

rarearth

Powerful magnets, zero waste.

Europe's first fully integrated magnet-to-magnet recycling platform: from WEEE to virgin-grade NdFeB.

Ing. Lorenzo Ghettini, Head of Business Development

lorenzo.ghettini@rarearth.it Website LinkedIn

Rare earths: what they are

17 chemically similar elements: ***not rare in the crust, but hard to separate.***

La Lanthanum	**Ce** Cerium	**Pr** Praseodymium	**Nd** Neodymium	**Pm** Promethium	**Sm** Samarium	**Eu** Europium	**Gd** Gadolinium	**Tb** Terbium
Dy Dysprosium	**Ho** Holmium	**Er** Erbium	**Tm** Thulium	**Yb** Ytterbium	**Lu** Lutetium	**Sc** Scandium	**Y** Yttrium	

Used in NdFeB permanent magnets

Scarce in usable form

Abundant in the Earth's crust, but rarely concentrated enough to be mined.

Hard to separate

Their chemistry is so similar that splitting them takes long, chemical-intensive processes.

Small dose, big effect

Nd and Pr make magnets strong; Dy and Tb keep them stable at high temperatures.

NdFeB magnets: what they are

The strongest permanent magnets on the market, ***developed in the early 1980s.***

WHAT IS INSIDE (BY WEIGHT, APPROXIMATE)



Boron and other additions: ~4%. Rare earths: mainly Nd and Pr, with Dy and Tb for heat resistance.

WHERE WE FIND THEM

- **Electric cars**
- **Wind turbines**
- **Hard drives**
- **Robots**
- **MRI scanners**
- **Speakers**
- **Industrial motors**
- **Drones**

Anything that moves, spins or vibrates in an electrified world.

WHY THEY MATTER

- Much stronger than ferrite magnets of the same size.
- Make motors and generators smaller, lighter and more efficient.
- Produced as sintered, bonded or hot-pressed magnets.
- No equivalent substitute in many high-performance uses.

Rare-earth magnets are the new fuel

*Every electrified, decarbonised and connected system **runs on NdFeB permanent magnets.***

Electric Mobility

~2 kg NdFeB per EV · 100% of modern traction motors

Wind Power

0.6-1.0 t per MW direct-drive turbine

Defence & Aerospace

F-35 (~400 kg), drones, missile guidance — no substitutes

Healthcare

MRI scanners, surgical robotics, hearing aids

Robotics & Industry

Cobots, servo motors, factory automation

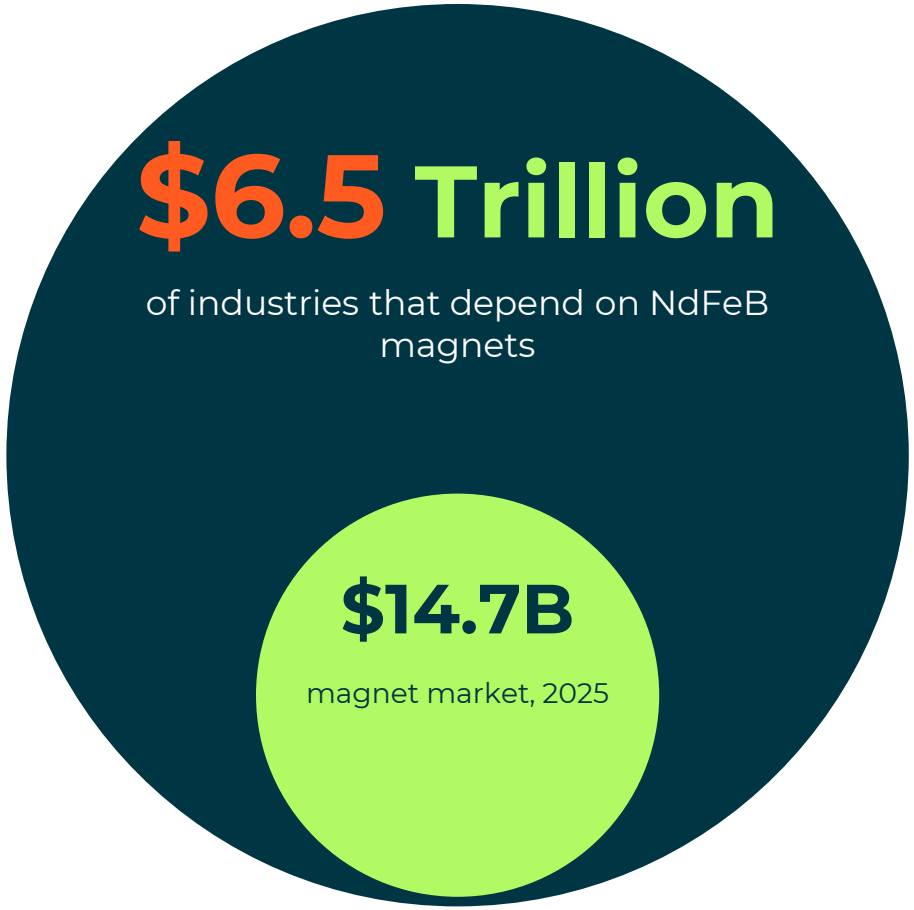
Consumer & Appliances

Smartphones, speakers, e-bikes, home appliances

Whoever controls magnet supply controls the energy, mobility and defence stack.

Small market, huge dependency

*A ~$15 billion market underpins **whole industries.***

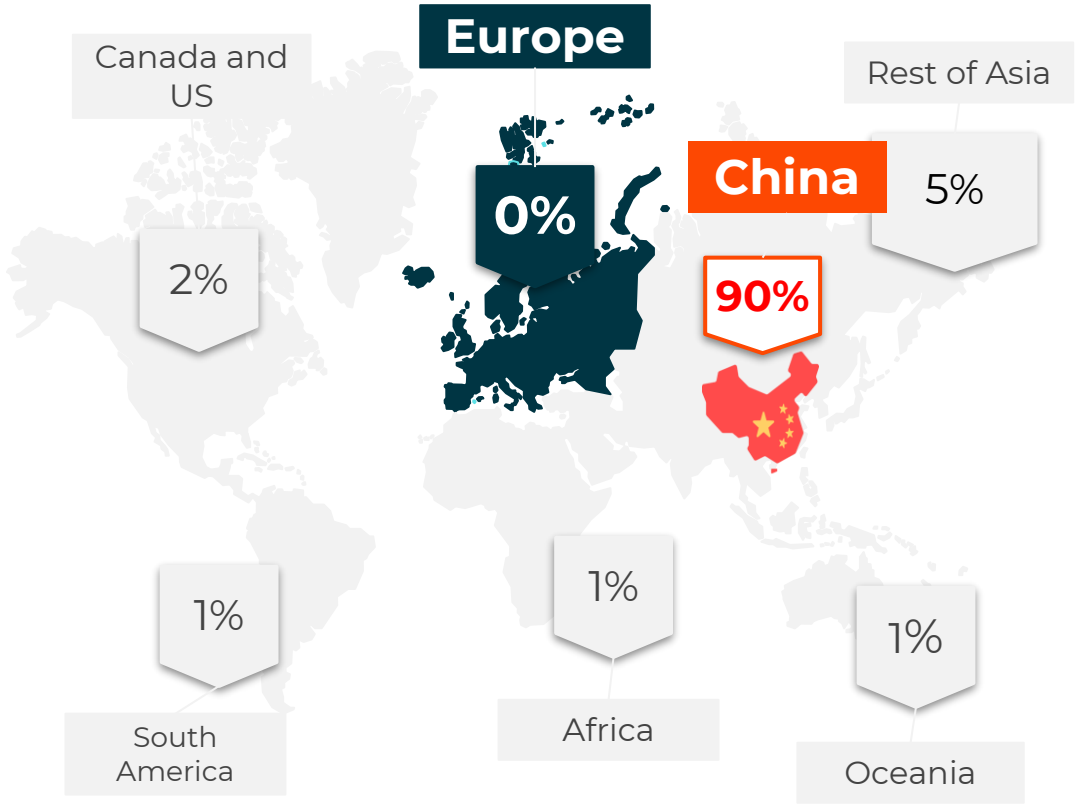


$14.7B → $29.7B
global NdFeB magnet market, 2025 → 2035

8.1%
expected annual growth (CAGR)

3×
EU demand for NdFeB magnets by 2030

Europe dependency on China



90% of global NdFeB magnets produced in China

< 1% of rare earths in WEEE currently recovered

3× EU NdFeB demand projected by 2030

Who controls the supply chain

*China dominates **every step** from ore to finished magnet.*

Mining	Separation & refining	Metals & alloys	Magnet manufacturing
~70%	**~90%**	**~90%**	**~90%**
China's share of global capacity	China's share of global capacity	China's share of global capacity	China's share of global capacity

Ore mined elsewhere is processed in China

Even non-Chinese mines mostly ship concentrate to Chinese separation plants.

Heavy rare earths are the bottleneck

Dysprosium and terbium, needed for high-temperature magnets, are almost entirely Chinese.

Approximate shares of global capacity. Europe's share of magnet production is close to zero.

When export controls bite

*Licences, not tariffs, decide **who gets magnets, and when.***



Technology ban

China prohibits exports of rare-earth extraction, separation and magnet-making technology.

Licences introduced

Export licences required for 7 medium and heavy rare earths and their magnets. Shipments fall; some automotive lines stop.

Controls extended

Wider controls announced, then suspended for one year after US-China talks.

Uncertainty persists

Supply blocked or delayed and prices highly volatile. The suspension expires at the end of the year.

One licensing decision can stop a European production line within weeks.

In 2026: regulatory + supply shock.

Now

China export controls

Blocked or delayed supply-chain and huge price volatility.

2024 → 2030

Critical Raw Materials Act

EU targets: 25% recycling, 40% processing, 10% extraction.

2026

WEEE revision

Mandatory magnet collection; export ban on magnet scraps being drafted.

2025 — 2035

Market tailwind

From $14.7B → $29.7B at 8.1% CAGR;

Europe needs to build its own magnet supply chain fast.

The EU 2030 benchmarks

*The Critical Raw Materials Act sets targets for **annual EU consumption.***

10%

extracted in the EU

40%

processed in the EU

25%

from recycling

65%

max from a single third country

WHAT IT MEANS FOR MAGNETS

- Rare earths for permanent magnets are strategic raw materials.
- The WEEE revision aims at mandatory collection of magnets.
- Export restrictions on magnet scrap are under discussion.
- Recycling is the one target that Europe can meet with its own waste.

Three scenarios to 2030

*EU demand for NdFeB magnets is expected to **triple by 2030.** How will it be met?*

Status quo

Keep buying from China

Dependence stays around 90% while demand triples.

SUPPLY RISK

Highest

Every licence decision hits production.

Diversify

New mines and refineries

Projects outside China in Europe, the US, Australia, Africa and Canada.

SUPPLY RISK

Medium

Heavy rare earths remain a bottleneck.

Diversify + close the loop

Add recycling of magnets

Recover the magnets already in WEEE, motors and industrial scrap.

SUPPLY RISK

Lowest

Secondary supply made in Europe.

Recycling does not replace mining, but it is the fastest lever Europe can pull.

The urban mine

*NdFeB magnets are already in Europe, **inside products reaching end of life.***



Hard drives & IT equipment

Spindle motors and voice-coil actuators



Industrial & household motors

Servo drives, compressors, appliances



E-mobility

Traction motors from end-of-life vehicles



Wind turbines

Direct-drive generators: a growing future stream



WEEE & production scrap

Dismissed equipment and manufacturing offcuts

OUR THESIS

The urban mine is a lever for Europe's security of supply.

Today most of the value in these magnets is lost: they are shredded, diluted or exported.

Our Solution

A circular supply of neodymium magnets:
we recycle EoL magnetic components and produce high-performance magnets

End-of-Life or discarded systems with permanent magnets

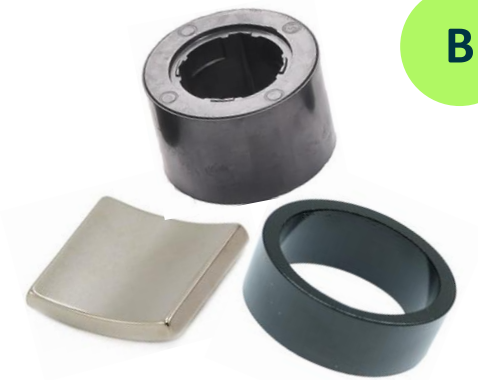
A



rarearth

High-performance permanent magnets

B



Short-loop Direct Recycling

Magnet-to-Magnet Approach

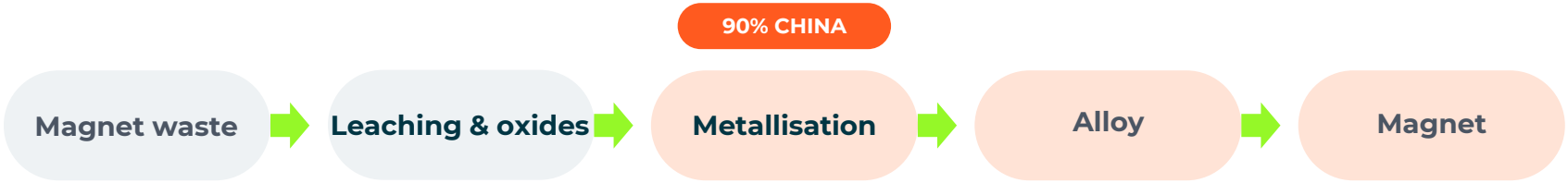
Modular Process Architecture

No detour through China

*The short loop keeps **the whole chain in Europe.***

LONG LOOP

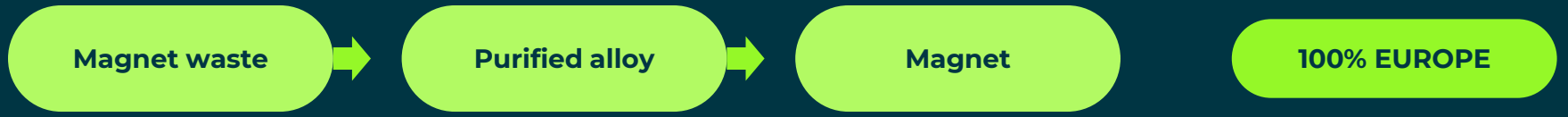
Recycling via oxides



Oxide separation and metal production sit almost entirely in China.

OUR SHORT LOOP

Alloy to magnet



No step depends on Chinese capacity.

No export-control risk

No Chinese licence stands between our waste and our magnets.

Shorter, faster to secure

Fewer steps means fewer partners and less to build in Europe.

Supply made in Europe

Aligned with the CRMA goal of reducing single-country dependence.

Results vs. the primary route

*We share the **outcomes**.*

~100% recycled content

Magnets made from end-of-life magnets and industrial scrap.

Virgin-grade quality

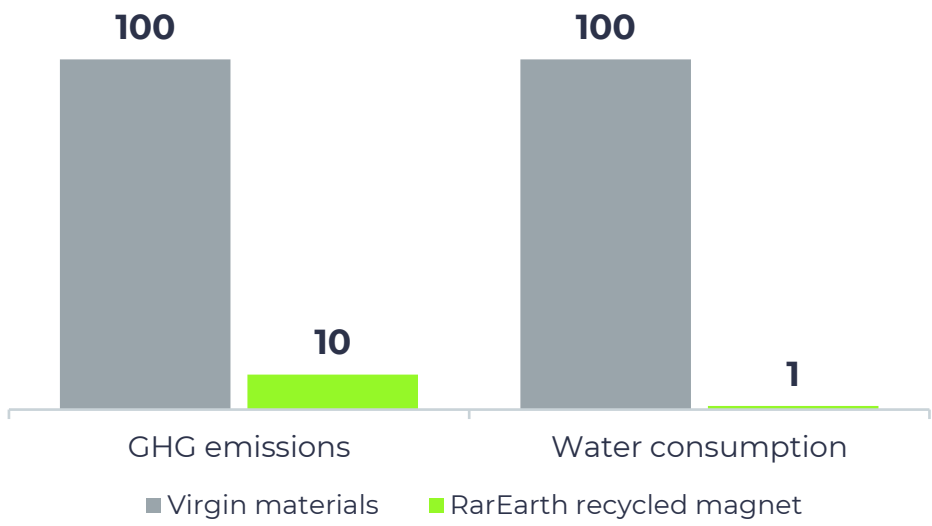
Regenerated magnets equivalent to virgin ones, at current market price levels.

Protected know-how

Patented selective purification and magnet regeneration technologies.

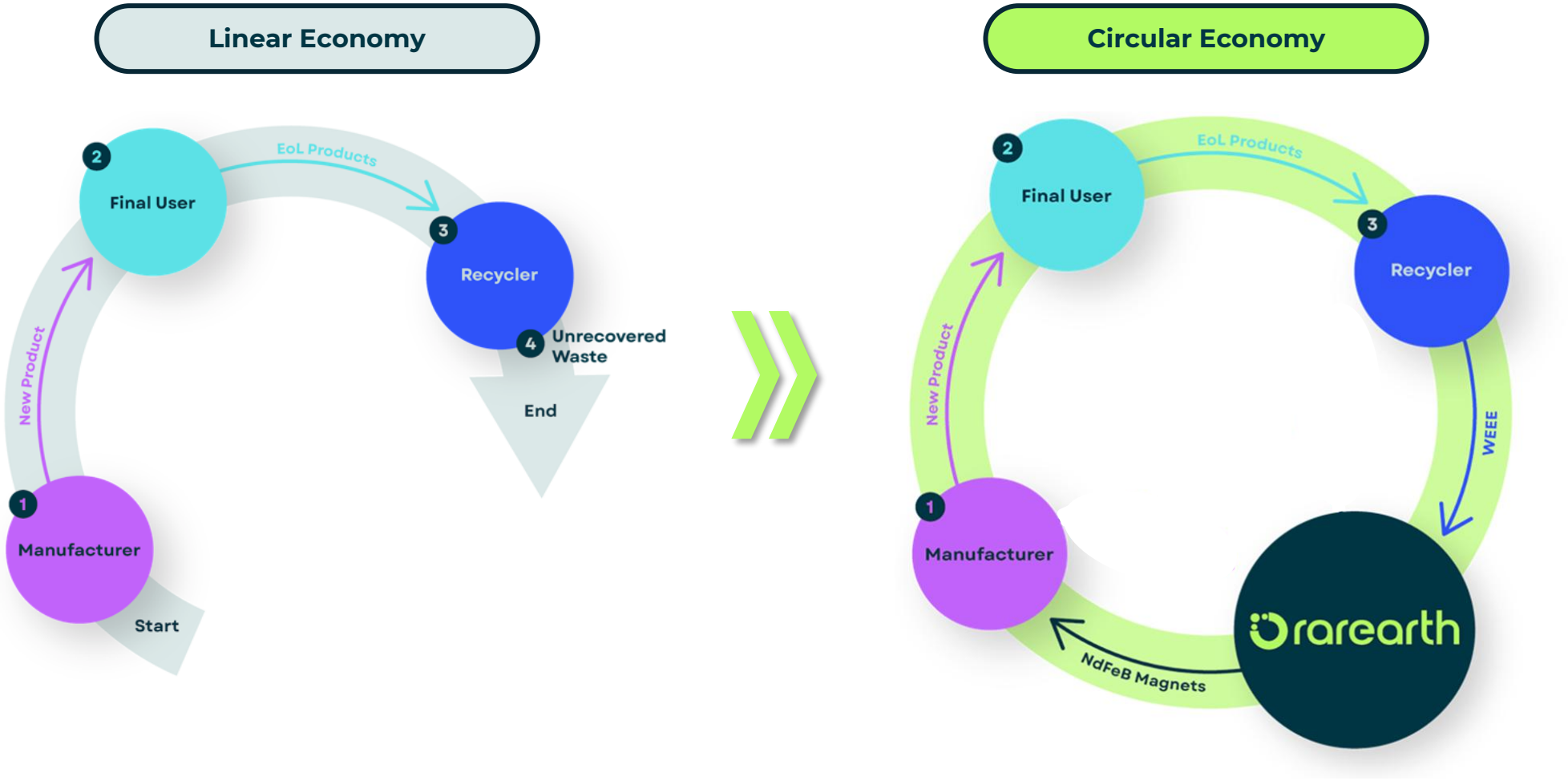
ENVIRONMENTAL IMPACT

Index, magnet from virgin materials = 100



Estimated reductions of about 90% (GHG) and 99% (water).

Business Model



Partnerships Options

Two different **collaboration models** to integrate circularity into companies' value chain.

A



End-of-Life strategic management

We **collect EoL assets and industrial scrap** containing NdFeB magnets:

- High **reduction** in **waste management costs**
- Better **valorization** of EoL material
- Company waste into **strategic critical resources**

B



Magnet supply

We **produce high-performance recycled NdFeB permanent magnets**:

- **100% European** supply chain
- **Stable** and **guaranteed** sourcing
- **Identical** to **virgin magnets**

Our place in the value chain

*We connect **those who hold the waste** with **those who need the magnets.***

SOURCES

Where the material comes from

- Waste managers and recyclers (WEEE)
- Industrial scrap from magnet users
- End-of-life assets from OEMs

RAREARTH

From waste to magnet

- Collection and dismantling
- Selective purification
- Magnet production: sintered, bonded, hot-pressed

CUSTOMERS

Who uses the recycled magnets

- Medical
- Industry and robotics
- Automotive and e-mobility
- Wind energy

A closed loop: the sectors we collect from are the sectors we supply.

The team that makes it possible

+30 years in Robotics

Industrial robotics and automation know-how

PhD-Led R&D

Academic excellence in Chemistry, Metallurgy and Physics

Magnet Recycling Leadership

Elite talent density

Highly selective recruitment



Enrico Pizzi
Co-Founder & CEO
Environmental Engineer



Gianluca Torta
Co-Founder & CTO
Industrial Chemist (PhD)



Jacopo Neri
CFO
Energy Engineer



Kenny Alvarez
COO
Mechanical Engineer (PhD)



Davide Luzzi
Process Manager



Matteo Casadei
Lead Researcher



Angelo Barilari
Senior Engineer



Matteo Melegari
Senior Researcher



Sofia De Rossi
Researcher



Gabriele Melchiorre
Senior Researcher



Michele Bianchini
Senior Engineer



Lorenzo Ghettini
Business Developer



Silvia Mercuriali
Communication Manager



Giulia Agostini
Administration Manager

What we are looking for

Waste managers & recyclers

Suppliers of end-of-life magnets and scrap containing NdFeB.

Magnet users & OEMs

Co-qualification of our magnets and supply agreements.

Research & universities

Joint projects on materials, processes and characterisation.

Institutions & associations

Recognition and support for a European magnet supply chain.

Ing. Lorenzo Ghettini

Head of Business Development, RarEarth S.r.l.

lorenzo.ghettini@rarearth.it

www.rarearth.it

linkedin.com/company/rarearth

From today's waste to tomorrow's magnets, made in Europe.



Thank you for your attention!