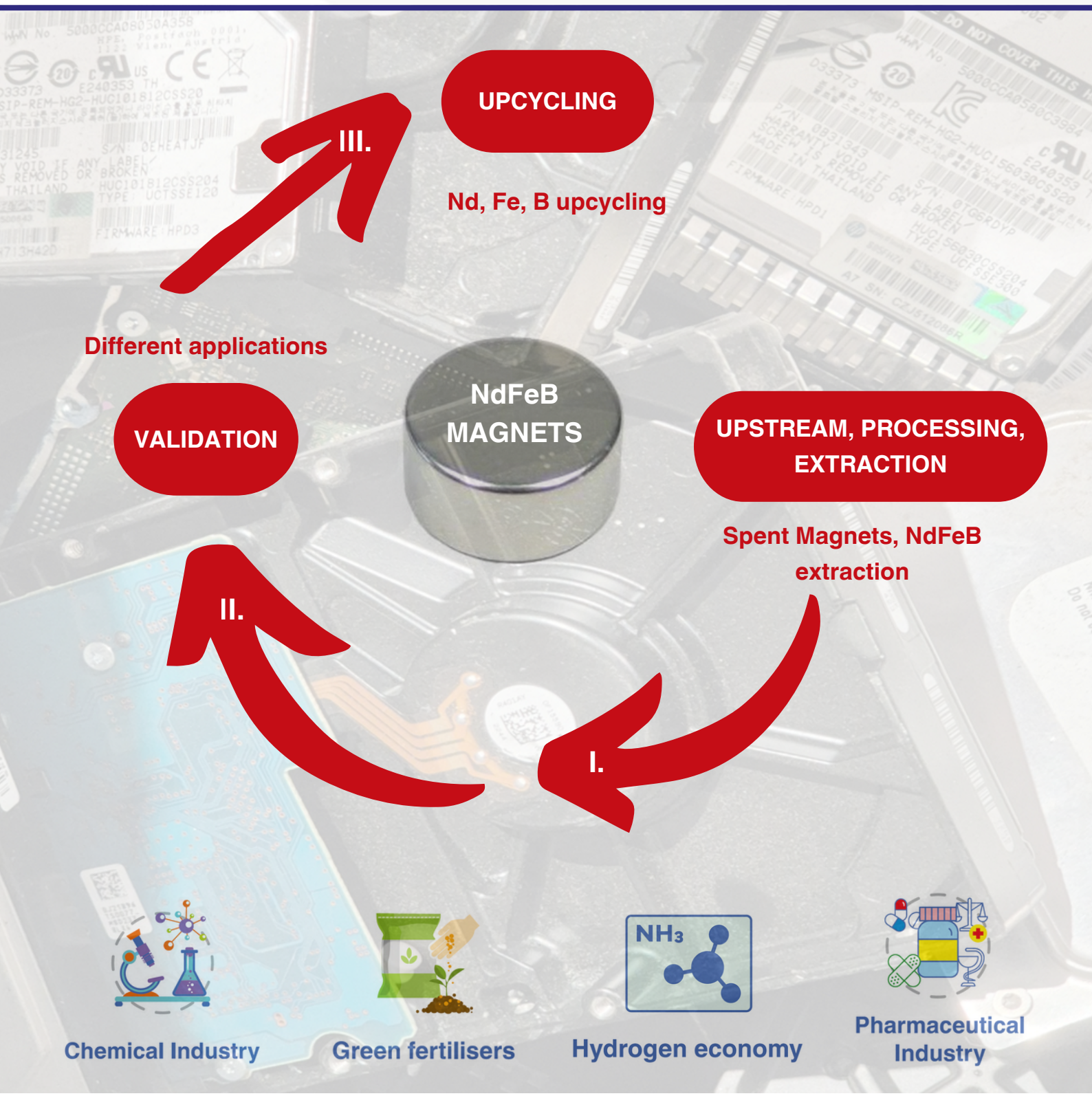


UPCYCLING OF NdFeB MAGNETS IN THE EU FOR GREEN APPLICATIONS



The NEO-CYCLE project aims to demonstrate at TRL6 the sustainable upcycling of spent NdFeB magnets coming from hard disk drives (HDDs), reaching high-quality end products for 4 case studies: pharmaceutical, ammonia, fertilizers, and polymers industries and will include necessary paths to reach the market uptake. To achieve this aim, NEO-CYCLE involves all the relevant actors in the value chain, from public authorities to WEEE recycling companies, technology developers, associations, NGOs, SMEs, and commercial companies in the targeted sectors.

One of the main objectives is to transform the European economy to recycle rare earths and boron from residual materials within Europe and to build up its own production capacities. This ensures a supply of strategic raw materials to European manufacturers and traders and thus promotes the development of a European raw materials industry in long term.



III.

Demonstration of upcycling approaches for Nd, Fe, and B transforming these recovered materials into high-performance industrial catalysts.

These catalysts play a crucial role in four key industries: pharmaceuticals, ammonia production, fertilizers, and polymers.

Upcycling approaches for Nd, Fe and B

- Nd and B catalysts for Active Pharmaceutical Ingredients for anticancer, antiviral drugs manufacturing and fine chemicals synthesis
- Nd catalysts for novel polymers development
- Fe and Fe-Nd nanoparticle catalysts for green ammonia synthesis supporting the hydrogen economy

II.

Validation of the quality and performance of final products by leading commercial companies

Digitalisation, data science and IT platforms

- Mathematical modelling, optimisation monitoring and digital twins of plants

Sustainability, green logistics, Digital Product Passport, regulation

- Life Cycle Sustainability Assessment, Techno-economic assessment (TEA)
- Assessment of production and recycling optimization, sustainable logistics, and the development of a digital product and material passport

Standardization assessment

- Developing a roadmap for standardization

I.

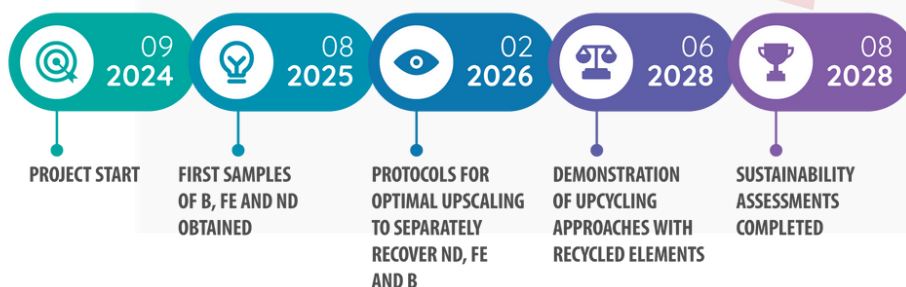
Demonstration of a Solid-State Chlorination, Electrochemical and Purification processes to separate Nd, Fe and B

Overall Goals

- Develop advanced methods for Nd recovery from waste magnets
- Focus on process optimization, sustainability, and scalability for industrial applications
- Integrate environmental and economic assessments to ensure responsible resource management

Waste Inventory, Magnet Characterization

- Development of a waste inventory for Nd-containing electronic waste in the EU using UNEP guidelines
- Manual separation of spent magnets from electronic devices



idener.ai



**Funded by
the European Union**

NEO-CYCLE has received funding from the European Union under grant agreement No 101138058.



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

