



Institut Veblen pour les réformes économiques

Critical materials: assessing the EU strategy

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The low-carbon transition triggered a proliferation of critical minerals-related strategies and public policies around the globe. The EU is no exception: the 2023 Critical Raw Materials Act sets targets for increasing European extraction (10% of its annual consumption), refining (40%), and recycling (25%).

This is a major challenge, both in terms of speed of adaptations, complexity and social acceptability. This note highlights several obstacles and discusses possible solutions. It particularly stresses the overall need for cross-sector policies to increase material sufficiency.

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Introduction

"From green and digital technologies to defence and aerospace, demand for critical raw materials is increasing fast. Without action, Europe risks supply shortages and unwanted dependencies." With these few words, Thierry Breton, European Commissioner for Internal Market, succinctly summarized the stakes of the European Critical Raw Materials Act (CRMA) must address. An agreement on the CRMA was reached between the European Parliament and the Council of the European Union on November 13, 2023¹.

Ursula von der Leyen, President of the European Commission (EC), had made the adoption of binding legislation on critical raw materials one of the priorities of her mandate². And the quick negotiations reflects the extreme importance attributed by the EU to this issue: the text was presented by the EC in March 2023 and the European Parliament and the Council reached a first agreement on the text in November. The CRMA aims to reduce the EU's dependence on external critical ores and metals suppliers, notably China, and to improve the industrial sector's resilience in the face of supply chain disruption risks. It targets the entire value chain – from extraction to recycling, including (re)development of refining and mineral processing on European soil – and aims to reduce the environmental and social impacts of critical metals production as well as to improve recycling and circularity of material flows.

Beyond ambitious objectives, the EU's entry into this new industrial logic may face numerous obstacles (financing, acceptance, etc.) despite its desire to develop global leadership on the issue.

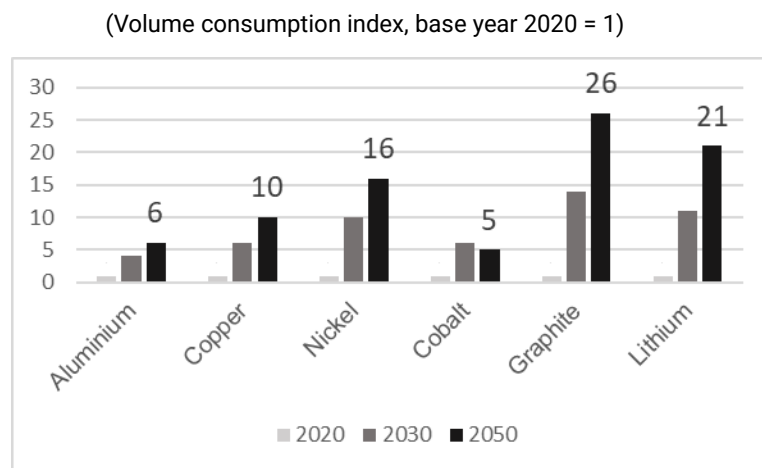
¹ Press release from the Council of the EU (November 13, 2023), [https://ec.europa.eu/commission/presscorner/detail/en/ip_23_5733](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_5733).

² State of the Union Address 2023 by President von der Leyen, [https://ec.europa.eu/commission/presscorner/detail/en/speech_23_4426](https://ec.europa.eu/commission/presscorner/detail/en/speech_23_4426).

1. European ambition in a metal-reliant transition context

European ambition responds to a clear acceleration of critical minerals related issues on the international stage since the end of the 2010s. International reports (International Energy Agency 2021, 2023; World Bank 2017, 2021; IRENA 2021) and research articles (Hache et al., 2019a,b; Seck et al., 2020; 2022; Hache et al., 2023) have highlighted the increasing demand for minerals and metals necessary for the low-carbon and digital transition, particularly in Europe (Figure 1). According to the IEA (2021), reaching the goals of the Paris Agreement (2015) and limiting global warming to below 2°C – compared to pre-industrial temperatures – by 2100 could result in a fourfold increase in current mineral consumption.

Figure 1: Evolution of the EU’s metal requirements in low-carbon technology sectors



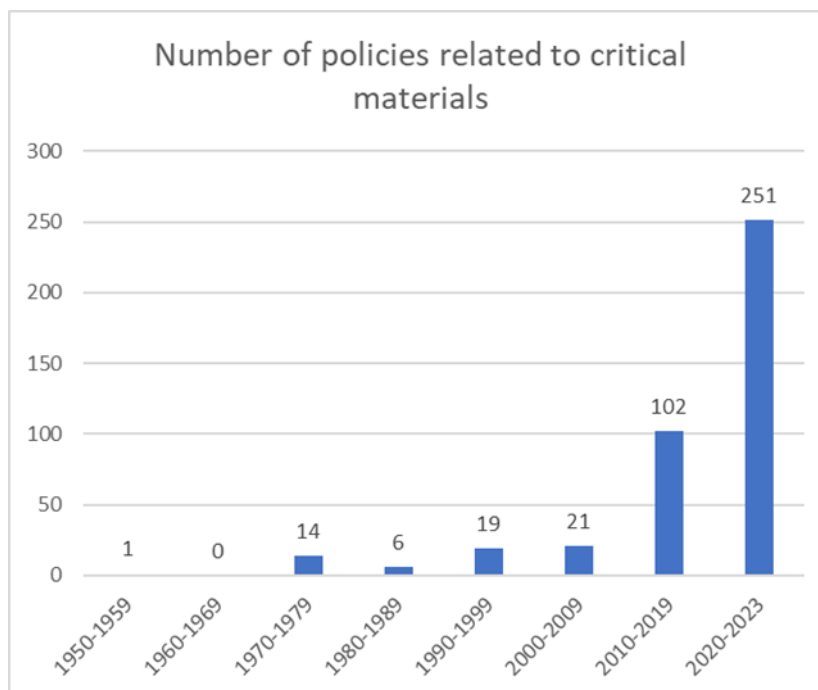
Source: JRC; HDS* scenario

*HDS Scenario: High Demand Scenario resulting from rapid deployment of technologies in line with ambitious energy and climate objectives (REPowerEU for the EU in 2030).

This awareness has been accompanied by a growing emphasis on securing supplies of critical minerals by different global consumption zones in a context of systemic rivalries between China and the United States. The metallic nature of the energy and digital transition has led to a proliferation of critical minerals strategies. More than half of the 414 global critical minerals policies identified by the IEA between 1970 and 2023 were initiated between 2020 and 2023³ (Figure 2) – these include both the publication of critical minerals lists and strategies and the conclusion of related strategic bilateral and multilateral partnerships.

³ Critical Minerals Policy Tracker (2022), <https://www.iea.org/reports/critical-minerals-policy-tracker>

Figure 2



Source: IEA Critical Minerals Policy Tracker

The adoption of the CRMA in March 2023 is part of a long-standing reflection. Indeed, the EU is one of the pioneers with its first Communication on Raw Material supply for the European Economic Community (EEC) in 1975 and the update of a European Mineral Yearbook⁴ (Bedder 2015). The topic gained momentum with the launch of the Raw Materials Initiative⁵ (2008) at a time when the production of metallic ores in the area accounted for only about 3% of global production. This initiative led to the first European 14 critical raw materials list in 2011. The list has been updated every three years since, and the methodology used by the EC to define it has become an international reference. Since 2017, each presentation of a new list has been accompanied by an industrial initiative. The EU thus launched the European Battery Alliance (EBA) as early as October 2017 after realizing its dependence on Asian value chains in this area (materials, cells). It aimed to develop battery production on European territory (construction of gigafactories) and to establish environmental standards to gradually build leadership. The EBA was bolstered in its strategy by the announcement in July 2021 of the ban on the sale of thermal vehicles by 2035 as part of the European Green Deal. In 2020, the EU announced an action plan comprising ten actions⁶, including the creation of a European Raw Materials Alliance⁷ (ERMA). The ERMA's aim was to propose a

⁴ European Minerals Yearbook.

⁵ Raw Materials Initiative (2008) : Communication from the commission to the European Parliament and the council, The raw materials initiative – meeting our critical needs for growth and jobs in Europe, COM(2008) 699 final.

⁶ <https://ec.europa.eu/docsroom/documents/42852>

⁷ <https://erma.eu/about-us/>

strategy for diversifying the value chain of rare earths and permanent magnets before being extended to other raw materials. The CRMA incorporates the latest version of this list and recognizes 34 critical raw materials and, for the first time, 17 strategic raw materials. The strategic raw materials designate materials "that are of high strategic importance, taking into account their use in strategic technologies underpinning the green and digital transitions or for defence or space applications" (Table 1). The CRMA marks a milestone in European assertion on these issues as it is the first legally binding European text in this field and the only global strategy to set quantified objectives for the critical minerals' extraction, refining, and recycling by 2030.

Table 1: List of 2023 EU's critical and strategic materials

Aluminium-Bauxite	Antimony	Arsenic	Barite	Beryllium	Bismuth	Borate (metallurgical grade)	Cobalt
Coking coal	Copper	Feldspar	Gallium	Germanium	Hafnium	Helium	Lithium (battery grade)
Magnesium (metal)	Manganese (battery grade)	Graphite (battery grade)	Niobium	Nickel	Phosphorus	Platinum group metals	Phosphate rock
Scandium	Silicon métal	Fluorspar	Strontium	Tantalum	Light rare earth elements	Heavy rare earth elements	Titanium (metal)
Tungsten	Vanadium						

Source: European Commission, 2023 (updated with the press release from the Council of the EU regarding the provisional agreement on the CRMA)

2. Improving current policies

The CRMA was jointly presented with the Net Zero Industry Act⁸ within the broader framework of the Industrial Green Deal⁹. It reflects a new resilience approach adopted by many countries which don't isolate the minerals and metals from the rest of the value chain. Indeed, the EU aims to develop or revitalize the various European links in the value chain of critical minerals. It has set targets for extraction on European territory (10% of its annual consumption), refining (40%), and recycling (25% including the recycling of mining waste). Such a policy should reduce European dependence on imports and ensure better control over the environmental and social impact of materials consumed by the EU. Furthermore, it should enable the relocation of a dynamic industrial sector, driven by the low-carbon transition, and create jobs on a European scale.

These objectives may seem very ambitious at first glance, considering the high levels of import dependency noted by the EC (Grohol and Veeh, 2023). **The EU currently has underexploited soil that attracts only 2% of global mining exploration investments**, offers unattractive tax conditions compared to Australia, Canada, or the United States¹⁰, and enjoys a less than favorable image in the European imagination. The CRMA should help overcome some of these obstacles by encouraging Member States to conduct a mining inventory and carry out regular exploration campaigns of their soil¹¹, as well as identifying "strategic projects" for which permit granting procedures should be accelerated. Furthermore, it seeks to develop very high environmental standards (minimization of pollution and water consumption) and social standards (training of qualified personnel) for production, allowing the assertion of a European mining model capable of competing with that of China.

This might be a huge challenge when considering the short time horizon set for the objectives (2030). It can take from 7 (lithium) to 17 years (copper) between the first exploration and the first commercial production of a mine: European mining projects needed to achieve the CRMA objectives should therefore already be under development. Furthermore, revitalizing the European mining industry will require significant funding. However, mining projects are not integrated into the European taxonomy on low-carbon investments and do not benefit from a specific budget allocated to them – unlike the United States' Inflation Reduction Act (IRA). Considering the magnitude of the required investments, **it would be desirable for the EU to dedicate a specific budget and administrative resources to support "strategic projects,"** share costs and risks, and ensure the development of mining projects which are the most beneficial to the EU as a whole by compensating for the unequal distribution of mineral resources among Member States¹².

⁸ Net-Zero Industry Act : https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en

⁹ Industrial Green Deal: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_510

¹⁰ <https://www.fraserinstitute.org/studies/annual-survey-of-mining-companies-2022>

¹¹ The French government notably mandated BRGM at the end of 2023 to carry out a new mining inventory.

¹² Meeting the costs of resilience: The UE's Critical Raw Materials Strategy must go the extra kilometer, Jacques Delors Centre, <https://www.delorscentre.eu/en/publications/eu-critical-raw-materials>.

Furthermore, in addition to the mining sector's outdated and negative image, the environmental impacts of extraction and processing activities risk sparking widespread opposition from local populations¹³. Achieving the goal of 10% extraction on European soil thus requires a high level of determination, given the difficult initial conditions. Moreover, the European territory simply does not have sufficient reserves for many metals (antimony, borate, graphite, manganese, tantalum, etc.). While the goal regarding refining and processing appears more reasonable, it will still require convincing policymakers and populations to accept the relocation of polluting activities to European territory. A genuine cultural battle will need to be waged at the European level to transform the image of the mining sector.

In addition to these objectives, the EU tries to move towards a circular and more sustainable economy. The CRMA aims to establish sustainable certifications for the minerals used in products and develop European recycling sectors so that 25%¹⁴ of consumed strategic materials come from secondary sources. The CRMA places particular emphasis on improving the circularity of permanent magnets, which are rich in rare earths, boron, nickel, and cobalt. This ambition is in line with the regulation on batteries and battery waste adopted in July 2023, which introduces objectives for collecting portable battery waste (73% by 2030), the recovery of lithium from this waste (80% by 2031), and minimum rates of recycled content in electric vehicle batteries¹⁵.

Recycling is an essential pillar for developing a European supply of minerals. But its development faces several challenges: developing collection points, sorting the waste, pre-treating it, and finally recycling through mineral processing chains is both complex and costly. Potentially recyclable products are often integrated into long-lasting consumer goods. Not all recycling technologies are profitable, and rapid evolution in battery chemistry makes investment in these technologies risky. Technical complexity of the "dispersive" use of materials, *i.e.* the use of an increasing number of materials in tiny quantities in the same finished product, is an additional obstacle. And so is the "downcycling": the loss of quality or performance of the post-recycling secondary raw material.

Therefore, betting on recycling 25% of strategic raw materials by 2030 is a bold move, as recycling chains are expected to reach maturity between 2035 and 2040.

- It might be relevant to set **specific recycling targets for each of the strategic materials** based on the maturity level of the chains and the characteristics of the consumer goods in which they are incorporated.
- In addition to recycling, there should be ambitious **goals for incorporating recycling metals into products (around 80%)**.

¹³ Response from EARTO to the public consultation of the European Commission on the CRMA (May 2023), <https://www.earto.eu/wp-content/uploads/EARTO-Answer-to-EC-Consultation-on-CRMA-Final.pdf>.

¹⁴ This figure includes the recycling of mining waste, unlike the initially proposed 15% target by the Commission. For example, this is what the Czech Chvaletice project aims for, which intends to recycle historical mining residues to extract manganese (cf. <https://www.mn25.ca/chvaletice-manganese-project>).

¹⁵ 16% for cobalt, 85% for lead, and 6% for lithium and nickel.

- Aiming for reuse and durability of products using strategic materials requires an increase in **repairability indices of objects**, availability of spare parts, and the implementation of measures favorable to second-hand markets.

3. Diversifying supplies

Finally, efforts should be undertaken to ensure that, by 2030, the EU is not dependent on a single third country for more than 65% of its supply of any strategic raw material, at any point of its value chain. Interestingly, this is currently the case for more than half of the strategic raw materials (Grohol and Veeh, 2023). Besides the difficulty of measuring the achievement of such an objective on the EU scale, finding alternative suppliers is a long-term endeavor.

Table 2 - Key actions for developing a domestic supply chain for critical raw materials

		EU	Japan	UK	USA
Extraction	Geological assessment of capabilities	✓		✓	✓
	Deep sea mining development		✓	✓	
	Mining legislative framework amendment	✓	✓	✓	✓
	FDI-friendly legislation	✓		✓	✓
	Financial support to domestic exploration and extraction projects	✓	✓	✓	✓
	Definition of domestic extraction targets	✓			
Refining	Financial support to domestic refining projects	✓	✓	✓	✓
	Definition of domestic refining targets	✓			
Recycling	Financial support to R&D on recycling and reuse	✓	✓	✓	✓
	Definition of recycling targets	✓			
Transversal	Development of minerals-related skills	✓		✓	✓
	Development of enabling infrastructure				
	Enhancement of high ESG standards	✓		✓	✓
	Public consultation	✓			✓

Sources : CRMA Proposal (2023), Japanese International Resource Strategy to Secure Rare Metals (2020), Resilience for the Future: The United Kingdom's Critical Minerals Strategy (2022), US Department of Energy's strategy to support domestic critical mineral and material supply chains (2021), US Inflation Reduction Act (2022).

Raw materials production concentration is universally perceived as a threat by consumer countries. A single supplier can indeed disrupt the entire production chain in case of natural disasters, domestic unrest, or geopolitical tensions. This threat is perceived as even more acute when China concentrates production (Bonnet et al., 2022). Playing a predominant role in European supply of bismuth, gallium, germanium, and rare earths, Beijing is described as

the "most influential country in terms of global supply for the majority of critical raw materials" by the EC in its 2017 communication. This is explained by the exceptional concentration of current production and processing of critical minerals in China (Bonnet et al., 2022; Castillo and Purdy 2022), the concentration of ongoing projects in the sector, and China's aggressive investment strategy in foreign mining projects (Ericsson et al., 2020). But the possible use of this control as a political and strategic leverage specifically worries consumer countries. China has already used this leverage applied to rare-earths supply in 2010 (Gholz, 2014) and to gallium and germanium since August 2023¹⁶ and might be interested in doing it again as relations between China and the West deteriorate.

Breaking free from Chinese dependence will not be easy for the EU (Hache and Merigot, 2017; Hache, 2019). The EU rather considers "de-risking" than "decoupling" its relations to China: its objective is not so much to reduce the supply of Chinese materials but to diversify its partners. So does the UK. To the contrary, Japan has a very different stance and explicitly aims to reduce its dependence on Chinese rare earths from 85% to 50% by 2025 (Nakano 2021). Resource-rich countries like Australia, Canada, or the United States implement safeguard policies to limit Chinese investments in the sector¹⁷.

The CRMA should facilitate bilateral strategic partnerships conclusion, such as the 2021 Canada and Ukraine partnerships and the 2022 Namibia and Kazakhstan partnerships. The most recent trade agreements concluded with Mexico, the United Kingdom, and New Zealand include a dedicated chapter on energy and critical raw materials, and negotiations are ongoing for similar agreements with Australia and Indonesia – significant players in the nickel value chain. However, the conclusion of agreements alone will not be enough to diversify European supply. It should be accompanied, on one hand, by a **dedicated European budget for investment development in third countries** through programs such as Global Gateway, and on the other hand, by a direct obligation imposed on companies to diversify their supplies. **When an alternative supply solution exists, the European Commission could, for example, condition access to European subsidies on the company's compliance with the 65% objective.**

The EU criteria for prioritizing partnerships in critical raw material supply – values of democracy, transparency, governance, and respect for human, social, and environmental rights – are part of a broader reflection on the need to friendshore the production and processing of critical minerals, *i.e.* to relocate them in allied countries (Vivoda 2023). Concluding agreements with like-minded partners is already an explicit policy in the strategies of the United States, the United Kingdom, Australia, and Canada.

¹⁶ Neill, Alastair. 2023. « Weaponizing Critical Minerals, China Selects Gallium as Tool of Choice ». InvestorIntel (blog). 4 juillet 2023. <https://investorintel.com/critical-minerals-rare-earths/china-selects-critical-mineral-gallium-as-weapon-of-choice/>.

¹⁷ Kissin, Ellesheva. 2023. "The Five Eyes Set Their Sights on Critical Minerals." FDI Intelligence, March 2, 2023. <https://www.fdiintelligence.com/content/feature/the-five-eyes-set-their-sights-on-critical-minerals-82006>.

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While friendshoring is presented as a necessary alternative or even a political priority¹⁸, its concrete translations have been relatively limited so far. The US, the UK, Japan, and the EU do not react in the same way regarding raw materials. For example, while the US seeks to revitalize an already substantial domestic mining sector, Japan recognizes its limited geological resources, while the United Kingdom and the EU seek to catch up. Nor is the level of economic dependence the same: with a significant industrial sector and almost nonexistent mineral resources, Japan has long identified raw materials as a national priority. As a result, many States might pursue conflicting interests in this field. The competition for relocation of metal refining and battery production will be particularly intense, as these sectors represent the largest share of value-added associated with the production of critical raw materials and can be developed rapidly and independently of primary ore extraction.

Even among allied Western countries, the cooperation might reach its limits and turn into competition for attracting foreign investments or investing abroad. The almost simultaneous launch of a several initiatives targeting raw materials initiated by the US (Minerals Security Partnership)¹⁹, Canada (Sustainable Critical Minerals Alliance) or announced by the EC (Critical Raw Materials Club) shows that Western powers prefer maintaining control over their own supply chains rather than cooperating with others. In this context, the EU will need to define more precisely the rules of its new “Club” and continue to explore possible allies in the friendshoring approach.

4. Conclusion

The EU’s painful awakening regarding gas markets following the war in Ukraine has undoubtedly made it more aware of dependence issues in general. The CRMA partially addresses this issue by seeking to improve the European industry’s resilience and strategic autonomy. By setting ambitious objectives, the EU aims to counter the gradual shift of minerals related decision-making towards Southeast Asia – a result of the rise of “Indo-Pacific”²⁰ policies. The EU thus intends to embrace a new logic based on the development of mineral assets, reindustrialization, and international cooperation.

However, obstacles remain very real, in terms of financing, timelines, social acceptance, etc. Surprisingly, the EU does not focus on demand reduction. Material sufficiency is the necessary counterpart to critical raw material supply chains’ Europeanization and diversification (Hache, 2022). Sufficiency is part of the solution and will take multiple forms. The EU could lead the way by initiating widespread discussions on the need to reduce the size and weight of vehicles, and the power of batteries, and by encouraging equipment

¹⁸ [1] Exchange between J.L. Yellen, U.S. Treasury Secretary, and C. Freeland, Canadian Deputy Prime Minister (2020), <https://home.treasury.gov/news/press-releases/jy0830>.

¹⁹ <https://www.state.gov/minerals-security-partnership/>

²⁰ Quadrilateral Security Dialogue, Supply Chain Resilience Initiative launched in 2021, and Indo-Pacific Economic Framework for Economic Prosperity launched in May 2022.

pooling through modal shifts, carpooling, and the development of car-sharing. In all cases, sobriety measures will have to be multidimensional if we hope to reduce demand sufficiently.

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