purchase of vehicles on batteries or fuel cells. To qualify for the full subsidy, a vehicle must, among other things, be equipped with a battery that has at least some of its critical mineral content either recycled in North America or mined and processed in the US or a country with which the US has concluded a free trade agreement or an agreement on critical materials, without which EU firms are at risk of being excluded from US automotive supply chains, reducing the EU's export possibilities.

The EU and the US announced their intention to negotiate an agreement on critical minerals in the March 10, 2023, joint statement by President von der Leyen and President Biden, as well as in the May 31 joint statement of the EU-US Trade and Technology Council. The conclusion of an EU-US agreement on critical minerals will guarantee that the EU, as an ally, will enjoy a status equivalent to that of US free trade partners under the US Inflation Reduction Act. EU firms will then be able to compete on a level playing field in the US

market with US and third country competitors such as Chile, the Republic of Korea and Japan. An agreement on critical materials between the EU and the US will also help to boost the EU's production capacities in industrial sectors of strategic importance. The existence of strong environmental and labor provisions will help ensure a better supply of critical raw materials in a sustainable manner. In addition, the agreement will help strengthen the Commission's proposal for the Regulation on Industry Contributing to Net Zero Emissions and the European Critical Raw Materials Act, which aims to expand the EU's production of key carbon-neutral technologies.

Once adopted by the Council, the authorization and accompanying directives will give the Commission the power to negotiate an agreement containing provisions on: trade facilitation so that critical raw materials extracted or processed in the EU can be used in vehicles eligible for subsidies under in the form of US clean vehicle credits, cooperation to make the critical raw materials sector more sustainable by encouraging a high level of environmental protection, international technical standards and circular economy approaches, promoting workers' rights in the critical raw materials sector and strengthening sustainable and fair supply chains through common standards, collaborating with allies and partners.

Conclusions

Critical raw materials are indispensable for the EU economy and for a wide range of technologies needed in strategic sectors such as renewable energy, digital, space and defense. Access to resources and sustainability are a strategic security issue and are essential for the EU's resilience in terms of raw materials. To guarantee the security of resources, actions are needed to diversify the supply, both from primary and secondary sources, to reduce dependencies and to improve the efficiency of the use and circularity of resources, including sustainable design of products.

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