

Pressemitteilung

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Which research and innovation approaches can help the EU achieve a sustainable supply of critical raw materials

Raw materials are crucial resources when it comes to prosperity and quality of life in the European Union. However, various raw materials are categorized as critical due to the uncertain supply situation. Through research and innovation, the European Union can improve its supply of critical raw materials – but how exactly can this be achieved? A new study led by Fraunhofer ISI on behalf of the STOA Panel of the European Parliament (EP) sheds light on the role of research and innovation along the value chain, it identifies research needs and evaluates concrete proposals for measures in terms of costs, benefits and feasibility.

The European Union faces the challenge of securing a sustainable supply of critical raw materials such as phosphorus, helium and magnesium. Whether a raw material is classified as critical depends on its economic importance and on the risk of its supply being disrupted ("supply risk"). Raw materials that can only be extracted in a few specific countries have a higher supply risk. The economic importance is particularly high, for example, when there are no alternative raw materials available for certain products or applications.

In the EU, 34 raw materials are currently considered critical ("Critical Raw Materials", CRM). Demand is expected to rise in the future especially for the 17 so-called strategic raw materials (SRMs) and major supply difficulties may ensue – in the case of cobalt and lithium for example.

The European Union has already launched various initiatives to tackle the challenges surrounding critical raw materials: Supply risks are monitored and the potential consequences of supply bottlenecks are analyzed so that political measures can be taken to counteract them. A new regulation came into force in May 2024: The "Critical Raw Materials Act" sets various targets, for example, 10 percent of the EU's demand for strategic raw materials should be extracted, 40 percent processed and 25 percent recycled in the EU.

Additional expertise and new technologies are needed to achieve these goals. The EP Panel for the Future of Science and Technology (STOA) has therefore commissioned a study to shed light on the role of research and innovation (R&I;) in this context. Researchers from the Fraunhofer Institute for Systems and Innovation Research ISI, the Institute for Technology Assessment of the Austrian Academy of Sciences, the Norwegian Institute for Sustainability Research (NORSUS) and the Karlsruhe Institute of Technology (KIT) were involved.

The study clearly shows that major efforts in research and innovation are still needed to improve the EU's position with regard to critical raw materials. There is a need for research in various areas along the supply and value chains: For example, in the exploration of raw material deposits, the development of more ecological and safer extraction methods, the establishment of new methods in processing and production with regard to efficiency and the circular economy and for more comprehensive recycling of raw materials.

Although the European Union has only limited raw material resources by international standards, it has a strong position in research and innovation. In order to reduce or avoid economic and political dependence on countries that are richer in raw materials, the EU must continue to expand its technological leadership in these areas. In order to achieve this, it must invest in research and in strengthening companies in global value chains. A first step should be the expansion of monitoring and analysis capacities. According to the study, investment in raw materials research should correspond to that of other key technologies.

In addition to these technological issues, the social sciences need to play a central role in raw materials research: This is because mining projects or new production sites often meet with resistance due to environmental and social concerns. This applies equally to activities both inside and outside the EU. Participation processes and approaches for resolving conflicts could help to accompany social controversies and establish global standards for a more socially just extraction of raw materials.

Three sets of measures for greater independence on the raw materials market

For their study on behalf of the STOA, the researchers identified three sets of measures and evaluated the individual policy options in terms of various factors such as costs, benefits, social acceptance and feasibility.

The first set of measures includes actions to strengthen research and innovation capacities within the EU. The EU institutions tasked with implementing the Critical Raw Material Act require additional resources for the assessment of critical raw materials and the monitoring of supply chains. In addition, companies and providers of technology need support in developing competitive solutions for the global commodities market.

The second set of measures is aimed at international cooperation. The researchers emphasize that Europe must work with the best – regardless of whether it is already a leader in one area or needs to catch up. More intensive cooperation with the USA, Japan, but increasingly also with China, seems advisable, as well as strengthening joint efforts within Europe.

The third set of measures deals with the legitimacy of projects along the supply chains. It evaluates political options for action in order to investigate the causes of local conflicts and to jointly develop solutions. Research and innovation can help to find ways of creating value in a socially responsible and sustainable way.

The exact contents of the three sets of measures as well as starting points for research and innovation along the value chains of critical raw materials and the detailed evaluation of individual measures can be found in the long version of the study.

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The Fraunhofer Institute for Systems and Innovation Research ISI analyzes the origins and impacts of innovations. We research the short- and long-term developments of innovation processes and the impacts of new technologies and services on society. On this basis, we are able to provide our clients from industry, politics and science with recommendations for action and perspectives for key decisions. Our expertise is founded on our scientific competence as

well as an interdisciplinary and systemic research approach.

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