

Securing Europe’s Independence in Critical Raw Materials and Technological Components

by Frank Umbach

Summary

The paper analyses the EU’s present import dependence for critical raw materials (CRMs)—particularly on China—and its efforts to ‘de-risk’ this through various countermeasures in the EU’s raw material policies. It reviews such policies since 2008 (with a focus on the EU’s Green Deal and its Critical Raw Materials Act), the challenges for the EU considering the rapidly rising global demand for CRMs, the implications for its foreign raw material policies and the inherent conflicts of competing strategic objectives. It concludes by making the following three major recommendations, and providing details of the concrete measures to be taken: (1) expanding domestic mining and stockpiling with sustained political, public and financial support; (2) strengthening the EU’s foreign raw-materials policy; and (3) promoting the ‘de-risking’ of the supply chain for CRMs and disruptive technologies (components).

Keywords Critical raw materials – Energy transition – Green technologies – Supply chains – Import diversification – Refining – Stockpiling – De-risking

Introduction

The global energy transition and climate-change targets (i.e. limiting global warming to 1.5°C) are becoming ever more dependent on the critical raw materials (CRMs) which are required for green technologies.¹ Alongside the increasing geopolitical rivalries, China’s control of many CRMs has also become a major concern for Western arms industries and in terms of the resilience of CRM supply chains in major crises or conflicts with China.² A US analysis warned last May: ‘The countries that are able to secure their own supply chains for critical technologies will be in the position to write the rules of global economic governance for years to come’.³

China is the world’s largest producer of green technologies such as solar cells, wind turbines and electric vehicles (with a 60% share of the global market). It has benefited from its strong position in raw-materials extraction and processing for green technologies and electromobility from the outset, and uses its strategically dominant position in mining, metallurgy and materials science to its advantage. New developments in its supply chains are not constrained to increasing mining, but complete the process by adding refining, reprocessing, recycling and manufacturing systems.

In contrast to China, the EU is heavily dependent on imports of CRMs from abroad (100% for primary metals)—and thus on access to foreign mines and the availability of their products on the international commodity markets. Currently, China supplies 98% of the EU’s rare-earth elements (REEs) and around 62% of the 34

¹ See also F. Umbach, *Energy Security in a Digitalized World and Its Geostrategic Implications*, Konrad Adenauer Foundation (Hong Kong, September 2018); F. Umbach, *The New ‘Rare Metal Age’. New Challenges and Implications of Critical Raw Materials’ Supply Security in the 21st Century*, S. Rajaratnam School of International Studies and Nanyang Technological University, Working Paper no. 329 (Singapore, 27 April 2020); F. Umbach, *Strengthening Energy Security and Building Resilience in the Asia–Pacific*, UN Economic and Social Committee in Asia and Pacific (Bangkok, 2021).

² G. Wischer, ‘The U.S. Military and NATO Face Serious Risks of Mineral Shortages’, *Carnegie Endowment*, 12 February 2024; J. Emont, ‘America’s War Machine Runs on Rare Earth Magnets. China Owns That Market’, *Wall Street Journal*, 4 May 2024; M. Bazilian and G. Wischer, ‘The West Needs to Produce More Critical Minerals. Here’s How the Pentagon Should Help’, *Defenseone.com*, 30 May 2024; L. Zhen and S. Hyeon Choi, ‘The US Wants to Decouple Its Military Supplies From China – But Can It?’, *South China Morning Post*, 18 June 2024; F. Umbach, ‘Rare Earth Minerals Return to the U.S. Security Agenda’, *Geopolitical Intelligence Service* (1 August 2019).

³ R. C. Berg, H. Ziemer and E. Polo Anaya, ‘Mineral Demands for Resilient Semiconductor Supply Chains. The Role of Western Hemisphere’, *CSIS Briefs*, Washington, DC (May 2024), 1.

CRMs defined as such by the EU in 2023.

REEs are just one example of how China dominates the global supply of CRMs, the country being responsible for nearly 80% of global production of the 17 REEs and more than 90% of their refining processes. Currently, Chinese companies also control about 80% of global refined cobalt production, more than 60% of global lithium-ion production capacity and 75% of all lithium-ion battery production. China is the only superpower to have positioned itself so dominantly in the entire clean-tech supply chain and the mining, metallurgy and materials science fields.

In a move comparable to Russia's gas-export policies, China weaponised its production and export monopoly of REEs as early as 2010. This was the result of an escalating maritime territorial and resource conflict with Japan, which led to the imposition of an export ban on REEs to Japan without any prior notice. At that time China controlled some 97% of the global production of REEs, despite having less than 40% of the world's reserves and only 57% of global resources. Towards the end of the 38-day diplomatic conflict between China and Japan in autumn 2010, the US and the EU were also drawn in when Japan began importing Chinese REEs from them, thus circumventing the direct export ban.⁴

New disruptive technology developments, such as batteries for electromobility, are having a lasting impact on geopolitical dynamics regionally and globally. They require new supply chains, trade routes and strategic partnerships, including to secure the supply of CRMs. This is leading to the forging of new geopolitical alliances and geo-economic rivalries that need to be anticipated in the EU's economic, trade, foreign and security policies.

In 2017 a World Bank study explicitly warned that the global energy transition and climate-protection policies would demand significantly greater use of CRMs. The warning was confirmed by a report from the UN Environment Programme (UNEP) in the same year: the envisaged 2°C limit to global warming would require around 600 million tons more metallic raw materials than a 6°C target by 2050. The International Energy Agency has forecast that the global demand for CRMs could rise to 40 times the 2020 level by 2040. According to industry forecasts, global demand for the REEs used in magnets could increase fivefold by 2040.⁵ Given the rocketing demand for copper for achieving net-zero targets, as much new copper will be required as the world has produced in all recorded history.⁶

Generally speaking, there are no acute geological restrictions on the availability of CRMs, including REEs. However, there are concrete limitations to extraction, processing and recycling due to geopolitical and geo-economic risks, as well as domestic constraints in the producing and exporting countries (restrictive environmental regulations, lack of good governance, resource nationalism, lack of local public acceptance etc.). Hence, the global supply of many CRMs is limited to coming from a few, often politically unstable, countries. Furthermore, global competition for access to these CRMs will further intensify due to the needs of the global energy transition, electromobility, the digitisation of all industrial sectors and our private lives, and the development of artificial intelligence.

⁴ See also Umbach, *Energy Security in a Digitalized World and its Geostrategic Implications*, 50.

⁵ See also World Bank Group, *The Growing Role of Minerals and Metals for a Low Carbon Future*, (Washington, DC, June 2017); UNEP, *Sustainable Trade in Resources: Global Material Flows, Circularity and Trade* (Nairobi, 14 May 2020); UNEP, *Mineral Resource Governance in the 21st Century. Gearing Extractive Industries Towards Sustainable Development* (Nairobi, 2020); OECD, *Global Material Resources Outlook to 2060* (Paris, 2020); D. Gielen, *Critical Minerals for the Energy Transition*, International Renewable Energy Agency, Technical Paper 5/2021 (2021); International Energy Agency, *The Role of Critical Minerals in Clean Energy Transitions* (Paris, 2021); International Energy Agency, *Global Critical Minerals Outlook 2024* (Paris, May 2024); World Bank Group, *Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition* (Washington, DC, 2020)

⁶ See V. Beiser, 'The Green Economy Is Hungry for Copper – and People Are Stealing, Fighting, and Dying to Feed it', *Wired.com*, 22 August 2024.

Against this backdrop of growing dependence on the import of CRMs, particularly from China, Western mining projects and plants often have to cope with exploding investment needs and budgets, delays, missed production goals and insufficient commercial profitability. They all have to compete with low and subsidised Chinese prices. The involvement of any Western project will ultimately increase the price of the final product—be it renewables or already expensive high-tech Western weaponry. Rare-earth magnets produced in the US, for instance, are around 50% more expensive than Chinese ones. Moreover, even new Western reprocessing projects have to rely on Chinese technology, which China could cut off access to. Last year, it banned exports of REE-processing technologies.

Beijing is seeking to control key technology and value chains to further its strategy of asymmetric interdependence. In 2024 it ordered its state-owned companies to increase annual REE production by almost 13%, up to 135,000 tons. Its deliberate overproduction—on top of lower demand growth than expected—has already dropped prices to a three-year low, hampering Western counter-strategies for building up alternative REE supply chains.⁷ Beijing has also curbed the export of antimony, another CRM vital to the Western defence industry. China has also reportedly discovered a large potential reserve of REEs in the Himalayas, where it has a long-standing violent territorial conflict with India. Together with its increased mining of CRMs in Afghanistan and its huge CRM reserves, this discovery could further strengthen its dominant global market position.⁸

EU raw-materials policies and strategies since 2008

European awareness of supply-chain issues has changed in recent years due to the EU's pandemic experience with critical-supply disruptions and the concerns arising from the geopolitical overdependence of Western supply chains on China. China is no longer seen just as an economic partner and competitor, but also as a 'systemic (geopolitical) rival'.⁹ As early as 2018, Vice-President of the European Commission Maros Sefcovic warned that CRMs could become the 'new oil'.¹⁰

Although the European Commission introduced a common raw-materials policy in 2008, it was not until 2017 that the Commission, Germany and some other member states began to push ahead with appropriate industrial strategies to meet the challenges of raw-material supply for electromobility and the construction of European battery gigafactories. Currently, the EU27 can only cover 9% of the EU's total raw material needs. Europe accounted for only 5% of the world's mining in 2020 and is the only region in the world with a declining mining industry. Global demand for lithium could increase eighteen-fold, cobalt by fifteen-fold by 2030 and by sixty-fold by 2050. Demand for REEs could increase tenfold by 2050.¹¹

Both Germany's and the EU's raw-materials policies have promoted a 'three-pillar strategy' since 2010. These pillars comprise: (1) using domestic raw materials; (2) importing primary raw materials not available in

⁷ C. Lu, 'China's Antimony Curbs Expose U.S. Critical Mineral Supply Chain Vulnerabilities', *Foreign Policy*, 23 August 2024; *Economist*, 'China Controls the Supply of Crucial War Minerals', 13 July 2023; E. White, 'China's Overseas Investment in Metals and Mining Set to Hit Record', *Financial Times*, 31 July 2023; C. Cytera, 'China, Gallium, and Germanium – the Minerals of the Chip War', *Cepa.org*, 8 August 2023; P. Andersson, *The Growing Secrecy Around China's Mineral Resource Planning, Implications for the EU*, Swedish National China Centre, Commentary 2/2024 (2024); C. Lu, 'Beijing Tightens Its Grip on Critical Mineral, Rare-Earth Supply Chains', *Foreign Policy*, 7 November 2023; J. Emont, 'China Is Winning the Minerals War', *Wall Street Journal*, 21 May 2024; H. Dempsey, 'Western Graphite Producers' Shares Soar After Beijing Announces Export Curbs', *Financial Times*, 23 October 2023; K. Johnson and E. Groll, 'China Raises Threat of Rare-Earths Cutoff to U.S.', *Foreign Policy*, 21 May 2019; C. Lu, 'Beijing Tightens Its Grip on the Critical Minerals Sector', *Foreign Policy*, 7 November 2023; E. Morina, 'Rare-Earth Prices Are in the Doldrums. China Wants to Keep Them That Way', *Wall Street Journal*, 15 July 2024; M. Wilowski, 'China Restricts Exports of Graphite, Key Mineral Used for Making EV Batteries', *Investopedia.com*, 20 October 2023.

⁸ See also F. Umbach, 'Chinas Interesse an Afghanistans Rohstoffreichtum. Implikationen für die EU-Versorgungssicherheit bei kritischen Rohstoffen', *Europäische Sicherheit und Technik* (July 2022); F. Umbach, 'Scenarios for Afghanistan's Critical Raw Materials', *Geopolitical Intelligence Service* (18 October 2021); S. Chen, 'Chinese Scientists Turn to Artificial Intelligence as Potential 1,000km Seam of Rare Earth Found in Himalayas', *South China Morning Post*, 21 June 2023.

⁹ See F. Umbach, 'EU–China Relations at a Crossroads: Decoupling or a European "Sinatra Doctrine"?', *East Asian Policy* 13 (Spring 2021).

¹⁰ F. Simon, 'EU's Sefcovic: Real Risk That 'Raw Materials Become the New Oil'', *Euractiv*, 20 November 2018.

¹¹ See footnote 5.

Europe; and (3) reducing dependence on primary raw materials through recycling, substitution and increasing resource efficiency.¹²

The growing concern about and geo-economic importance of the EU's current and future raw-material supply security is also reflected in the European Commission's list of defined CRMs: the number has risen steadily from 14 in 2011 to 34 in 2023. The latest list was produced after assessing 70 raw materials and minerals, comprising 67 individual materials and 3 material groups: 10 heavy REEs, 5 light REEs and 5 platinum group metals. Copper and nickel did not meet the CRM thresholds but have been included on the list of 'strategic raw materials'.

The EU's Green Deal and Critical Raw Materials Act

With the Critical Raw Materials Act (CRMA) presented in March 2022, the EU has provided a comprehensive conceptual approach to the numerous challenges to the security of the future raw-material supply for its electromobility and battery industries. The EU wants to limit and reduce demand growth for its CRMs in the medium term by introducing a circular economy with much higher recycling and reuse levels, to diversify its imports and to expand its domestic mining in Europe. The following are the goals up to 2030:

- at least 10% of annual consumption to be covered by the EU's own raw-material extraction;
- at least 40% of annual consumption to be generated by EU-based processing (instead of between 0% and 20% as before);
- at least 15% of annual consumption to be ensured through recycling; and
- a maximum of 65% of annual consumption for each CRM at all stages of processing to be imported from a single third country.¹³

The CRMA also aims to reduce administrative burdens and shorten permitting procedures for CRM projects in the EU, while still ensuring a high level of social and environmental protection. In addition, selected strategic projects will receive financial support (in Spain, Portugal, Sweden and Norway) and have shorter approval periods (27 months for extraction permits and 15 months for processing and recycling permits).

The EU and the European Bank for Reconstruction and Development have also set up a new facility under the InvestEU umbrella, providing equity investments for CRM exploration. The facility aims to mobilise €100 million in investments that will support the EU's CRMA and REPowerEU.

The EU has also contemplated the idea of buying more than 30 CRMs on the global markets as a collective buyer (following the model of the gas joint-buying platform). However, mining executive managers have remained sceptical of buying CRMs collectively.¹⁴

¹² See also F. Umbach, 'Neue Herausforderungen für die deutsche Rohstoffversorgungssicherheit', *Energiewirtschaftliche Tagesfragen* 1/2 (2020); European Commission, *Tackling the Challenges in Commodity Markets and Raw Materials*, Communication, COM (2011) 25 final (2 February 2011).

¹³ European Commission, *A Secure and Sustainable Supply of Critical Raw Materials in Support of the Twin Transition*, Communication, COM (2023) 165 final (16 March 2023).

¹⁴ A. Hancock and T. Wilson, 'Mining Industry Sceptical of EU Joint Purchasing Plan for Critical Minerals', *Financial Times*, 21 May 2024.

Challenges and policy recommendations

Despite having developed a coherent, sustainable and comprehensive strategy for CRM supply security, the implementation of the CRMA is hampered by manifold uncertainties with regard to increasing European production and expanding its processing capacities. These include cost competitiveness, bureaucratic overregulation, local failures of acceptance due to environmental and other objections, and potential Chinese counter-strategies on the global supply market.

Medium-sized industries face even greater problems with the future supply of raw materials, because they do not have direct access to international mining projects (with no shares in mining projects they have to rely on intermediary suppliers) and therefore to sufficient raw materials on the world markets, compared to large Chinese, Russian and other competitors with their own mining projects. The European extractive industry is currently not in a position to extract from new or old mines without large subsidies from the EU or its member states as these mines are barely financially competitive—especially against Chinese state-owned companies. For this reason, the EU's raw-materials policy aims to improve the framework conditions for the extraction of raw materials both from imports and domestically. As the EU has made only limited progress in diversifying its global supply chains for CRMs and disruptive technologies in recent years, the following recommendations intend to enhance the EU's security of supply for CRMs.

Expanding domestic mining and stockpiling with sustained political, public and financial support

So far, the European Commission has had much less authority over and strategic influence on the raw-materials policies of its member states than their energy and gas policies. In many cases, the policies are ineffective as the member states (rather than the European Commission) have overlooked or marginalised the inherent risks of European CRM import dependencies—particularly with regard to China. These dependencies are much higher than the former 40% dependence on Russia for European gas imports.

To cope with the ever-increasing demand for CRMs, which form the basis of the most important and disruptive technology supply chains (e.g. in the energy and defence sectors), the EU should develop enhanced and resilient CRM policies that give more authority to the European Commission in cooperation with the member states. This would allow better Europe-wide management and avoid the duplication of efforts or rivalries developing within the EU. The Commission does not so much have a problem with a lack of strategic thinking and concepts as with the timely and coherent implementation of its policies and concepts by the member states.

While full strategic autonomy is neither realistic nor desirable, diversification of the supply and import of CRMs is necessary. Strengthening the resilience of the raw-material supply chain includes expanding domestic mining, processing and refining capacities in Europe to reduce imports and undesirable geopolitical dependencies, as well as global climate emissions. Alongside political leadership, appropriate political support and public communication strategies regarding the European mining of CRMs are urgently needed to achieve these strategic goals. In the best-case scenario, the EU could produce around 30% of its raw-material demand domestically in the future. However, this is highly unlikely, even though the EU is providing significantly more financial support for extractive projects in Europe. This is due to the lack of social and local acceptance in densely populated member states such as Germany.¹⁵

¹⁵ See also F. Umbach, 'Critical Raw Materials for the Energy Transition: Europe Must Start Mining Again', *Energypost.eu*, 10 January 2022; F. Umbach, 'Geopolitical Dimensions of the EU's Future Supply of Critical Raw Materials', *Euractiv*, 1 June 2021.

Furthermore, domestic mining in Europe needs to factor in responsible sourcing and environmental regulations. This has already further increased the price difference with Chinese mining production costs and decreased the EU's global competitiveness. Therefore, simplifying EU permitting procedures as part of less bureaucratic regulations for all member states is essential to shorten the time frames for new CRM mining and refining, as well as recycling projects and supply chains.

However, many environmental groups are opposed not only to fossil-fuel mining, but also to raw-material mining, believing that future recycling and reuse of CRMs alone can offset the need for it and replace the estimated growth in demand. This seems highly unrealistic, at least in the next decade, as recycling and reuse, as well as other alternatives to reduce the demand for and import growth of CRMs also face numerous challenges and limitations. In addition, the replacement of larger quantities of batteries, solar panels and wind turbines will not occur until after 2030, meaning the resources within them will not be available for reuse until then. While the introduction of a circular economy is of paramount importance for both climatic and industrial reasons as well as for supply security, it alone will not be a 'silver bullet' for the rapidly growing European demand for CRMs and the associated security of supply risks in the next decade.

This poses a strategic dilemma in the form of a *conflict of goals and objectives*, which green parties and environmental non-governmental organisations try to avoid discussing publicly or stifle discussions on with the argument of the supposed silver bullet solution of recycling as the central component of a circular economy. As is currently the case with wind-power projects, green parties and non-governmental organisations have to choose between local environmental protection and global climate protection. Hence, local environmental standards may have to take a back seat in favour of national and international climate protection policies and agreed goals. For the latter, European raw-material mines are more necessary than ever, for two reasons. First, because they are a prerequisite for the faster implementation of electromobility and the massive expansion of renewable energies and energy storage. Second, because the existence of European raw-material mines would significantly lower CO₂ emissions due to the stricter EU environmental protection regulations and shorter transport routes involved than if the EU remained dependent on significant raw-materials imports from Latin America, Africa and Asia (China).¹⁶

The EU currently has no REE mining. Sweden's Norra Karr REE mining project, which could supply a large share of Europe's demand, has been delayed for 10 years due to environmental opposition. However, in Romania, Europe has restarted magnesium mining for the first time in more than a decade as a way to decrease its dependence on China after Beijing curbed and temporarily stopped magnesium exports in 2021.

Any efforts to reduce the dependency on Chinese REEs have also been hampered by the fact that key European REE companies have long had operations in China or joint ventures with Chinese companies. They are dependent on Chinese technologies for REE mining and refining. In addition, all European and Western countries will have to address the shrinking size of the mining workforce, including mining engineers, due to the increasing number of workers who will reach retirement age in the coming years. The best efforts to attract the next generation from universities are complicated by the industry's 'dirty' reputation, which conflates mineral mining with coal mining.

In addition to education and efforts to change stereotypes about the mining and refining industries, the EU needs to promote the creation of raw-material stockpiles of its 34 CRMs, both at the centralised EU level and among companies (by offering tax breaks and credits). Thus, it is useful to consider recent US experiences:

¹⁶ See also F. Umbach, 'Unpopular, but Strategically Necessary: Why Europe Needs Domestic Resource Extraction', *Sustainable Supply Chains*, 11 March 2024.

the US's current national defence industry stockpile is considered insufficient as it still only covers 40% of the military's needs for a one-year conflict followed by three years of recovery and replenishment.¹⁷ Thus, the capacities of the various stockpiles need to be based on clearly defined strategic needs and objectives.

Strengthening the EU's foreign raw-materials policy

According to industry analyses, around 300 new raw-material mines will have to start operating by 2035 to meet the expected demand for CRMs such as lithium, nickel, cobalt and REEs. However, since the average global lead time from the planning to the commissioning of raw-material mines takes an average of 7 years (in Western democracies, more like 10–15 years), there is the threat of a global supply bottleneck for CRMs. This makes the accelerated decarbonisation of global industry to achieve the 1.5°C target highly challenging.

As a late-moving actor, the EU is also facing problems with its mineral foreign policy. Africa plays an increasingly important role in coping with the rapidly rising global demand for CRMs, not only for China, but also for the US, Japan and the EU. Western interest in Africa can be explained not just by the continent's vast reserves of raw materials, but also by the more positive economic development, successful political reforms, greater political stability and improved investment opportunities for foreign investors in several African countries in recent years. The African continent accounts for 60% of the world's diamond deposits, 50% of cobalt reserves, 40% of phosphate (used in fertiliser) and almost 90% of the precious metal platinum, as well as huge deposits of bauxite (for aluminium) and numerous other industrial metals. It is therefore hardly surprising that most direct investment in the continent flows into Africa's extractive sector—including from China.

When considering its raw material foreign policies, the EU should consider the approach of the US, which currently has just one free-trade agreement (out of 20) with an African country (Morocco, which has the world's largest phosphate reserves). While the EU's commodity partnerships with African and Latin-American countries are certainly useful and necessary to diversify import dependencies, as are long-term contracts, neither of these provides any real guarantee, especially in times of crisis with changing framework conditions. Such partnerships and contracts could, under certain circumstances, also lull politicians and industry into a false sense of security regarding the stability of supply of raw materials if they are not part of a comprehensive and strategically defined raw-materials strategy.

The US and the EU may already be too late to work with some African countries. The example of the Lobito Corridor project (reviving a 100-year-old railway line to connect the Republic of Congo in central Africa with the Angolan port of Lobito in western Africa) for transporting CRMs to the US and the EU highlights this, as most of the African supply of such materials has already been locked in by China.¹⁸ Therefore, the following concrete recommendations should be considered:

- Expand and deepen partnership agreements for CRM cooperation and common mining and refining projects, particularly with like-minded democratic countries with market economies (e.g. Norway, Canada, Australia and others, including those—if possible—in Africa and Latin America).
- Promote and financially support friend-shoring projects for CRM mining/refining/processing in strategic partnership countries (e.g. Norway).

¹⁷ G. Wischer and M. Bazilian, 'The US Government Should Build a Resilient Resource Reserve for Wartime and Peacetime', *Atlantic Council*, 29 August 2024.

¹⁸ See A. Schipani, 'The US-Backed Railway Sparking a Battle for African Copper', *Financial Times*, 21 August 2024; W. Schneidman and V. Songwe, 'Biden's IRA Shuts Africa out of Critical Minerals Supply Chains', *Foreign Policy*, 3 August 2023; K. Bartlett, 'US, China Compete for Africa's Rare Earth Minerals', *Voa News*, 10 February 2023; *RANE Worldview*, 'What Africa's Largest Mining Project Means for Guinea, China and the World', 16 July 2024.

- Become a more active partner of the US in its Minerals Security Partnership and deepen transatlantic partnership projects in Africa, Latin America and Asia.¹⁹
- Develop similar rules to those of the US on ‘Foreign Entities of Concern’ to work with partner countries to reduce their dependence on China. These US rules mandate that companies qualify for tax credits from the Inflation Reduction Act if Chinese state-owned companies do not control more than 25% of the operation in partner countries. Such investment limits help to reduce Chinese profits and the country’s interest in new investment projects.
- Develop new global regulatory frameworks for CRM mining and refining by adjusting environmental, climate and technology standards as part of transatlantic and G7 policies in the UN and other international organisations.

Promoting the ‘de-risking’ of the supply chain for CRMs and disruptive technology (components)

The global environment is rapidly changing, with critical supply chains becoming more fragmented due to rising competition and conflicts between Western democracies and autocratic–dictatorial systems in Russia, China and the Global South. Beijing seeks to control the most important global supply chains for new disruptive technologies (e.g. clean energy, batteries, chips and semiconductors, artificial intelligence and quantum computing). It has also enhanced its ‘civil–military fusion’ policy, which subordinates all economic and civilian technology policies to meeting China’s military needs and its arms build-up.

A simplistic, unbalanced and naive liberalisation of the markets has weakened the national security of Western democracies because of their non-diversified import dependencies—in areas ranging from energy supply to medical equipment, medicines, semiconductors, telecommunications and CRMs—which are open to exploitation for geo-economic and geopolitical leverage. The EU needs to develop new economic security strategies as not just politicians, but even businesses and companies often have little understanding of their own supply-chain vulnerabilities and the potential cascading impacts of these on other sectors and national economic security. Geopolitical resilience has become a competitive advantage for companies operating in the unstable international environment. With its newly developed comprehensive Economic Security Strategy, published in June 2023, the European Commission seeks to reconcile the imperatives of economic growth and technological innovation with the needs of (geo-economic) security.²⁰ In this complex and rapidly changing geopolitical and geo-economic international landscape, the following actions will help to develop more resilient European supply chains:

Prioritise projects within a strategy that balances supply security with incentives for free and fair bilateral trade and which also operates within global competition rules (without decoupling and unfair provisions of

¹⁹ For transatlantic cooperation perspectives, see SAFE, *A Global Race to the Top. Using Transparency to Secure Critical Mineral Supply Chains* (Washington, DC, 2023); M. Moschella, ‘Potential for EU–US Coordination on Diversification and Resilience of Supply Security’, IAI Papers 24/24 (September 2024); J. Smyth, M. McCormick and H. Dempsey, ‘Western Nations Join Forces to Break China’s Grip on Critical Minerals’, *Financial Times*, 23 September 2024; J. A. Rupp, ‘How the US Can Confront China’s Critical Mineral Challenge’, *Financial Times*, 10 October 2023; C. S. Hendrix, ‘The US Strategy on Critical Minerals Needs Clearer Priorities’, *Piie.com*, 1 August 2023; K. Lebedur and E. Weinthal, ‘Can South American Lithium Power Biden’s Battery Plans?’, *Foreign Policy*, 12 April 2023; R. Blakemore and P. Ryan, ‘One Year After the IRA, the Hard Work to Build Resilient Mineral Supply Chains Is Only Beginning’, *Atlantic Council*, 16 August 2023; S. Finizio, ‘Climate Action, Geopolitical Risks and Strategic Policy: The Western Race to Secure Critical Raw Materials’, IAI Commentaries 23/53 (October 2023).

²⁰ This strategy is based on three pillars: (1) promotion of the economic base and its competitiveness, (2) protection against risks, and (3) partnerships with countries that share common concerns and interests. It also identifies four areas that require continuous risk assessment: (1) resilience of supply chains, including energy security; (2) physical and cybersecurity of critical infrastructure; (3) technology safety and leakage; (4) weapons of economic dependency and coercion. European Commission, *European Economic Security Strategy*, Communication, JOIN (2023) 20 final (20 June 2023).

protectionism). The balancing of competing strategic objectives needs strong EU and political leadership with clearly defined strategic priorities.

Prioritise financial support for friend-shoring projects by introducing tax breaks and credits for the development and production of disruptive technologies and critical technology components.

Increase information exchange and best practices for disruptive technologies and critical technology components among the G7 and the US Minerals Security Partnership, as well as with other strategic partner countries.

	Programme 1	Programme 2	Programme 3
	Enhancing supply security of CRMs	Implementing a CRM foreign policy	Promoting the ‘de-risking’ of the supply chain for CRMs and disruptive technology (components)
Project 1	Expand European projects to increase mining, refining and processing capacities.	Expand CRM partnership agreements and common projects with like-minded democratic countries with market economies (such as Norway, Canada and Australia).	Prioritise projects within a strategy that balances supply security with incentives for free and fair bilateral trade and which operates within the global rules of competition (without decoupling and unfair provisions of protectionism).
Project 2	Promote raw material stockpiling.	Promote and financially support friend-shoring projects in CRM mining/refining/processing.	Prioritise financial support for friend-shoring for the development and production of disruptive technologies and critical technology components.
Project 3	Transfer more national authority for CRM supply security to the European Commission, as happened with the EU’s gas policies.	Develop new global regulatory frameworks for CRM mining by adjusting environmental, climate and technology standards.	Increase information exchange and best practices for disruptive technologies and critical technology components among the G7, as well as with other strategic partner countries.

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