

Strengthening the security of supply of products containing Critical Raw Materials for the green transition and decarbonisation

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The study¹ assesses the needs and vulnerabilities of the EU in accessing products containing Critical Raw Materials (CRM) needed for the green and digital transitions in a changing geopolitical context. It provides an overview of the wider situation, as well as a policy context. The study sets out to identify at which stage of the supply chain, ranging from raw materials to final products, the European industrial ecosystem is dependent on CRM imports. It reviews the CRM methodology designed by the JRC to identify which materials are critical and require special attention. The study finds out that setting up of EU stockpiling facilities could mitigate supply disruptions of raw materials and components. However, such an action would require an effective public-private management.

Background

The research provides an overview of the supply chains involved in key green and digital technologies, from raw material needs, components, to final goods. It sets the scene of the EU's need for CRM by mapping the technologies needed to meet the various decarbonisation targets. It distinguishes where the EU makes use of the raw materials directly, and where it makes use of components and products that embed these raw materials. Using trade data predating the COVID-19 pandemic, the study identifies the raw materials for which the EU is sensitive to imports from outside the EU, with a special focus on the raw materials and components that historically came from Russia and China.

The study discusses the CRM methodology designed by the JRC to identify which materials are critical and require special attention. This methodology rests on two criteria, economic importance (EI) and supply risk (SR). It is crucial to demonstrate how critical materials responds to changes in this methodology when including elements on the new geopolitical context.

Stockpiling is proposed as a course of action to mitigate supply disruptions of raw materials and components. The study investigate the suitability of stockpiling as a solution to alleviate the consequences of supply chain disruptions and of the potential weaponisation of trade vulnerabilities, especially in the specific context of achieving the green transition. It compares the advantages and disadvantages of stockpiling. It discusses the feasibility of using trade policies to increase the diversification of supply of products containing critical raw materials.

Key findings

The EU has a dependency on key components for most green energy and digital technologies, more than on raw materials as such. At present, the EU relies on Russia for a significant share of its imports for three CRMs: platinum, palladium and titanium. These are indispensable materials for the development of hydrogen technology. In addition, the EU highly depends on imports from China for both the production of permanent magnets and the extraction and refining of Rare Earth Elements (REEs) used in their production and relies on China for imports of batteries used for Electric Vehicles (EVs) and energy storage.



The EU develops the industrial capacity to manufacture products from these raw materials in line with the industrial policy objectives of the European Commission. These focus on developing domestic industrial capacity for batteries, electrolysers and fuel cells for renewable hydrogen, and the permanent magnets needed for the electric motors used in e-mobility and wind power industries. In addition, an active risk-monitoring of security of supply can help safeguard the European supply of products shaping the green and digital transition.

The current level of raw material criticality is defined by two key factors: EI and SR. The CRM methodology might benefit from an extension of scope, including an assessment of product groups and sectors. An independent assessment in this report confirms that including expected future demand in CRM assessments provides relevant additional insights that might support future policy decision-making.

This study finds out that setting up of EU stockpiling facilities could mitigate supply disruptions of raw materials and components. The strategic stockpiling of products containing CRM is a common policy in the US, Japan, South Korea and Switzerland. Principles for European stockpiling can be drawn from these examples. Based on the assumption that a potential stockpile could cover 60 days of imports, estimates of the possible value of CRM stockpile range between EUR 6.45 billion and EUR 25.8 billion (2021 prices).

Among the preferred composition of product groups to be stockpiled are those shaping the green and digital transition. This means that a volume of 8.6 million tonnes and a value of EUR 25.8 billion will be assumed as respectively the required size and value of the EU stockpile.

Stockpiling products containing CRM takes weeks and months, whereas a successful green and digital transition requires decades to materialise. Stockpiling action in the EU would mitigate supply shocks for nascent and strong manufacturing industries which are vital for the green and digital transition. If stockpiling is introduced as a policy measure, the associated industry ecosystem should also be put in place.

1 RIETVELD, E. et al, 2022, Strengthening the security of supply of products containing Critical Raw Materials for the green transition and decarbonisation, publication for the Committee on Industry, Research and Energy, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg.

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