

# SUPEERA

## Policy Brief



# Critical Raw Materials Act

CHALLENGES AND  
OPPORTUNITIES AHEAD



## Setting the scene

The year 2022 represented a watershed moment for the EU energy system. After a long period of high-volume trade with Russia, led by the conviction that commercial relations could ease the diplomatic ones, the invasion of Ukraine by the former has turned the tide on energy markets in the EU.

The events have created the conditions for strong action on the EU side, marked first and foremost by the launching of one of the most ambitious policy packages to date, the REPowerEU Plan. According to it, the EU should cut all ties with Russian-based fossil fuels by 2030, freeing Europe from burdening dependencies and boosting its renewable energy capacity at home.

The past year also saw the launching of the Inflation Reduction Act (IRA) by the Biden administration in the US, a package of \$369 billion worth of incentives to support green energy innovation, manufacturing, and usage. This bold move prompted the reaction from the European Commission, which unveiled on the 1<sup>st</sup> of February 2023 the European Green Deal Industrial Plan, an initiative aimed at preserving and boosting the EU's industrial competitiveness by bolstering clean-tech investments while keeping climate goals on track.

Under this plan, the European Commission has so far presented three key initiatives: the Net Zero Industry Act to promote the scale-up of clean energy technologies, the Electricity Market Design reform to prepare the electricity market for an increasing share of renewables, and the Critical Raw Materials Act, to ensure sufficient access to materials crucial for manufacturing key technologies.

In this context, the research community is called to be an integral part of the transformation of the EU energy system. EU policymaking will need to boost research efforts now more than ever, as the ambitious goals set in the REPower EU Plan and in the legislation surrounding it will be in vain if not accompanied by targeted efforts in investigating new solutions. The research community remains, therefore, a core piece of the EU policymaking puzzle, although it is sometimes not recognised as such. Its enormous contribution in aligning political priorities with empirical findings plays a crucial part in creating realistic and ambitious policies, opening the door to a greener future for the energy system.

The focus on low TRLs is needed now more than ever, although it might sound counterintuitive when the EU targets are set for a short timeframe, such as 2030. But, as the International Energy Agency (IEA) has underlined, many of the technologies that will enable the clean energy transition have not been developed yet. Therefore, the triple helix of research, industry and policy needs to come together quickly to safely attain the EU climate neutrality goals.

As part of the SUPEERA project, a series of Policy Briefs is being developed to identify R&I challenges in EU policies relevant to the clean energy research community. The ultimate objective is to accelerate the development and implementation of innovative solutions that can foster a sustainable and resilient energy system in Europe. This Policy Brief focuses on the Proposal for a Regulation establishing a framework for ensuring a secure and sustainable supply of critical raw materials, also known as the Critical Raw Materials Act, published by the European Commission on March 16<sup>th</sup> and aimed at establishing a framework that ensures the secure and sustainable supply of critical raw materials required for the clean energy transition.

## The Proposal for a Regulation establishing a framework for ensuring a secure and sustainable supply of critical raw materials

The **Proposal for a Regulation establishing a framework for ensuring a secure and sustainable supply of critical raw materials**<sup>1</sup>, also known as the **Critical Raw Materials Act (CRMA)**, was introduced in 2022 during the European Commission President's State of the Union speech and then launched on 16 March 2023 as a part of the Green Deal Industrial Plan. The Act aims to address the challenges posed by highly-concentrated raw materials value chains and the over-reliance on certain countries, driven by various geological, economic, and political determinants. The initiative sets out a regulatory framework to **increase and diversify the supply of critical raw materials (CRMs) in the EU, promote circularity, and support research and innovation (R&I)** in the area.

The table below summarises the main R&I challenges of the proposal:

| Identified R&I challenges  |
|--|
| <ol style="list-style-type: none"> <li>1. Increase material efficiency (durability, reusability, reparability, resource use or resource efficiency)</li> <li>2. Increase material circularity (possibility of remanufacturing and recycling, recycled content and the possibility of recovery of materials)</li> <li>3. Increase the technological maturity of recycling technologies for critical raw materials</li> <li>4. Promote the substitution of critical raw materials wherever possible</li> <li>5. Develop technologies that make CRMs more easily retrievable in the EU or partner countries</li> <li>6. Ensure that the workforce is equipped with the skills needed and, in case, develop plans for upskilling and reskilling the workforce</li> <li>7. Increase the state of knowledge on the technology for recycling permanent magnets which contain critical raw materials, such as neodymium, praseodymium, dysprosium and terbium, boron, samarium, nickel or cobalt</li> <li>8. Assess the EU's potential to increase its extraction, processing or recycling capacities</li> <li>9. Develop strategic manufacturing technologies such as semiconductors</li> </ol> |

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<sup>1</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160>

## A key tool to strengthen supply chains and accomplish the clean energy transition

In the Critical Raw Materials Act, critical raw materials are defined as **specific raw materials that are essential for the European Union's industry and have high economic importance for the EU economy**. These materials, including antimony, arsenic, barite, bauxite, and beryllium, play a significant role in various strategic sectors such as green technology, digital industries, defence, aviation, microelectronics, medical devices, and everyday devices like smartphones. The CRMA also categorises certain raw materials as **strategic raw materials (SRMs)**. This subset of CRMs is deemed highly significant for specific sectors and applications that are vital to the EU's transition objectives. SRMs are eligible for greater support and play a key role in elements like microchips or batteries, which are susceptible to global demand, supply imbalances, and trade barriers imposed by producing countries. The proposed legislation's list of SRMs includes lithium, as well as base metals such as aluminium, copper, and zinc.

In a European Commission's document<sup>2</sup> accompanying the 2021 update of the new industrial strategy, CRMs were identified as an area of strategic dependency for the EU. The present proposal would be the first EU act to regulate the EU's supply of CRMs specifically and would contribute to strengthening the EU's open strategic autonomy. It introduces a monitoring system, stockpiling measures, and risk preparedness strategies to secure the EU's CRMs' supply and enhance capacities along the value chain.

### Increasing needs for CRMs

**Critical raw materials are subject to a projected steep rise in demand that could potentially outpace supply.** A foresight study from the European Commission's Joint Research Centre (JRC)<sup>3</sup> provides a systematic and detailed overview of fifteen key technologies' complete value chains across the five strategic sectors (renewable energy, electro-mobility, industrial, digital) responsible for delivering on the EU's climate and energy neutrality targets. According to the report, the consumption of lithium, a crucial element of batteries in electric vehicles and devices, is expected to increase by 9 to 12 times by 2030 and up to almost 21 times by 2050, primarily due to the adoption of e-mobility solutions. However, **Europe is highly dependent on importing critical materials, especially for manufacturing batteries.** China controls 50% of the battery materials supply chains and produces 90% of the permanent magnets required for production. By 2030, Europe needs to establish 600 to 800 GWh capacity for electric vehicles, and although it has some of the critical

The need for CRMs will increase so sharply that Europe will struggle to address this growing demand while reducing its dependency on highly concentrated supply chains. To cope with this challenge, it is necessary to act on:

- Upscaling domestic mining
- Developing recycling
- Reinforcing trade partnerships to diversify imports

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021SC0352>

<sup>3</sup> <https://publications.jrc.ec.europa.eu/repository/handle/JRC132889>

materials required for this transition, the demand for metals and minerals will rise too sharply to meet it. The demand for rare earth metals for wind turbines – also classified as CRMs – is, for example, expected to increase more than fourfold by 2030. In the case of graphite, overall EU consumption is anticipated to rise to 14 times its current levels by 2030 and 26 times by 2050. A recent study from KU Leuven on the clean-energy metals needed to reach the EU's 2050 climate-neutral target stressed that **metals will play a central role in successfully building Europe's clean technology value chains and meeting the EU's 2050 climate-neutrality goal**<sup>4</sup>. Besides, CRMs are also used in other sectors beyond energy, such as health, defence and space. The European Parliament's think tank (EPRS) pointed out that “a number of still unknown new key technologies may emerge in the future, using specific CRMs”<sup>5</sup>, affecting the expected demand trajectories and rendering the need to secure the supplies of CRMs even greater.

The CRMA proposes two main ways to enhance the EU's strategic autonomy when it comes to raw materials. The first approach is to **explore potentially untapped domestic resources**, such as scaling up mining activities in Europe and promoting the development of technologies that rely on CRMs easily retrievable in the EU or partner countries. The second approach involves **increasing recycling capacities in Europe**. The Act establishes benchmarks for both pathways, requiring a 10% increase in European CRMs and a minimum of 15% of strategic raw materials to be produced from recycled materials<sup>6</sup>.

#### Upscaling domestic mining

Europe has some domestic resources of lithium, especially in France and Portugal. However, upscaling mining capacities in the EU poses several challenges. Apart from technical and economic feasibility questions, **permitting procedures regarding mining are lengthy and complex**. With a timeframe of 10 to 15 years from the decision to implementation, new EU mining production cannot contribute significantly to the EU's raw materials requirements by 2030. Moreover, mining regulations fall under the Member States' responsibility. The CRMA proposes to address this challenge by identifying Strategic Projects. This status, granted by the EU to projects that meet certain terms of technical feasibility and sustainability, will allow to speed up the process of obtaining necessary permits – even within two years when it comes to mining for SRMs – and will simplify access to financing.

It is important to point out as well that mining has low public acceptance and is often subject to local resistance from communities living close to the mining sites, especially in regard to the impact of mining on nature and climate. For instance, it consumes a substantial amount of water and generates hazardous waste, while also posing health and safety risks to workers<sup>7</sup>. Therefore, although the CRMA sets a target of only 10% of strategic raw materials to be mined in the EU, it is unlikely that this requirement will be met by 2030. While not the most obvious, this represents nevertheless an area where the role of the R&I community needs to be better recognised. Beyond industrial policy, **increasing domestic mining will indeed require the upskilling or reskilling of a part of the workforce, as well as assessing thoroughly the resources available in Europe and how to exploit them in a way that mitigates risks**. Of

<sup>4</sup> <https://eurometaux.eu/media/jmxf2qm0/metals-for-clean-energy.pdf>

<sup>5</sup> [Securing Europe's supply of critical raw materials \(europa.eu\)](https://europa.eu/secure-europe-supply-critical-raw-materials)

<sup>6</sup> These benchmarks refer to the 2030 time horizon, in alignment with the Union's climate and energy targets set under Regulation (EU) 2021/1119 of the European Parliament and of the Council

<sup>7</sup> See Reference 6

course, **research will also allow the further use of domestic resources outside of mining by fostering demand reduction and increasing resource and product efficiency.**

### Improving recycling capacities

Compared to expanding mining production, scaling up the EU's recycling capacity may have a faster time horizon. While recycling cannot realistically cover the needs of a sharply growing market where demand keeps increasing, it can participate in alleviating some of the pressure on primary production supply chains. The CRMA sets a target for the EU's recycling capacities to cover at least 15% of the annual consumption of each SRM by 2030. Rather than solely relying on new domestic sources to retrieve critically needed materials, **increasing knowledge of recycling technologies could be beneficial, especially in sectors heavily dependent on external sources** such as batteries, hydrogen, and semiconductors. The European Commission's Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) released a report on Critical Raw Materials and the Circular Economy, which highlights that several CRMs have a high potential for technical and real economic recycling. However, despite government encouragement to move towards a circular economy, the recycling rate of critical raw materials remains generally low<sup>8</sup>.

Scaling up the EU's recycling capacity may have a faster time horizon than expanding mining production. However, it cannot realistically cover the needs of a sharply growing market where demand keeps increasing.

To this day, very few CRMs are recycled and reused. To address this challenge, the EU needs to:

- Further incentivise recycling and provide preferential treatment for repurposed CRMs
- Work on eliminating bottlenecks in the recycling process
- Recognise the crucial role of R&I in making recycling processes more efficient and effective

This issue may be principally attributed to bottlenecks in the recycling chain. The availability of products to be recycled is a primary consideration in meeting the future demand for CRMs for electric mobility and renewable energy. Yet, the ability to process large volumes of recycled products is equally important. **To upscale recycling capacities, the efficiency of the entire recycling system and the European recycling industry must be improved.** The circular use of CRMs is highly dependent on the sectors in which they are used as well as on various other parameters, including the nature of end-of-life products or different take-back schemes implemented in different sectors. Therefore, **parallel EU regulations could accelerate the transition to a circular economy.** For example, the proposed new Battery Regulation aims to speed up the recovery of batteries from electric vehicles in the EU by requiring minimum levels of recovered cobalt (16%), lead (85%), lithium (6%), and nickel (6%)<sup>9</sup>. The EPRS highlights that for lithium-ion batteries, recycling end-of-life batteries could help meet 52% of the 2040 demand for lithium for new battery production, 58% of the demand for cobalt, and 49% for nickel in the most optimistic scenarios<sup>10</sup>.

<sup>8</sup> [https://weee4future.eitrawmaterials.eu/wp-content/uploads/2020/09/09\\_report-of-CRM-and-CE.pdf](https://weee4future.eitrawmaterials.eu/wp-content/uploads/2020/09/09_report-of-CRM-and-CE.pdf)

<sup>9</sup> <https://data.consilium.europa.eu/doc/document/ST-5469-2023-INIT/en/pdf>

<sup>10</sup> [See 6](#)

While it is evident that secondary resources alone cannot meet the growing demand for CRMs as today's amount of resources that can be recycled is lower than tomorrow's needs, **the importance of circularity should not be underestimated in the current regulation.** However, it is noteworthy that **the regulation, in its present form, does not address the issue of circular product design. R&I will play a pivotal role in reducing the reliance on primary CRM sources by promoting recyclability, exploring alternatives to mining, developing innovative extraction methods for CRMs, and identifying non-critical materials as substitutes when feasible.** However, **numerous technologies are still in the developmental stage and require scaling up,** highlighting the need for **greater emphasis on piloting and advancing the necessary technologies (TRLs 5-7).** Additionally, **fostering collaboration with key stakeholders engaged in the R&I agenda is essential.**

### Diversifying imports

While increased mining and recycling efforts constitute important steps in the right direction, they may still not be enough to meet Europe's ever-growing critical materials demand. As a result, the CRMA relies on a third pillar that focuses on diversifying imports to avoid reliance on single suppliers and address trade imbalances. The EU has indeed been prompted to deeply reevaluate its partnerships with third countries as well as its supply strategies in the wake of the Covid pandemic and the Ukraine war. The goal established within the Act is to ensure that no single country supplies more than 65% of a strategic raw material at any stage and that 40% of raw material processing occurs within the EU.

As it is quite certain that the EU will never achieve complete self-sufficiency in supplying CRMs, the European Commission acknowledges that international trade is essential to support global production and ensure supply diversification. Therefore, **the EU must strengthen its global engagement with reliable partners, promote stability in international trade, and enhance legal certainty for investors,** especially as access to CRMs is a concern shared with many other stakeholders. The Commission has published a Communication<sup>11</sup> alongside the CRM Act that emphasises the need to seek mutually beneficial partnerships with emerging markets and developing economies while adhering to Environmental Social and Governance standards (ESGs). It also insists on making good use of existing partnerships, such as bilateral and trade agreements, as well as the Global Gateway strategy<sup>12</sup>. Examples of such partnerships include Latin America for copper and lithium, the Democratic Republic of Congo (DRC) for cobalt and copper, and Indonesia for nickel and cobalt.

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<sup>11</sup> <https://circabc.europa.eu/rest/download/7ce37e41-1d9a-4f96-a24b-4f89207700bf>

<sup>12</sup> [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/stronger-europe-world/global-gateway\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/stronger-europe-world/global-gateway_en)



## Conclusion

To achieve Europe's ambitious goals for the green and digital transition by 2030 and 2050, it is essential to **diversify supply chains and avoid reliance on a limited number of suppliers**.

The Critical Raw Materials Act presents multiple pathways that can complement each other in this endeavour. One such pathway involves **increasing domestic primary production**, which would grant the EU greater control over supply chains and ensure more reliable access to critical materials. However, this option faces various challenges, including regulatory obstacles, low public acceptance, local resistance, high carbon emissions, and insufficient investment in mining. Addressing these issues requires measures to expedite permitting processes, encourage European investment in mining and processing, and promote sustainable practices.

To reduce the need for additional primary production, **recycling must also play a significant role**. Upscaling recycling capacities relies on enhancing material circularity, implementing circular design strategies, and advancing recycling technologies. Therefore, greater attention should be given to **circularity**, providing **preferential treatment and support for recycled, reused, or repurposed CRMs**, along with the adoption of **Circular Product Design principles**.

The third pathway outlined by the CRMA focuses on diversifying imported materials to mitigate overdependence on specific countries. Recognising that the EU will never achieve complete self-sufficiency in CRM supply, **the bloc must strengthen global engagement with reliable partners based on observance of ESG standards**. This approach facilitates investment diversification, promotes stability in international trade, and strengthens legal certainty for investors.

Against this backdrop, while the Commission's proposal emphasises the EU's industrial policy, **it is vital to acknowledge the crucial contribution of research and innovation in achieving the outlined goals**. They play a pivotal part in diversifying the supply mix, reducing CRM demand and usage, improving resource efficiency, advancing technologies with reduced CRM requirements, and enhancing sustainability and efficiency in the CRM value chain. Therefore, **strengthening the role of R&I in the Regulation and fostering collaboration between industry and the research community are vital steps toward ensuring a secure and sustainable supply of CRMs**.

Critical Raw Materials will be key in achieving the clean energy transition. In order for the EU to obtain as much as it needs in that regard, the CRM Act plans to increase domestic mining and circularity and strengthen international partnerships.

Within and beyond these solutions, the role of R&I has to be better recognised, as it is essential for:

- Diversifying the supply mix
- Reducing CRM demand and usage
- Improving resource efficiency
- Advancing technology with reduced CRM requirements
- Enhancing sustainability in the CRM value chain.



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