

EGMONT PAPER 121

– APRIL 2023 –

The CRM Act in a global perspective

Victor De Decker



ABOUT THE EGMONT PAPERS

The Egmont Papers are published by Egmont – The Royal Institute for International Relations. Founded in 1947 by eminent Belgian political leaders, Egmont is an independent think-tank based in Brussels. Its interdisciplinary research is conducted in a spirit of total academic freedom. A platform of quality information, a forum for debate and analysis, a melting pot of ideas in the field of international politics, Egmont’s ambition – through its publications, seminars and recommendations – is to make a useful contribution to the decision-making process. The opinions expressed in this paper are those of the author(s) alone, and they do not necessarily reflect the views of the Egmont Institute.

ABOUT THE AUTHOR

Victor De Decker is a Research Fellow in the Europe in the World Programme at the Egmont Institute since January 2023. His research centres on geoeconomics, economic statecraft, international political economy, and economic security, with a particular focus on Asia.

He holds a master’s degree in International Relations from Ghent University and is working towards a PhD in Geoeconomics at The University of Ghent and the Royal Military Academy.



Table of Contents

Introduction	4
Critical Raw Materials Act	4
Green OPEC	5
CRM champion China	6
The USA enters the race	7
Towards a Critical Raw Materials Club	7
Processing, refining, manufacturing	8
CRM lists	8
Conclusion	9
Annex: comparison of CRM/SRM lists EU, USA, Japan, China	10
Endnotes	13



Introduction

Minerals are essential building blocks for clean energy technologies. As the renewable energy industry will grow, demand for minerals will increase accordingly. A 2020 World Bank Report found that the production of minerals would need to increase by 500 % by 2050 to meet the growing demand for clean energy technologies.¹ Especially the anticipated growth of mineral-intensive electrical vehicles will be a driver for demand. Supply of Lithium, an essential mineral in the production of EV batteries, will need to increase a dazzling 57 times by 2050 to meet the projected increase in demand. Moreover, green energy has a strong geoeconomic dimension for the EU: offering a way out of overdependence from autocratic fossil fuel-rich states like Russia. Nonetheless, there remains the risk of becoming more dependent on a handful of mineral-rich states.

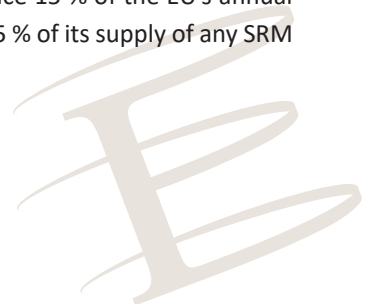
In response to these risks, the European Commission proposed its Critical Raw Materials Act, to pave a path towards resilience and strategic autonomy. Taking an approach of increasing domestic extraction, recycling and processing capacities, however, will find its limitations: Europe's soil simply lacks reserves of some of the most strategically important minerals. An international strategy is required. The Act sets out the first step, by indicating a diversification criterium and instrumentalising Global Gateway projects to scale up raw materials extraction and processing capacities in friendly third countries. Without specific investment figures, however, it is hard to assess the effectiveness of this strategy.

CRITICAL RAW MATERIALS ACT

Already in 2008, the European Commission warned that the EU was “highly dependent on imports of strategically important raw materials”.² Part of its response was the establishment of the Raw Materials Initiative (RMI), which was based on ensuring access, increasing supply, and improving efficiency.³ A few years later, from 2011 onwards, the Commission started publishing a Critical Raw Materials list, identifying all Critical Raw Materials (CRMs). This list has been updated every three years. From 2020 onwards, the tone of the Commission took a more geopolitical turn, stating that “access to resources is a strategic security question for Europe’s ambition to deliver the Green Deal”, as these minerals would be crucial to both the green transition and the Union’s strategic autonomy.⁴ This communication reiterated the three pillars of the RMI, while emphasising the need to diversify the supply and integrating strategic autonomy in the narrative.

Facing an increasingly competitive CRM environment, the Commission proposed in March 2023 its EU Critical Raw Materials Act. This proposed act establishes a framework for ensuring secure and sustainable supply of critical raw materials. Additionally, to the updated list of CRMs, which was expanded to 34,⁵ the Commission came up with a list of Strategic Raw Materials (SRMs). While there is a large overlap, SRMs differ from CRMs as these are highlighted to be crucial to technologies important to Europe’s green and digital ambitions.

The Act contains internally and externally focused measures to strengthen various stages of strategic raw materials’ values chains. The objective is to ensure that by 2030 the European Union reaches the following benchmarks: (1) extraction capacity within the EU will produce 10 % of the EU’s annual consumption of SRMs; (2) processing capacity within the EU will produce 40 % of the EU’s annual consumption of SRMs; (3) recycling capacity to produce 15 % of the EU’s annual consumption of SRMs; (4) the EU is not dependent on a single third country for more than 65 % of its supply of any SRM at any stage.⁶



To these ends, the Commission will set up a European Critical Raw Materials Board which will coordinate Strategic Projects that should help securing and diversifying the supply of CRMs. These Strategic Projects will then benefit from streamlined permitting procedures and improved access to finance.

Looking at the list of Strategic Raw Materials, four SRMs come to the front wherefore the EU is significantly dependent on foreign suppliers as well as play a vital role in the green transition. These minerals are Cobalt, Lithium, Nickel, and Rare Earth Elements (REEs).

According to A Foresight Study on Critical Raw Materials, done by Joint Research Centre of the European Commission, bottlenecks and supply risks are mostly located in REEs, for which the EU depends virtually entirely on China.⁷ REEs play a crucial role in the manufacturing supply chain of wind turbines and traction motors, as they are contained in permanent magnets – a key component in both technologies.

Although the exact duration varies widely between minerals, location, and mine types, on average it takes over 16 years to develop mining projects from discovery to production.⁸ Even with rules to speed up the processes to acquire permits for mining, this becoming more self-reliant on domestic mining will be a lengthy process. Moreover, European SRM resources are relatively small and often not of high enough quality to be considered battery-grade – as is the case for lithium.⁹

Taking all of this in consideration, it is clear that the EU, despite all its proposed initiatives, will remain dependent on foreign suppliers for raw materials. Hence, an international approach is indispensable.

In complementarity with providing more attention to CRMs in trade agreements, Global Gateway will be instrumental in serving as a vehicle for assisting third countries in developing extracting and processing capabilities. In doing so, the EU will be facing harsh competition from strategic competitors, as well as a changing attitude from resource-rich countries, who are manifesting their own interests through domestic industrial policy actions.

“GREEN OPEC”

Efforts to diversify the supply of minerals will be necessary to increase the EU’s resilience, however, since critical raw materials are characterised by a high geographic concentration (higher than for fossil fuels), diversification will often meet its limits.¹⁰ Moreover, analysis by the International Energy Agency has projected that with the exception of copper, most of the output growth for cobalt, lithium and nickel will continue to come from today’s major producers. This concentration of market power on the supply side implies corresponding policy decisions by resource-rich countries.¹¹

Certain resource-rich countries are reviewing their role within mineral supply chains, charting a course away from merely supplying raw materials into higher-value activities. This way they seek to boost growth and create well-paid job opportunities within their own borders.

Indonesia is a case in point for this.

Indonesia’s Nickel production has grown significantly in recent years, increasing over six-fold over the past decade, making it the world’s largest Nickel-producing country. The country, however, is unhappy with its purely extractive function in global supply chains. Hence, Indonesia has been actively promoting an industrial policy to move upstream, aiming to become a global battery hub for electric vehicles through a series of nationalistic policies. This materialised fully in 2020 with

the implementation of a complete export ban on raw Nickel ore. Estimated to account for 37 % of the global production and 22 % of global reserves of this metal, the government tries to lure FDI in the Indonesian Nickel processing industry.¹²

The EU has filed a complaint within the WTO to dispute these protectionist measures by Indonesia.¹³ By the end of 2022, the WTO ruled in favour of the EU, prompting Indonesia to appeal.¹⁴ Instead of tracking back on its steps, Indonesia is doubling down, as it is now also exploring possibilities to establish an OPEC-like cartel for Nickel and key battery metals.¹⁵

Also in South America, similar initiatives seem to be on their way as Argentina, Chile, Bolivia and Brazil are planning to coordinate policies that would propel them further down the EV supply chain.¹⁶ Argentina and Chile are already major Lithium producers, accounting for 6 % and 25 % of global production in 2021, respectively.¹⁷ Whereas Bolivia is currently only a minor Lithium exporter, the country sits on the largest lithium sources of the world (estimated 21 million tons).¹⁸ Brazil, ranking as the sixth biggest car producing country in the world, adds extensive know-how of the car manufacturing market.¹⁹

These are no isolated cases, as over the past decade, there has been a five-fold increase in export restrictions on raw materials, across the board.²⁰ This trend stands testament for a changing dynamic within CRM markets. Multilateral arrangements are falling short, while national(ist) interests increasingly dictate the market.

CRM CHAMPION CHINA

China's recognition of the strategic value of minerals dates back to the 7th National Five-Year Plan for Rare Earth Industry (1986-1990), highlighting the need for research and production of advanced rare earth applications and new materials. This early focus inspired Deng Xiaoping to cite the prophetic words: "[the] Middle East has oil, China has rare earths."²¹ A combination of rich natural endowments, cheap labour, low production costs, and low environmental and labour standards, set the stage for rapid growth in REE extraction and processing.²² This resulted in the fact that up to this day, China accounts for the majority of the global production of REEs.²³

However, in order to grapple China's dominance in CRMs, one needs to have a closer look at its processing and refining capacities: here China controls a strong presence across the board. China's share of global refining is at 35 % for Nickel,²⁴ 65 % for Cobalt, and 58 % for Lithium. Given its high REE mining capacity, China's processing share in global value chains is 87 %.²⁵

China's raw materials approach is not limited within its own borders. As of 2020, 15 of the 19 Cobalt producing mines in Congo were owned or financed by Chinese companies.²⁶ Furthermore, recent foreign direct investments in Nickel processing capacities in Indonesia have been coming virtually all from Chinese companies, namely Tsingshan Holding Group and CATL.^{27 28}

When China shook global commodity markets by restricting exports of REEs in 2010. The WTO ruled against these export restrictions. Nonetheless, this instigated countries affected by this ban to assess their dependency on Chinese REEs. Notably Japan successfully diversified away from China in subsequent years through a series of investment and trade policies.²⁹



THE USA ENTERS THE RACE

Historically rich in natural resources, it took a while before the United States entered the critical raw materials race. Under the Trump presidency the United States adopted a Federal Strategy to Ensure Secure and Reliable Supplies of Critical Raw Materials in 2017. As the name suggests, this strategy was aimed at reducing the country's vulnerability to disruptions in the supply of critical minerals.³⁰

President Biden's landmark Inflation Reduction Act, signed into law over the Summer of 2022, promises to shake up energy markets in a dramatic fashion. Built within the Act is a commitment to increase the domestic supply of critical minerals that provide the materials necessary for electric vehicles, batteries, and renewable power production infrastructure.

Amongst other incentives, the tax credit for EV purchases comes with certain thresholds linked to the origins of raw materials used. In order to be eligible to the USD 7500 consumer tax credit for electric cars a minimum share of the value of battery components (currently 50 %) or critical minerals (currently 40 %)³¹ should come from North America or countries with which the USA has a Free Trade Agreement (FTA).³² Every year these thresholds will be increased by about 10 percentage points. Furthermore, any use of critical materials coming from Russia, Iran, North Korea, and – most notably – China will be phased out completely.³³

The USA, just as the EU, is extensively reliant on Chinese critical raw materials, thus, just as the EU, the US faces an uphill battle increasing domestic production and diversification of supply chains of CRMs. Difficulties for the US are reinforced by the fact that the US does not have currently standing FTAs with many CRM-providing countries.

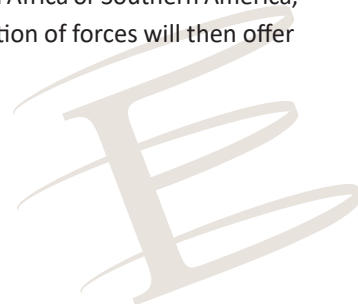
TOWARDS A CRITICAL RAW MATERIALS CLUB

As part of the Critical Raw Materials Act, the EU vows to not only strengthen its ties with resource-rich countries, but also with like-minded countries on the demand side: notably with Japan and the USA, thereby establishing a so-called 'Critical Raw Materials Club'. This corresponds with calls made across the pond. US Treasury Secretary Janet Yellen already indicated that the EU and Japan should revamp trade agreement negotiations with the US to meet their respective mineral-sourcing criteria.³⁴

Initially, the IRA was met with criticism within the EU, luring investments in clean tech manufacturing and mineral refining capacities away from European territory, towards the USA. In the meantime, transatlantic dialogue has continued, making way for a more pragmatic interpretation of the IRA benchmarks, more favourable to the EU's position.³⁵ Given that the IRA does not define the term "free trade agreement", the Treasury Secretary Yellen already indicated that certain agreements focused on issues like trade in minerals that "could qualify in the future as a free-trade area".³⁶

A buying club of like-minded partners could then come together to cooperate on procurement of CRMs, avoiding harmful competition. The EU can thus negotiate trade agreements focused on CRMs with allies like Japan, the UK, and – most importantly – the US, that would allow mutually reinforcing climate subsidies for manufacturing as well as CRM sourcing, processing, and recycling.

This CRM Club can then reach out as one purchasing entity to various suppliers of CRMs, e.g., in Africa or Southern America, ensuring reliable access, while preventing a bidding war between G-7 nations. This combination of forces will then offer resource-rich countries an alternative to the current Chinese market dominance.



PROCESSING, REFINING, MANUFACTURING

Even if this buying club will be successful, it will remain key to scale up European processing capacities. As mentioned above, China currently owns a majority stake in global refining and processing capabilities. For some CRMs, the bilateral dependence of the EU on Chinese processing capacities is even greater, notably for REEs.³⁷

As the CRM Act sets the goal for the EU to expand its processing capacity to 40 % of the EU's annual consumption of SRMs, an increase of investment in processing plants is front and centre.

Beyond processing capacities, an entire renewable energy industry needs to be scaled up dramatically in order to adequately respond to the increased supply. To this end, in parallel with the CRM Act, the European Commission tabled its Net Zero Act (NZIA). This Act proposes setting a goal to domestically produce 40 % of clean technologies by 2030.³⁸ In order to be successful, both the CRM Act and the NZIA need to run in tandem: failure to diversify the CRM supply will risk impeding the green industrial transition, and vice versa.

Currently, clean energy technology supply chains (e.g. batteries, solar) are dominated by China, owning around 70 % of value chains. Making up for lost ground in these areas will come at a hefty price tag, estimated by the BNEF to be USD 149 billion.³⁹ The Commission has established Important Projects of Common European Interest (IPCEI) on battery value chains, which includes a section on raw materials.⁴⁰ Much more needs to be done, however, to catch up with China's green-industrial dominance.

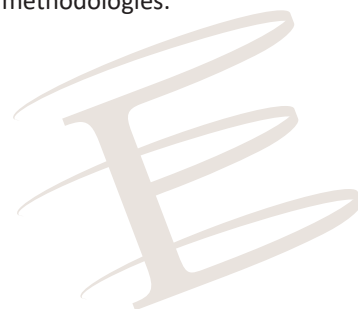
CRM LISTS

Strongly industrialised and heavily dependent on imports of natural resources, Japan was the first country to reckon with its dependence on foreign suppliers. To this end, it was the first major economy assembling a comprehensive list of critical minerals in 1984, under the auspices of the Ministry of International Trade and Industry (currently METI)). This list has been updated regularly but has remained fairly constant. As of March 2020, Japan instituted a New International Resource Strategy, including a list of 34 identified critical minerals – referred to as “critical metals”.⁴¹

Since 2011, the EU has been publishing a comprehensive list of CRMs. The latest version of the EU list includes a differentiation of critical raw materials and strategic raw minerals. For CRMs the EU is using a formula whereby economic importance is weighed against supply risks. For SRMs, the relevance to green, digital, defence and space applications is taken into account.⁴²

Following up on its Federal Strategy to Ensure Secure and Reliable Supplies of Critical Raw Materials in 2017, the US Department of the Interior drafted a list of 35 critical materials, similar to the European exercise.⁴³ This list was later revised and expanded. Early 2022, the United States' Geological Survey released the latest iteration of this list of 50 mineral commodities critical to the US economy and national security. Compared to the EU, the US list puts more emphasis on the national security aspect and lists all individual REEs instead of considering REE (or HREE, LREE, battery REEs) as one group.

Overall, there is a large overlap between the EU, US, and Japan, indicating a convergence of methodologies.



Being the main CRM exporter in the world, China does not worry too much about supply risks from other countries. Hence, the only equivalent explicit mapping for minerals is the Chinese National Plan for Mineral Resources (2016-2020), which was published in 2016. There has been no (publicly accessible) SRM-list published from the Chinese government ever since.⁴⁴

Comparing the US's, EU's, and Japanese lists to its equivalent in China, the comparison becomes bit murky (see annex). Whereas supply risks are a central parameter in identifying CRMs in the EU, US, and Japan – which are all net CRM importers –, China holds a different perspective on minerals. Abundant in natural resources, China is a net CRM-exporter. Therefore, the focus in the Chinese list is more on minerals that are of strategic importance (SRMs), rather than “critical”. Interestingly, next to critical minerals, the Chinese SRM-list includes fossil-fuels and other so-called “staple minerals” (iron, copper, oil, coal, natural gas). These resources are roughly defined as minerals that China needs in high quantities, whereby global demand is very high.⁴⁵

CONCLUSION

As is argued in this paper, Critical Raw Materials are increasingly becoming an arena for geopolitical and geoeconomic competition.

For the short-to-medium term the EU will remain dependent on imports for the majority of most CRMs, in spite of all initiatives listed in the CRM Act. For the time being, the EU will remain subject to geopolitical and global market forces. Not only China comes to the front as a disrupting force, but also other resource-rich countries are increasingly reviewing their role in global value chains, as they try to scale up domestic processing, refining, and manufacturing capacities.

High geographic concentration of CRM extraction can potentially jeopardise the EU's quest for strategic autonomy. For processing and refining, the EU will need to scale up domestic capacity as well as offer a development perspective for the Global South through Global Gateway projects. Here the EU can use Japan as an example, as the country managed to diversify its strategic mineral supplies through a comprehensive investment and trade strategy. For the EU being a net importer of CRMs, it remains of absolute importance that global competition for resources will not tilt towards a zero-sum game, as this could hamper the green transition and impede global competitiveness of European industry alike.

For the green transition to succeed, the EU needs to dramatically ramp up of investments – within the EU as well as in friendly third countries – increasing mining, processing, and refining capacities across the board. However, with no clear financial commitments provided, it remains to be seen whether this CRM Act will be a game-changer.

Increased coordination between like-minded partners, like the USA and Japan, seems a logical conclusion for the EU. Still, many question marks remain on the execution on this collaboration: How will this CRM Club take shape? What will be its procurement standards? How will this CRM Club be perceived by resource-rich countries?

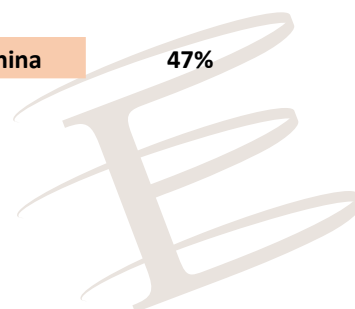
In conclusion, the CRM Act has made the initial step, but much more capital – financial and political – will be required to make it a success.



Annex: comparison of CRM/SRM lists EU, USA, Japan, China

(Compiled by the author)

minerals	EU CRM (2023) ⁴⁶	EU SRM (2023) ⁴⁷	USA (2022) ⁴⁸	Japan (2020) ⁴⁹	China (2016) ⁵⁰	Main global supplier (2020) ⁵¹	Main EU Supplier (2020) ⁵²	EU import reliance on biggest supplier (2020) ⁵³
aluminium			1		1	China		
antimony	1		1	1	1	China	Turkey	62%
arsenic	1		1			Peru		
barite	1		1			China	China	38%
barium				1		China		
bauxite	1					Australia	Guinea	64%
beryllium	1		1	1		USA		
bismuth	1	1		1		China	China	93%
boron	1	1		1		United States		
Carbon				1		China		
cerium (REE)	1	1	1	1	1	Japan		
cesium			1	1		Canada		
chromium			1	1	1	South Africa		
coal					1	Indonesia		
coalbed methane					1	USA		
cobalt	1	1	1	1	1	Congo DR	Congo DR	68%
coking coal	1					China	Australia	24%
copper	1	1			1	Chile		
crystalline graphite					1	China		
dysprosium (REE)	1	1	1	1	1	China		
erbium (REE)	1		1	1	1	China		
europium (REE)	1		1	1	1	China		
feldspar	1					Turkey		
fluorite					1	China		
fluorine				1		China		
fluorspar	1		1			China	Mexico	25%
gadolinium (REE)	1	1	1	1	1	China		
gallium	1	1	1	1		China	Germany	35%
germanium	1	1	1	1		China	Finland	51%
gold					1	China		
graphite	1	1	1			China	China	47%



hafnium	1		1	1		France	France	84%
helium	1					United States		
holmium (REE)	1		1	1	1	China		
indium			1			China	France	28%
iridium (PGM)	1	1	1	1		South Africa		
iron					1	Australia		
lanthanum (REE)	1		1	1	1	China		
lithium	1	1	1	1	1	Chile	Chile	78%
lutetium (REE)	1		1	1	1			
magnesium	1	1	1	1		China	China	93%
manganese	1	1	1	1		South Africa		
molybdenum				1	1	China		
natural gas					1	USA		
neodymium (REE)	1	1	1	1	1	China		
nickel	1	1	1	1	1	Indonesia		
niobium	1		1	1		Brazil	Brazil	85%
oil					1	USA		
osmium (PGM)				1		South Africa		
palladium (PGM)	1	1	1	1		Russia		
phosphate rock	1					China	Morocco	24%
phosphorus	1				1	China	Kazakhstan	71%
platinum (PGM)	1	1	1	1		South Africa		
potassium salt					1	Canada		
praseodymium (REE)	1	1	1	1	1	China		
rhodium				1		Chile		
rhodium (PGM)	1	1	1	1		South Africa		
rindium				1				
rubidium			1	1		Canada		
ruthenium (PGM)	1	1	1	1		South Africa		
samarium (REE)	1	1	1	1	1	China		
scandium (REE)*	1		1	1	1	China	UK	98%
selenium				1		China		
shale gas					1	USA		



silicon	1	1		1		China	Norway	30%
strontium	1			1		Spain	Spain	100%
tantalum	1		1	1		Congo DR	Congo DR	36%
tellurium			1	1		China		
terbium (REE)	1	1	1	1	1	China		
thallium				1				
thulium (REE)	1		1	1	1	China		
tin			1		1	China		
titanium	1	1	1	1		China		
tungsten	1	1	1	1	1	China		
uranium					1	Kazakhstan		
vanadium	1		1	1		China		
ytterbium (REE)	1		1	1	1			
yttrium (REE)	1		1	1	1	China		
zinc			1			China		
zirconium			1	1	1	South Africa		
Platinum Group Metals								
	1	1				South Africa		
HREE	1	1				China	China	98%
LREE	1	1				China	China	99%

Notes:

- EU SRM rare earth metals for magnets (Neodymium, Praseodymium, terbium, Dysprosium, Gadolinium, Samarium, Cerium)
- EU definition HREE: Dysprosium, Erbium, Europium, Gadolinium, Holmium, Lutetium, Terbium, Thulium, Ytterbium, Yttrium
- EU definition LREE: Cerium, Lanthanum, Neodymium, Praseodymium and Samarium
- EU definition PGMs: Iridium, Palladium, Platinum, Rhodium, Ruthenium
- Although scandium is present in the CRM-list, it is not considered within the subgroupings of REEs in the EU CRM List.



Endnotes

- 1 From 2018 annual production figures. World Bank Group Report: World Bank. (2020). Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition. World Bank. <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>
- 2 European Commission (2008, November 4). 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 {SEC(2008) 2741}. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0699:FIN:en:PDF>
- 3 European Commission. (2008, November 4). 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 {SEC(2008) 2741}. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0699:FIN:en:PDF>
- 4 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474>
- 5 European Commission. (2023, March 16). Proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160#document2>
- 6 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474>
- 7 Bobba, S., Carrara, S., Huisman, J. (co-lead), Mathieux, F., Pavel, C. (2020). Critical Raw Materials for Strategic Technologies and Sectors in the EU A Foresight Study. [DocsRoom – European Commission \(europa.eu\)](https://docsroom.europa.eu)
- 8 IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>, License: CC BY 4.0
- 9 Dempsey, H., & Nilsson, P. (2023, April 2). Lithium shortages threaten Europe’s electric car transition. Financial Times. <https://www.ft.com/content/154c53aa-5a9a-4004-abf9-2e6e5396dca4>
- 10 IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>, License: CC BY 4.0
- 11 IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>, License: CC BY 4.0
- 12 Kyunghoon K. (2023, February 20). Indonesia’s uncertain climb up the nickel value chain. Lowy Institute. <https://www.lowyinstitute.org/the-interpreter/loomberg-s-uncertain-climb-nickel-value-chain>
- 13 WTO | dispute settlement – DS592: - Indonesia – Measures Relating to Raw Materials. (n.d.). https://www.wto.org/loombe/tratop_e/dispu_e/cases_e/ds592_e.htm
- 14 Reuters. (2022, November 30). WTO backs EU in nickel dispute, Indonesia plans appeal. Reuters. <https://www.reuters.com/markets/commodities/loomberg-plans-appeal-after-losing-wto-nickel-dispute-with-eu-2022-11-30/>
- 15 Dempsey, H., & Ruehl, M. (2022, October 31). Indonesia considers Opec-style cartel for battery metals. Financial Times. <https://www.ft.com/content/0990f663-19ae-4744-828f-1bd659697468>
- 16 Attwood, J., Gilbert, J., & Durao, M. (2023, March 7). South America Boosts Efforts to Turn Lithium Into Batteries. Bloomberg.Com. <https://www.bloomberg.com/news/articles/2023-03-06/south-america-steps-up-efforts-to-turn-lithium-into-batteries>
- 17 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474>
- 18 US Geological Survey. (2022). Lithium. Mineral Commodity Summaries. <https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-lithium.pdf>
- 19 Statista. (2023, February 3). Car production by country 2021. <https://www.statista.com/statistics/226032/light-vehicle-producing-countries/>
- 20 Kowalski, P. (2023, February 10). Raw materials critical for the green transition: Production, international trade, and export restrictions. OECD Report: Working Party of the Trade Committee. [https://one.oecd.org/document/TAD/TC/WP\(2022\)12/FINAL/en/pdf](https://one.oecd.org/document/TAD/TC/WP(2022)12/FINAL/en/pdf)
- 21 The Economist. (2019, July 10). Rare earths give China leverage in the trade war, at a cost. The Economist. <https://www.economist.com/china/2019/06/15/rare-earths-give-china-leverage-in-the-trade-war-at-a-cost>



- 22 Yiyang Zhang, Guoyi Han, & Jürisoo, M. (2014). The geopolitics of China's rare earths: a glimpse of things to come in a resource-scarce world? Stockholm Environment Institute. <http://www.jstor.org/stable/resrep00363>
- 23 REEs include 17 metallic elements, four of which are of particular relevance to clean energy technologies: neodymium, dysprosium, praseodymium, and terbium
- 24 The figure is higher taking into account China's involvement in Indonesian operations.
- 25 IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>, License: CC BY 4.0
- 26 Searcey, D., Forsythe, M., Lipton, E., & Gilbertson, A. (2021, December 7). A Power Struggle Over Cobalt Rattles the Clean Energy Revolution. The New York Times. <https://www.nytimes.com/2021/11/20/world/china-congo-cobalt.html>
- 27 Ho, Y., & Listiyorini, E. (2022, December 15). Chinese Companies Are Flocking to Indonesia for Its Nickel. Bloomberg.Com. <https://www.bloomberg.com/news/articles/2022-12-15/chinese-companies-are-flocking-to-indonesia-for-its-nickel?leadSource=uverify%20wall>
- 28 CATL (2022, April 14). CATL partners up with Indonesia to boost e-mobility with an investment of nearly 6 billion USD. [Press release]. <https://www.prnewswire.com/news-releases/catl-partners-up-with-indonesia-to-boost-e-mobility-with-an-investment-of-nearly-6-billion-usd-301526359.html>
- 29 Hui, M. (2022, July 20). Japan's global rare earths quest holds lessons for the US and Europe. Quartz. <https://qz.com/1998773/japans-rare-earths-strategy-has-lessons-for-us-europe>
- 30 Federal Register. (2017, December 26). A Federal Strategy To Ensure Secure and Reliable Supplies of Critical Minerals. A Presidential Document by the Executive Office of the President: Executive Order 13817 <https://www.federalregister.gov/documents/2017/12/26/2017-27899-a-federal-strategy-to-ensure-secure-and-reliable-supplies-of-critical-minerals>
- 31 US Treasury. (2023). Anticipated Direction of Forthcoming Proposed Guidance on Critical Mineral and Battery Component Value Calculations for the New Clean Vehicle Credit. <https://home.treasury.gov/system/files/136/30DWhite-Paper.pdf>
- 32 Currently, the USA has FTAs with 30 countries: Office of the US Trade Representative. (2023). Free trade Agreements. <https://ustr.gov/trade-agreements/free-trade-agreements>
- 33 Kleimann, D., Poitiers, N., Sapir, A., Tagliapietra, S., Véron, N., Veugelers, R., Zettelmeyer, J. (2023). How Europe should answer the US Inflation Reduction Act. Bruegel. <https://www.bruegel.org/policy-brief/how-europe-should-answer-us-inflation-reduction-act>
- 34 Duehren, A. (2023, January 24). Janet Yellen Expects EV Subsidy Rules to Prompt New Trade Deals. WSJ. https://www.wsj.com/articles/janet-yellen-says-japan-eu-would-need-new-trade-deals-under-ev-subsidy-rules-11674591277?mod=article_inline
- 35 Chu, A., Bushey, C., Politi, J., & Williams, A. (2023, March 31). Biden offers olive branch to allies in electric vehicle subsidy dispute. Financial Times. <https://www.ft.com/content/6b7fdca1-d2ab-41b4-aad1-73b87e2d4bbd?shareType=nongift>
- 36 Duehren, A. (2023, January 24). Janet Yellen Expects EV Subsidy Rules to Prompt New Trade Deals. WSJ. https://www.wsj.com/articles/janet-yellen-says-japan-eu-would-need-new-trade-deals-under-ev-subsidy-rules-11674591277?mod=article_inline
- 37 Bobba, S., Carrara, S., Huisman, J. (co-lead), Mathieux, F., Pavel, C. (2020). Critical Raw Materials for Strategic Technologies and Sectors in the EU A Foresight Study. [DocsRoom - European Commission \(europa.eu\)](https://docsroom.europa.eu/DocsRoom-Commission/europa.eu)
- 38 European Commission. (2023, March 16). Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act) COM/2023/161 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0161>
- 39 Bloomberg Professional Services. (2022, October 28). Localizing clean energy supply chains comes at a cost | Insights | Bloomberg Professional Services. Bloomberg Professional Services. <https://www.bloomberg.com/professional/blog/localizing-clean-energy-supply-chains-comes-at-a-cost/#:~:text=Building%20the%20factories%20required%20for,%24113%20billion%20in%20the%20US.>
- 40 European Commission (2019, December 9). State Aid: Commission approves €3.2 billion public support by seven Member States for a pan-European research and innovation project in all segments of the battery value chain. [Press Release]. [State aid: €3.2 billion public support battery value chain \(europa.eu\)](https://ec.europa.eu/commission/presscorner/detail/en/IP_21_226) ; European Commission https://ec.europa.eu/commission/presscorner/detail/en/IP_21_226
- 41 IEA (2022, October 27). International Resource Strategy – National stockpiling system. [International Resource Strategy - National stockpiling system – Policies - IEA](https://www.iea.org/reports/international-resource-strategy-national-stockpiling-system-policies)
- 42 European Commission. (2023, March 16). Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020. [EUR-Lex - 52023PC0160 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160)
- 43 US Geological Survey, Department of the Interior. (2023, February 24). 2022 Final List of Critical Minerals. [Federal Register:: 2022 Final List of Critical Minerals](https://www.federalregister.gov/2022/02/24/2022-04311/final-list-of-critical-minerals)
- 44 China Ministry of Natural Resources. (2015). Chinese National Plan for Mineral Resources (2016-2020). <https://www.cgs.gov.cn/tzgg/tzgg/201612/W020161206616104236819.doc>

- 45 Andersson, P. L. (2020). Chinese assessments of “critical” and “strategic” raw materials: Concepts, categories, policies, and implications. *The Extractive Industries and Society*, 7(1), 127–137. <https://doi.org/10.1016/j.exis.2020.01.008>
- 46 European Commission. (2023, March 16). Proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160#document2>
- 47 European Commission. (2023, March 16). Proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160#document2>
- 48 US Geological Survey, Department of the Interior. (2023, February 24). 2022 Final List of Critical Minerals. [Federal Register:: 2022 Final List of Critical Minerals](#)
- 49 IEA (2022, October 27). International Resource Strategy – National stockpiling system. [International Resource Strategy - National stockpiling system – Policies - IEA](#)
- 50 China Ministry of Natural Resources. (2015). Chinese National Plan for Mineral Resources (2016-2020). <https://www.cgs.gov.cn/tzgg/tzgg/201612/W020161206616104236819.doc>
- 51 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474> with additions by the author: when EU MS is main supplier it is highlighted in green, when China’s dominance highlighted in pink – by author.
- 52 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474>
- 53 European Commission. (2020, September 3). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474> ; when dependence on third country exceeds 65 %, highlighted in orange – by author.





The opinions expressed in this Publication are those of the author(s) alone, and they do not necessarily reflect the views of the Egmont Institute. Founded in 1947, EGMONT – Royal Institute for International Relations is an independent and non-profit Brussels-based think tank dedicated to interdisciplinary research.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the permission of the publishers.

www.egmontinstitute.be

© Egmont Institute, April 2023

© Author(s), April 2023