



# EU RESEARCH & INNOVATION TO REDUCE DEPENDENCIES ON CRITICAL RAW MATERIALS

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Currently, the EU relies almost exclusively on imports for many critical raw materials, which makes our supply vulnerable. The [Critical Raw Materials Act](#) will help to ensure that Europe has sufficient access to those materials, like rare earths, which are vital for manufacturing key technologies for the green transition.

EU research and innovation (R&I) ensures that net-zero technologies use up fewer resources, are more circular in their use of critical raw materials by developing innovative solutions for their recycling and reuse, more sustainable product lifecycles in manufacturing and through [Ecodesign](#), as well as substitution of critical raw materials.

## Stepping up EU research and innovation to reduce our material dependency

Demand for critical raw materials is expected to skyrocket with the shift towards renewable energy, sustainable mobility, and digitalisation. For example, global demand for lithium, which is used to manufacture batteries, is expected to increase 89-fold by 2050 (High Demand Scenario).

**Horizon Europe**, the EU's R&I Framework Programme, **has invested €470 million on developing innovative solutions to reduce our dependency on critical raw materials.** R&I is essential to develop innovative solutions and highly **sustainable processes, and for the exploration, extraction, refining, recycling, resource-efficient use and substitution of critical raw materials.** Recent projects include the demonstration of innovative solutions to increase the overall **circularity of wind energy technology**, developing a **recyclability index for photovoltaic products** and various projects under the **Horizon Europe partnership on batteries**, including the sustainable processing and refining of battery grade graphite, the creation of a digital passport to track battery materials, and demonstrating sustainable processes for recycling of battery raw materials.

“*Research in new and advanced materials open a wealth of opportunities and will be decisive for our future competitiveness. Long lasting sustainability of EU economy requires R&I&E advancements on new materials to improve circularity and reduce our dependence from mining raw materials. We will mobilise up to €200 million to create 10 additional Hubs for Circularity in partnership with Processes for Planet. We will launch the European Raw Materials Academy to provide training for 500,000 professionals in the field while also improving opportunities for women.*”

*Mariya Gabriel, EU Commissioner for Innovation, Research, Culture, Education and Youth*

Research and  
Innovation



In addition, R&I is pivotal for actions along the full (critical) raw materials chain:



**for people and their skills,** which is why a Raw Materials Academy will be set up



**for research in enhancing the performance of (advanced) materials,** notably in order to reduce the need for, or substitute, critical raw materials



**for research to substantially increase recovery and recycling rates for raw materials,** which is why up to €200 million should be mobilised under both Horizon Europe and by Member States to deploy 10 additional [Hubs for Circularity](#) across the EU

## EU RESEARCH AND INNOVATION IN KEY AREAS

### EXTRACTION AND REFINING



EU Funding:  
€12.9 million

**Rare Earth Elements (REEs) are crucial to produce goods such as computers, TVs or wind turbines.** However, **many REEs are hard to separate out from their rock deposit,** so improving the extraction method is important.

A rare earths separation technology has been positively tested in certain sites and now requires more input from full scale extraction activity. [SecREEts](#) extracts REEs from **phosphate rocks used in fertiliser production.** Pilot processes are focused on metals such as Praseodymium, Neodymium and Dysprosium, which are used in the automotive, healthcare and space exploration industries.



EU Funding:  
€12.4 million

Contributing to the circular economy in the construction sector, [NEMO](#) has demonstrated the **potential use of mine tailings** (*leftover material after the process of extracting valuable material from the ore*) in concrete products, as well as recovering additional metals from sulfidic residues. Using this leftover material **reduces the environmental risk of poorly-managed waste,** and also **increases the new stock of critical metals and minerals.**

### ADVANCED MATERIALS AND CRITICAL RAW MATERIAL SUBSTITUTION



EU Funding:  
€5.6 million

In the area of **substitution,** [RECYCALYSE](#) is replacing critical raw materials with sustainable and recyclable catalytic materials for energy storage via water electrolysis, contributing to a clean and circular economy.



EU Funding:  
€6.0 million

In the area of **material efficiency and recyclability,** [Reapir3D](#) creates recycling process that can be implemented at local scale, and which apply **nanotechnology solutions** for high-end 3D-printed products using recycled plastic and carbon fibres.



EU Funding:  
€5.0 million

[Nanobat](#) develops advanced lithium-ion battery cells with improved performance and safety, as well as reducing waste and energy consumption.



EU Funding:  
€8.0 million

[GREENSENSE](#) has developed a pilot plant to produce recyclable and environmentally friendly paper-based printed electronics for application in the biomedical industry.



EU Funding:  
€6.8 million

For more robust assessments, [NanoInformaTIX](#) has put together numerous databases and models in one modelling platform to optimise the **sustainability assessment of advanced materials.**



EU Funding:  
€8.0 million

[Horizon Europe](#) will address substitution of critical raw materials in the design of new **permanent magnet** materials that are **free of REEs,** by using other material compositions that are high performing and abundant.

## HUBS FOR CIRCULARITY



EU Funding:  
€18.0 million

**CORALIS** will demonstrate the efficiency of **Hubs4Circularity** in three industrial parks. Outcomes will enable a **reduction in primary raw material intensity** of up to 20%. **Horizon Europe** projects will also support Hubs4Circularity (10 in total).

## SKILLS



EU Funding:  
€1.3 million

**intermin** identified, in particular for the mining sector, the need to re-skill and up-skill the workforce, to attract talents from other sectors, and to increase collaboration with universities. It also underlined the need for social skills in the sector, for instance skills related to mining rehabilitation and waste management.

## CIRCULARITY



EU Funding:  
€4.9 million

**Making use of waste left behind after mining or processing steel**, **CHROMIC** is developing new, sustainable technologies to recover critical and valuable metals, like **Chromium**, to use in the construction sector.



EU Funding:  
€6.2 million

**Treating fine-grained materials is very challenging for the mining industry.** New methods devised by **FineFuture** recover **valuable ultrafine materials** (mineral particles smaller than 20 µm). This helps boost the competitiveness of the European industrial minerals industry, by **reducing losses and increasing energy-efficiency**.



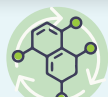
EU Funding:  
€7.0 million

Advances in electronic and electronic technologies have led to a sharp increase in their production and waste. **HR-Recycler** develops a novel approach to **electrical and electronic equipment**, making use of **automated recycling processes** to decrease risks, reduce costs and improve efficiency.



EU Funding:  
€7.0 million

The **platinum group metals (PGMs)** are among the **scarcest elements on earth** and conventional recycling methods are highly energy-intensive and harmful to the environment. **PLATIRUS** is developing **technologies to more sustainably and cost-efficiently recover PGMs from mining and electronic waste**. The project will enable the **recovery of enough PGMs to fill up to 30% of the EU's supply gap**, diversifying the supply chain and making European industry more competitive.



EU Funding:  
€7.0 million

One of the costliest elements on the market is **scandium**, used in high-intensity lighting and 3D printing applications. Its supply has been limited to imports from Asia and Russia. **SCALE** aims to **establish a closed supply chain for this valuable metal in Europe**, extracting it from metal waste.



EU Funding:  
€4.8 million

Dealing with the waste of high-quality, aerospace-grade materials is a major challenge for **sustainable aerospace engineering**. **SUSTAINair** is developing and introducing **novel concepts and techniques that will shape design, manufacturing, repair, overhaul and recycling processes** for lightweight, multifunctional and intelligent airframe and engine parts.



EU Funding:  
€5.0 million

The use of **sensor technology in aircraft materials** can improve the manufacturing process. **MORPHO** aims to **design, develop and test an environmentally-friendly industrial process to manufacture, monitor and recycle a new generation of intelligent, multifunctional, multi-material parts**, such as engine fan blades.

For more information visit:

[https://ec.europa.eu/info/research-and-innovation/research-area/energy-research-and-innovation\\_en](https://ec.europa.eu/info/research-and-innovation/research-area/energy-research-and-innovation_en)



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