

PRESS RELEASE



SUSMAGPRO
SUSTAINABLE RECOVERY, REPROCESSING AND REUSE
OF RARE-EARTH MAGNETS IN THE CIRCULAR ECONOMY

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EU launches European Raw Materials Alliance

A step in the right direction: EU launches European Raw Materials Alliance (ERMA) to secure sustainable supply of critical raw materials to which the EU project SUSMAGPRO makes an important contribution



EU Project SUSMAGPRO: Magnets recycling with hydrogen in fast motion (HPMS)

Permanent magnets based on rare earth elements are essential components of many high-tech products and of great importance for the green energy transition. Nevertheless, a large proportion of the respective raw materials currently needs to be imported to meet EU demand. As the main exporter, China dominates and controls the global market. With the launch of the European Raw Materials Alliance, the EU has now taken an important step to address this imbalance. One of the first items on the agenda is securing a sustainable supply of raw materials for the production of rare earth magnets. In this context, the EU project SUSMAGPRO makes an important contribution by developing a recycling supply chain and demonstrating the effective reuse of recycled materials within several industries.

Permanent magnets based on rare earth elements are high-tech products, indispensable in high-performance electric motors, generators and sensors. As functional components in wind turbines, electric and hybrid vehicles and robotics, they play a fundamental role in the transition to a digital, clean energy future. They form the basis for an industry worth more than three trillion US dollar, with a strong upward trend. Experts predict that demand for permanent magnets will grow by 15-20% annually over the next decade.

Despite their name, rare earth elements are by no means rare; quantities worthy of extraction are known to exist even in Europe. What worries European industry representatives is Chinese market dominance. Processing of ores extracted from open-cast mines produces large quantities of problematic waste such as alkalis, acids and radioactive by-products, and past Chinese environmental regulations have made unrivalled low-cost production possible. This

resulted in a ruinous worldwide price-war, which forced most competitors out of the market. However, while the Chinese state is currently undertaking great efforts to close illegal mines and bring environmental regulations up to international standards, its long-term investments and the consequent market development over the last 50 years have made market access for European companies increasingly difficult. It is worrying that China not only covers the entire value chain from ore mining to end use, but also combines high investments in the industry with a cap on mining capacity and export restrictions in its current five-year plan. China openly describes that turning raw material advantage into market leadership in key technologies has priority over the export of raw materials or magnets. Growing political tensions combined with import duty considerations further increase price volatility and thus vulnerability of the market.

Considering these developments, it is only logical that the European Commission has now launched the European Raw Materials Alliance (ERMA), whose first priority it is to secure raw materials for permanent magnets. The Alliance plans to increase supply security of magnetic materials through strategic cooperation with more stable partners such as Canada or Australia in the extraction and processing of raw materials. Furthermore, it foresees the support of African countries in establishing sustainable production and the expansion of cooperation with Latin American countries. In line with the European Green Deal, the alliance also places a strong focus on recycling the 20,000 tons of permanent magnets already in the European market. As Maroš ŠEFČOVIČ, Vice-President of the European Commission for Interinstitutional Relations, said at the official launch on 29th September: "The recycling of raw materials from electrical and electronic waste in urban mining and competitive sustainability are absolutely essential to reduce dependence on China, and the recycling rate of permanent magnets must be greatly increased."

Here, the EU project SUSMAGPRO makes an important contribution. Whereas previous approaches recover the rare earth elements (REE) neodymium and dysprosium through complex hydro- or pyrometallurgical processes and re-alloy them with iron and boron, a shorter recycling process is employed by the 19 European partners within SUSMAGPRO. The magnet material is embrittled and pulverised with the aid of hydrogen (HPMS, Hydrogen Processing of Magnetic Scrap). The powder can then be directly reprocessed into magnets without splitting it into its individual alloy components, thus saving over 90% of energy compared to primary production methods and reducing toxicity by as much as 98%. By 2024, once production maturity is achieved, 110 tons of magnetic waste will be recycled annually in four pilot plants in Sweden, the UK, Slovenia and Germany. The project consortium covers the entire recycling chain from large recycling companies and magnet manufacturers to end users of traction motors, loudspeakers, wind turbines and heating pumps.

"The difficulty does not lie in the actual recycling process. The HPMS process for neodymium-iron-boron magnets is efficient and cost-effective. Unfortunately, however, there is a wide variety of magnets on the market, e.g. ferrites or samarium-cobalt magnets, which are difficult to recycle, and the components containing magnets are not subject to mandatory labelling. Often, dismantling of components is also more expensive than the raw material value contained in them, which is why electronic scrap is often shredded," explains project coordinator Professor Dr Carlo Burkhardt from Pforzheim University. Therefore, an important task within SUSMAGPRO is the development of sensor technology and automatic sorting equipment to pre-sort the magnetic waste in a targeted manner and thus increase process efficiency. SUSMAGPRO is also looking at how to design new products to increase their recyclability. Burkhardt is confident that by consistently recycling components with a high magnetic content, i.e. primarily from wind turbines, electric cars, computer hard drives and pumps, a recycling rate of 15-25% can be achieved in the medium term.

Burkhardt adds: "But only if we all work together. Manufacturers, consumers and policy makers are equally challenged. By creating labelling standards, using recyclable products and developing new, particularly resource-efficient value-added chains, we must succeed not only in compensating for the current local disadvantage, but also in transforming it into an advantage in the medium term". The foundation of the European Raw Materials Alliance is an immensely important first step in this direction.

Stay tuned for the next SUSMAGPRO press release on the topic Design for Recycling.
For more information, visit www.susmagpro.eu



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