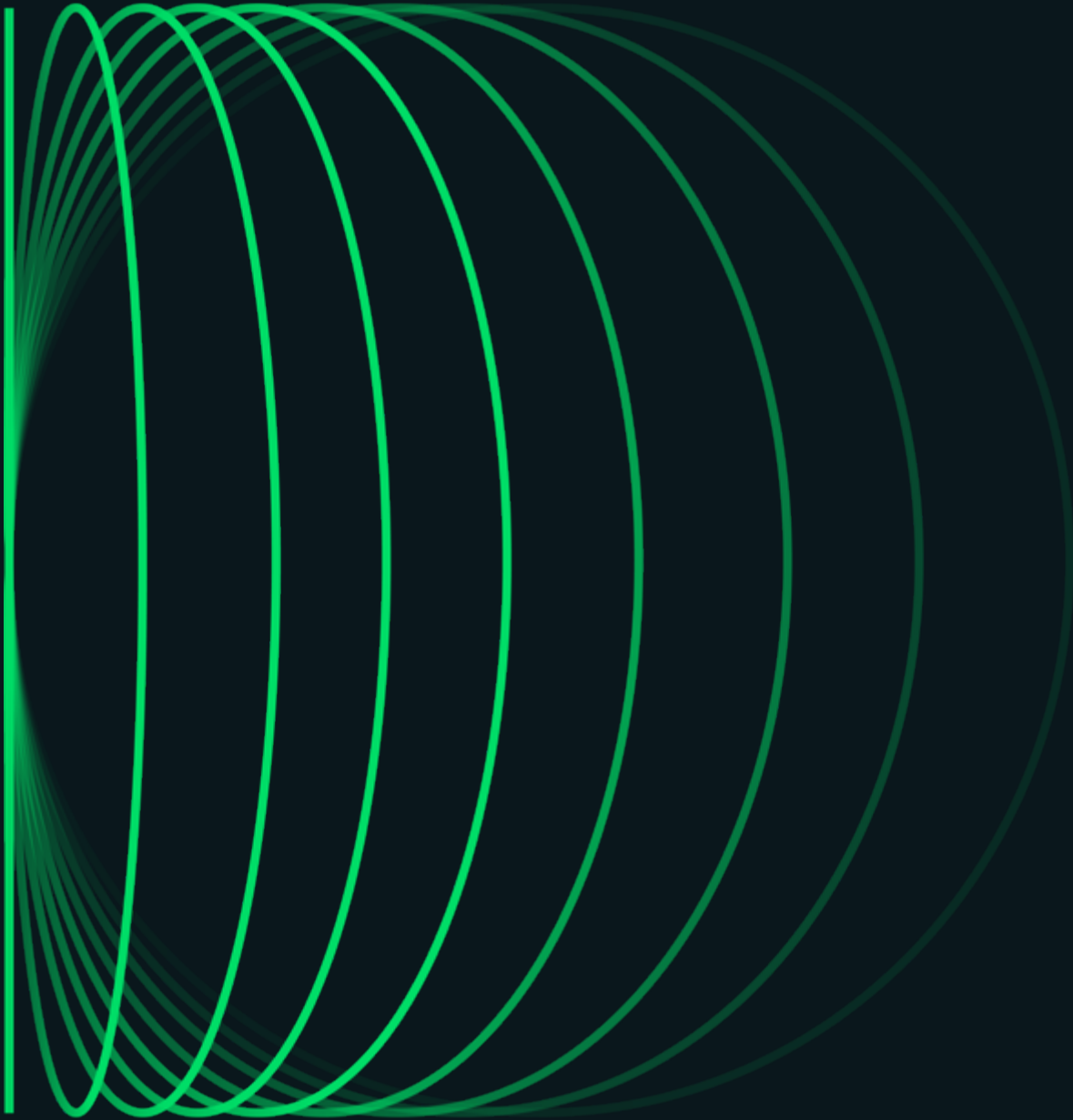




Rare Earths for Life

Magnet Recycling and the Circular Economy of Rare Earths

Corporate Presentation

June 2023

ionic
technologies

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About Ionic Technologies

Ionic Technologies has developed separation and refining technology that can be applied to the recycling and refining of individual magnet rare earths from used permanent (NdFeB) magnets.

Our hydrometallurgical process is able to deliver high purity separated magnet rare earth oxides no matter the quality and variability in composition of magnet feedstock.

Ionic Technologies is 100% owned by Australian rare earth resources company **Ionic Rare Earths Limited** (ASX: IXR).

Intake flexibility

Unlike other recycling processes, our technology can recycle any form of mixed waste magnets and production swarf regardless of type, age or coatings. We are not reliant on a single feedstock stream.



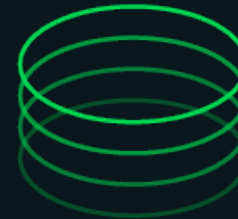
Magnet crushing
/ grinding



Digestion



Separate base
metals (Fe, Mn,
Al, Ni, Cu, B)



Nd, Pr, Dy, Tb
solvent separation
(15 stages)



Individual oxides
precipitation

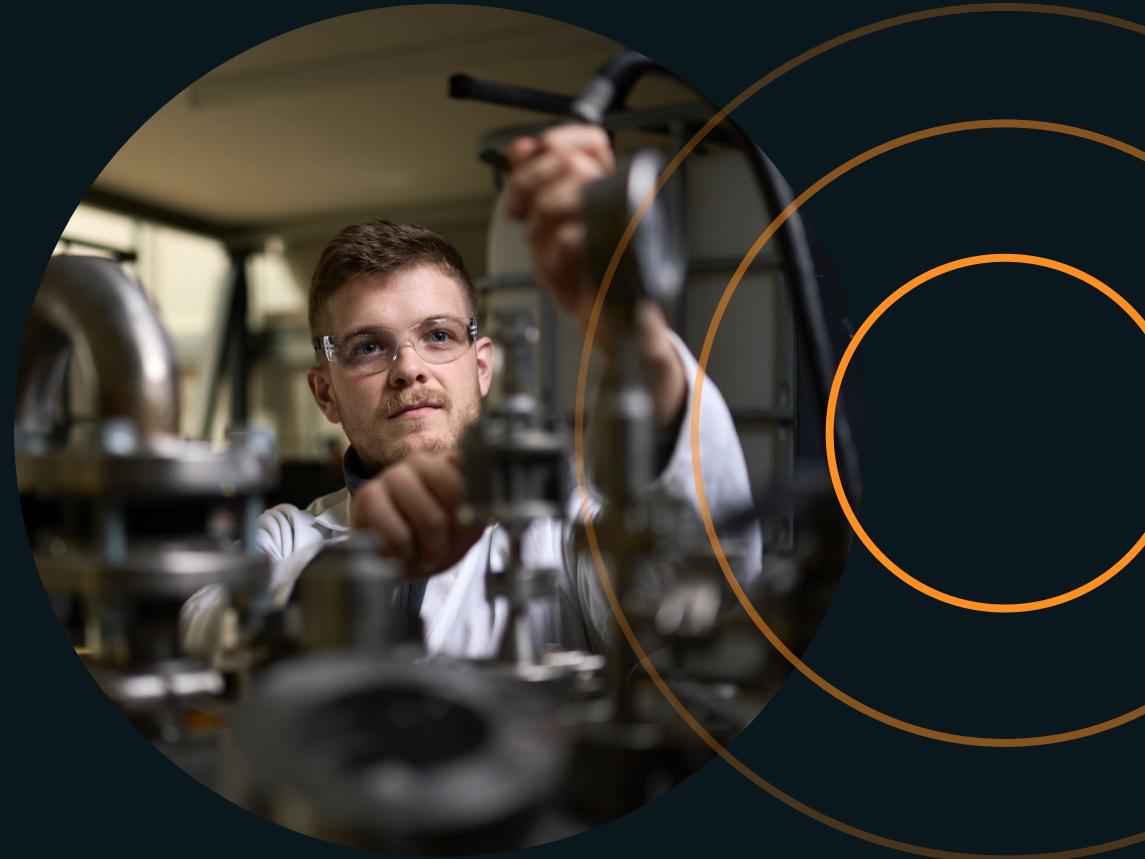
Unlocking rare opportunities

Rare earths are critical to the future of the net zero energy transition. Growing demand for these elements is driven by the ever-increasing investment in wind energy and electric vehicles (EVs).

Despite their name, many rare earths are relatively abundant in the Earth's crust, but unfortunately, they are very difficult and expensive to extract and process.

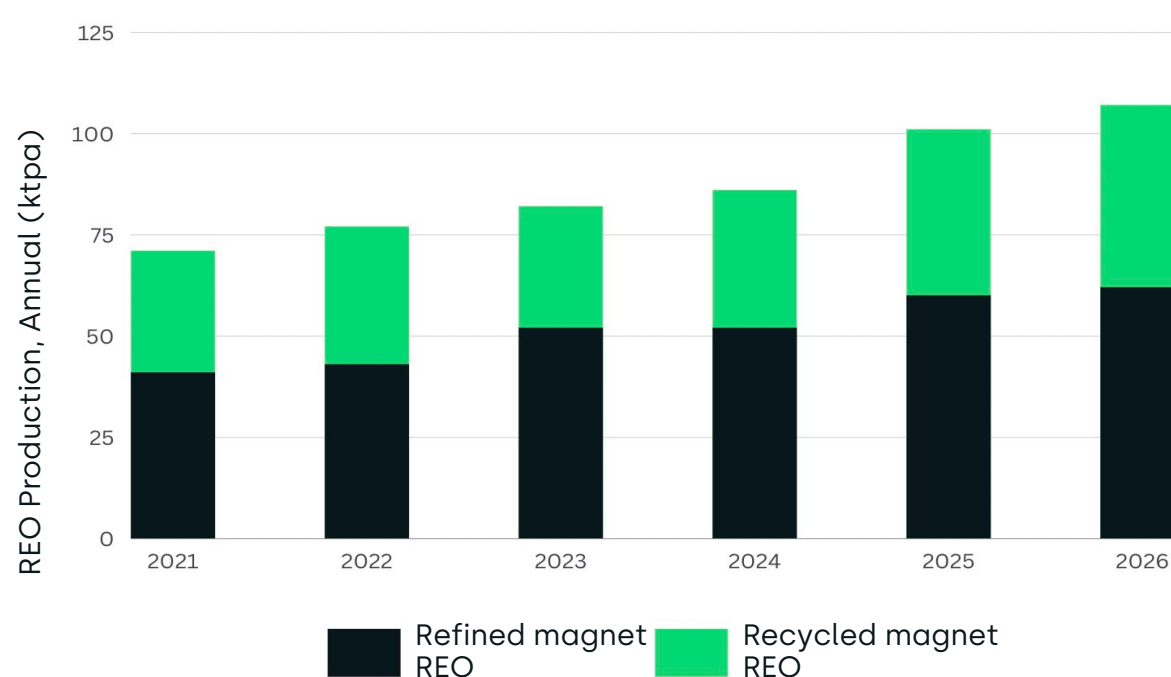
That's where Ionic Technologies come in. We set the standard for responsible product management. Our patented process enables the extraction of magnet rare earths that are already present in end-of-life magnets.

We are making strides towards powering a sustainable future by recycling secure, sustainable and traceable magnet rare earth oxides.

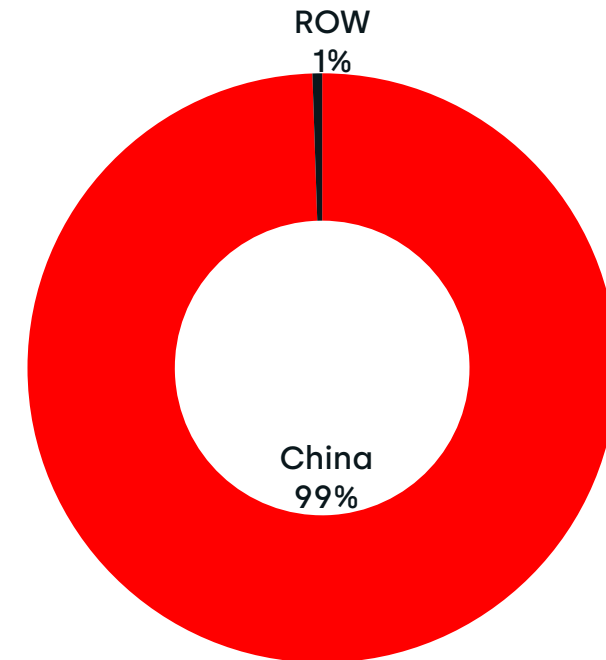


Ionic Technologies – NdFeB Magnet Recycling

Recycling of Magnet REO Makes Up 40% of Existing Global Supply,
... Dominated by China



Current breakdown and forecast to 2026 of global magnet REO production by refined vs recycled sources globally



Secondary sourcing (recycling) of rare earth oxides market share dominated by China

Ionic Technologies provides a new supply chain of secure,
sustainable and traceable magnet REOs

Recycling Neodymium Permanent [NdFeB] Magnets

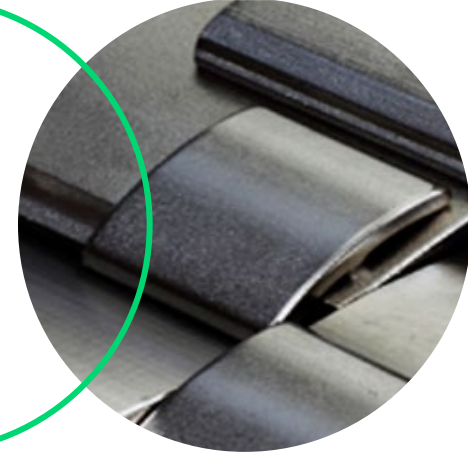
Ionic Technologies is a leader in rare earth separation, refining and recycling



Mixed grades of waste permanent magnets



100% recycled individual high purity grade magnet rare earth oxides



High spec permanent magnets for net zero carbon technologies such as EVs and off-shore wind turbines

Our Technology Provenance

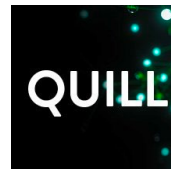
Our Technology was developed at Queens University Belfast (QUB) world leading QUILL Research Centre, the oldest and most established centre dedicated to studying ionic liquids.

Our continued investment in PhD students within the university underpins our forward-thinking ethos.

We continue to refine and enhance our technology as part of continuous improvement.



**QUEEN'S
UNIVERSITY
BELFAST**



Unique Proprietary Technology Protected Globally

Our technology carries four independent patents granted globally with rapid advancements to register further intellectual property



Intellectual Property Legal Advisors

ionic
technologies



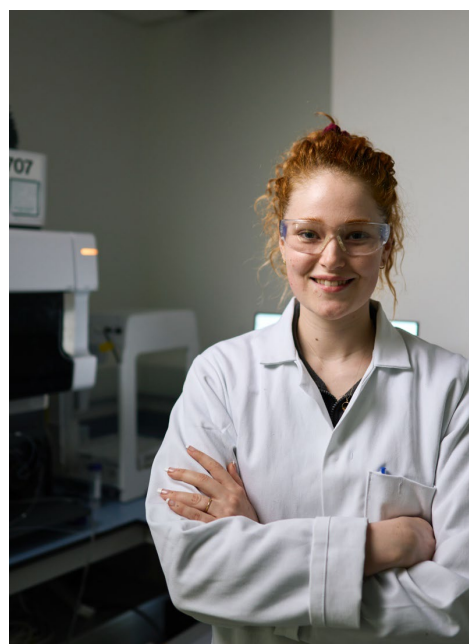
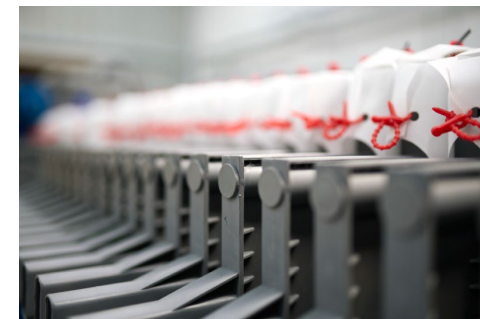
Ionic Technologies Demonstration Plant

Our Demonstration Plant, is now
producing magnet REOs.

Ionic Technologies will process both end of life magnets (waste) and swarf, to recover, separate and refine high-purity magnet Rare-Earth Oxides (REOs) using our sustainable technology.

Current plan is to process 30 tonnes of NdFeB magnet feedstock, producing over 10 tonnes of separated magnet REOs over the next 12 months.

Over 50 tonnes of NdFeB magnets secured.



Our Team

UK Government funding of £1.72m matched by investment from parent ASX listed Ionic Rare Earths Limited (ASX:IXR)



Thomas Kelly, General Manager – Operations



Fergal Coleman, Head of Technology



Neruja Srikantharajah, Engineering Manager



Andrew Holmes, General Manager – Sales/Sourcing



Prof. Peter Nockemann, Non-Executive Director

- Our management and seasoned senior team have 100+ years of experience between them
- 17 staff members (and growing) in chemistry, chemical engineering and professional services roles

High purity separated magnet rare earth oxide (REO) products

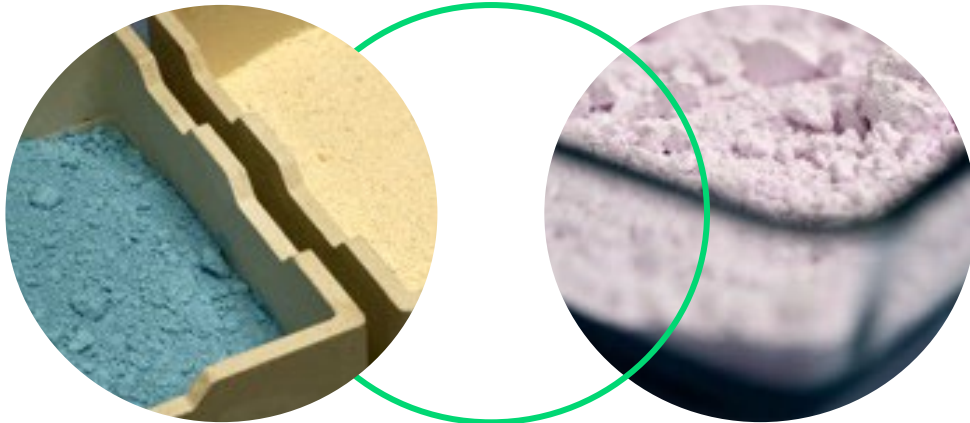
Unique proprietary recycling technology that can hydrometallurgically extract, separate and refine magnet REOs from spent magnets and swarf to high purity recycled individual 99.5%+ oxide products – both light and heavy magnet REOs

✓ Nd_2O_3

✓ Dy_2O_3

✓ Pr_6O_{11}

✓ Tb_4O_7



Our Path to Commercialisation

Rapid acceleration of our technology ready to scale for global markets



Lab scale

2016 – 2021



Pilot scale

2021 – June 2023



Demo scale
Production

June 2023 – June 2024

30 tonnes NdFeB
magnets → 10 tonnes
separated magnet
REOs



Commercial scale

Studies underway

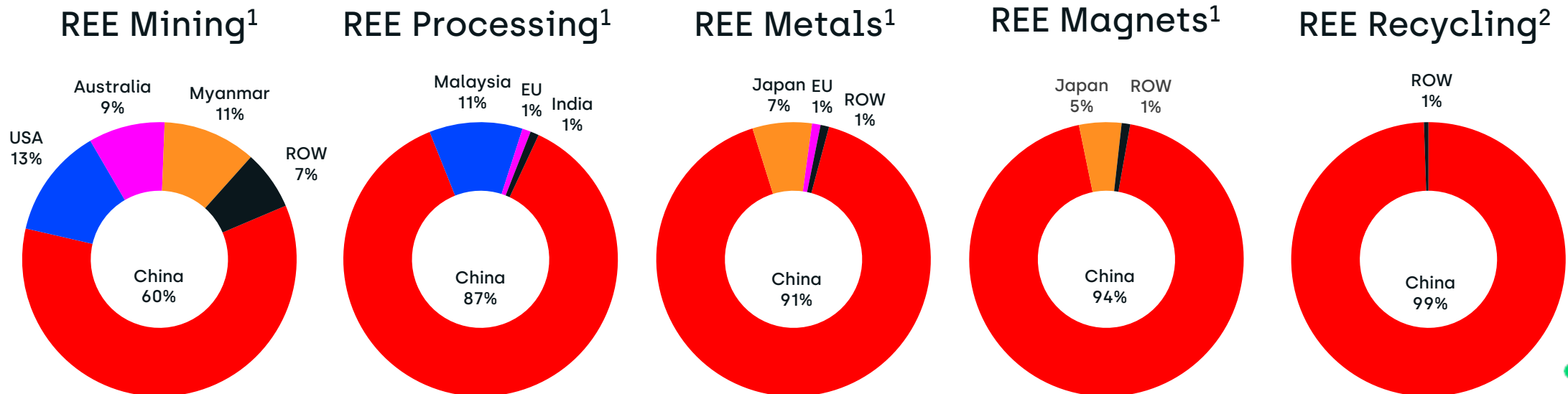
600mt NdFeB magnet
recycling plant → 200mt
of REE oxides

Modular scale up
potential

Rare Earth Supply Chain

Sustainably sourcing the molecules will require investment to develop alternative capacity globally

- Rare earths are amongst the most resource-critical raw materials: they are of highest economic importance and at the same time feature a high supply risk – supply chain dominated by China
- China has a dominant position in every value addition step in conversion of mined REEs to value added products
- Developing a sustainable supply chain external from China needs scale and capacity in every step → Long-term investment needed to facilitate this



¹ Rare Earth Magnets and Motors: A European Call for Action A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliances, Oct 2021. Argus Analytics Oct 2021. ² Wood Mackenzie Global rare earths short-term outlook August 2022.

Geo-Political Tensions – Driving Demand for Alternative, Resilient Supply

Global desire to develop alternative rare earths supply chains to protect manufacturing and defence

The scramble for rare earths carries big geopolitical risks

But without these metals there are limited solutions to our planetary problems

MISHA GLENNY + Add to myFT



A worker blasts the ground with water at a rare earth metals mine in Nancheng county, Jiangxi province. China dominates the production and supply of rare earth metals © Reuters

DEFENSE

Pentagon suspends F-35 deliveries after discovering materials from China

The issue does not affect flight operations of F-35s already in service.



"DOE, DOD, and the Department of State signed a memorandum of agreement (MOA) to better coordinate stockpiling activities to support the U.S. transition to clean energy and national security needs."

White House Briefing, 22 February 2022

Financial Times, The scramble for rare earths carries big geopolitical risks, 27 September 2022; Politico, Pentagon suspends F-35 deliveries after discovering materials from China, 7 September 2022.

"Lithium and rare earths will soon be more important than oil and gas. Our demand for rare earths alone will increase fivefold by 2030. [...] We must avoid becoming dependent again, as we did with oil and gas. [...] We will identify strategic projects all along the supply chain, from extraction to refining, from processing to recycling. And we will build up strategic reserves where supply is at risk. This is why today I am announcing a European Critical Raw Materials Act."

"We have to build a more resilient supply chain, supporting projects and attracting more private investment from mining to refining, processing and recycling."

European Commission President von der Leyen recalled some hard facts: "Without secure and sustainable access to the necessary raw materials, our ambition to become the first climate neutral continent is at risk."

14 September 2022

Rare earths that go on and on and on and on and on and

The Circular Economy of Magnet REOs

Our technology provides secure, sustainable and traceable supplies of magnet REOs today and tomorrow, for emerging supply chains, with potential to integrate into new magnet production to meet rapid forecast increases in demand.

Key Contacts

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