



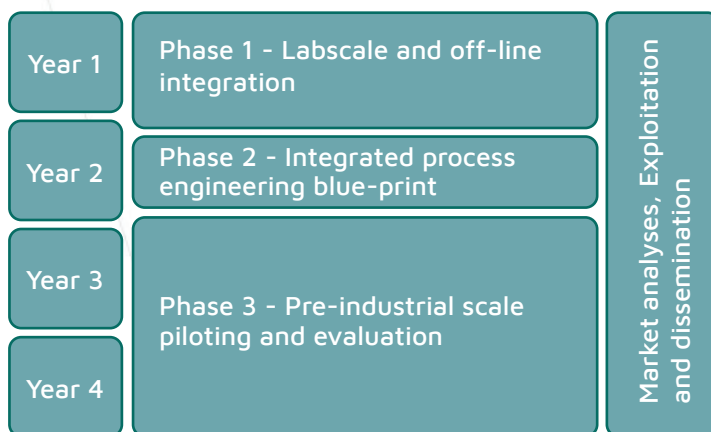
REE4EU: Integrated High Temperature Electrolysis (HTE) and Ion Liquid Extraction (ILE) for a Strong and Independent European Rare Earth Elements Supply Chain



Exciting Final Stage for the REE4EU project

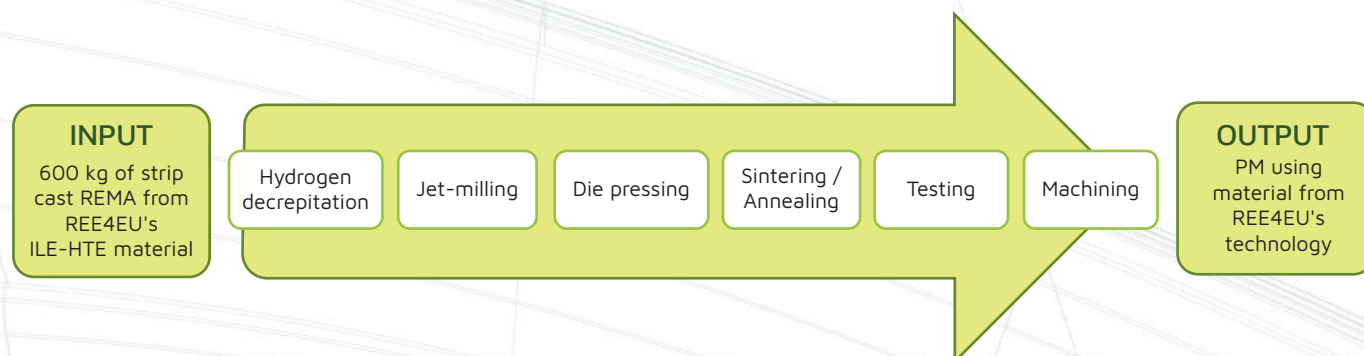
REE4EU project progress

The REE4EU consortium is playing the last year of the project, and the main activities have focused on the manufacture and validation of the end-product, which is the permanent magnet produced out of recycled material obtained in the REE4EU pilot. Moreover, the validation of REE4EU technology to other types of RE-containing wastes (nickel metal hydride battery waste) are ready to start after the preparation and commissioning of the pilot equipment at Elkem and SNAM.

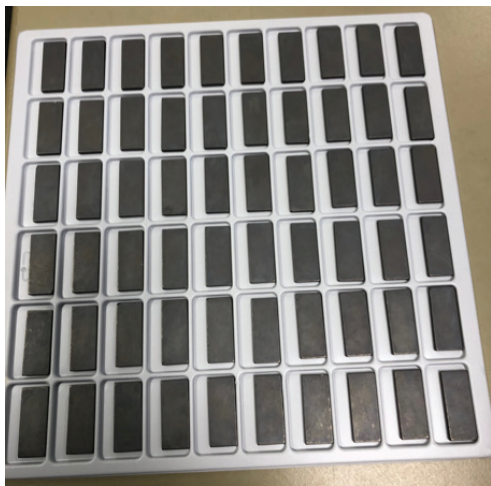


Industrial Permanent Magnet Manufacture and Validation using the REE4EU

The output material from the ILE-HTE REE4EU pilot installed at Elkem's premises, was used by LCM to manufacture 600 kg batch strip cast RE master alloy (REMA). 50 kg of the REMA produced was used by Vaccuumseltze to manufacture permanent magnets (PM) in its production line in Hanau.



Scheme of the steps followed by Vaccuumseltze to manufacture permanent magnets in its production line in Hanau using the strip cast master alloy obtained in the REE4EU project



Some of the permanent magnets manufactured using the waste material recycled in the REE4EU pilot

VAC determined both the quality of both the REMA input obtained LCM and the PM output obtained in terms of magnetic properties and chemical composition.

The results obtained showed that the PM prepared from the REMA processed in the REE4EU pilot at Elkem has the same properties as magnets from mass production at VAC using virgin material.

That means that **the REE4EU technology is suited for obtaining REA for high-tech PM production using PM-waste.**

REE4EU's Replication activities using NiMH battery waste

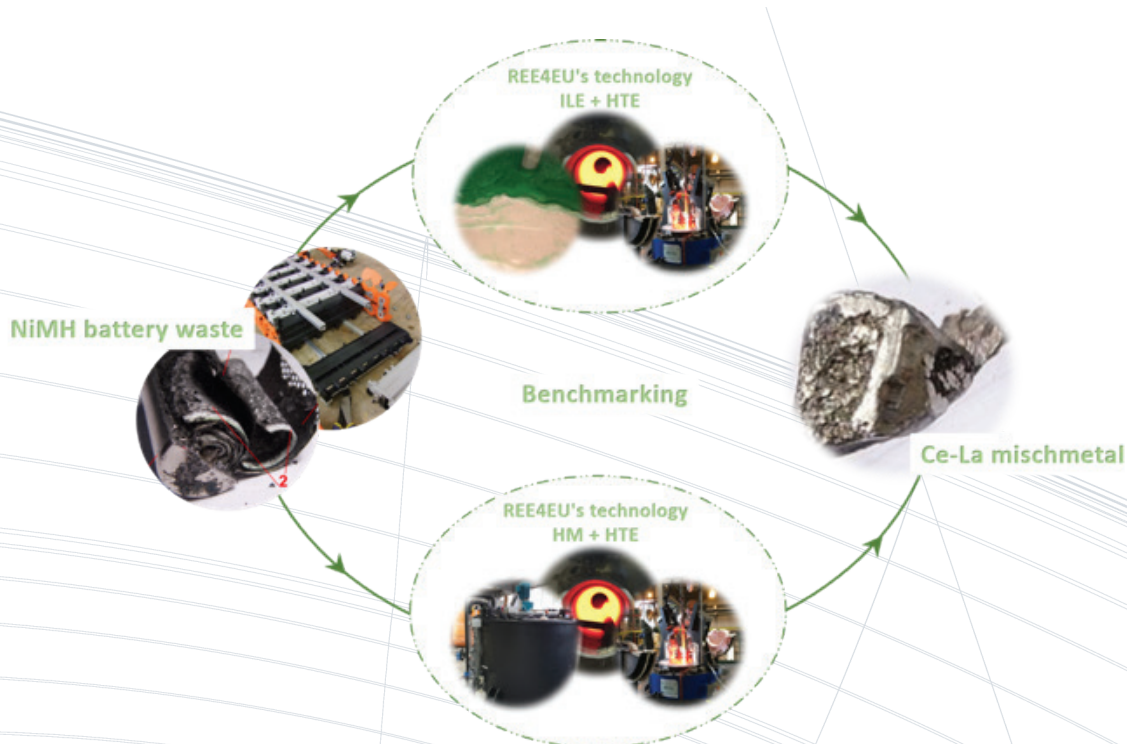
The flexibility towards different waste streams of the REE4EU pilot plant will be demonstrated in the replication activities related to the validation of the REE4EU's technology for RE alloy (REA) recovery from nickel metal hydride battery (NiMHB) waste.

The ionic liquid extraction (ILE) unit of the REE4EU pilot previously used in the processing of permanent magnet waste, was slightly adapted by Elkem to the new waste stream. A multidisciplinary design optimization (MDO) tool was used by partner Idener in order to predict the optimization of the operating parameters of the ILE pilot unit.

At the same time, the REO mixture obtained after the ILE unit will be compared to the REO mixture obtained after hydrometallurgical (HM) up-grading processing of the NiMHB black mass, which has also been up-scaled by partner SNAM in the frame of the REE4EU project.

Both REO mixtures, will be used in the high temperature electrolysis (HTE) unit in order to obtain a pure Ce-La mischmetal for the manufacture of electrodes for new NiMHB, or other suitable applications. In this way, the mischmetal products obtained from REO mixtures extracted by both ILE and HM methods will be benchmarked with SoA products.

The activities are currently on-going, and the results will be soon reported in the coming newsletter.



Outstanding dissemination activities

The REE4EU project was selected to participate in the exhibition organised in the context of the EU Industry Days 2019 that took place in Brussels on 5 and 6 February 2019.

This high-level European event gathered around 1500 participants including EU Commissioners, Members of the European Parliament and representatives from industrial sectors, finance, research and innovation and public government.

The exhibition showcased more than 30 innovative projects co-funded by the European Union under different programmes, and REE4EU was one out of 7 in the field of Industrial Materials.

This was a great opportunity to show the developed innovation to industry stakeholders, as well as to meet EU and national politicians, journalists, investors, senior managers from the EU institutions and to network with the other exhibitors.



The REE4EU booth at the EU-Industry Days 2019 High-Level Conference

Towards commercialization of the REE4EU technology

First results on the environmental foot-print and preliminary economic assessment of the REE4EU technology were presented to relevant stakeholders in the REE4EU workshop that was held in Brussels 24th April 2019.

The objectives of the exploitation workshop were twofold:

- To present the REE4EU recovery technology and results, including the technological aspects, the environmental foot-print and preliminary economic assessment.

To discuss the possibilities of bringing the REE4EU technology to the market

The Consortium has the pleasure to welcome several industrial actors world-wide interested in the rare earth-based permanent magnets value chain, as well as relevant stakeholders from the EU-Commission, i.e. EASME, SPIRE, DG-GROW.

Moreover, members of the Advisory Board, i.e. Professor Toru Okabe from the University of Tokyo, European Recycling Platform, and the EIT Raw Materials assisted in the audience and had the chance to evaluate the outcomes of the project so far.





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For more info about project visit the REE4EU website at: www.ree4eu.eu



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