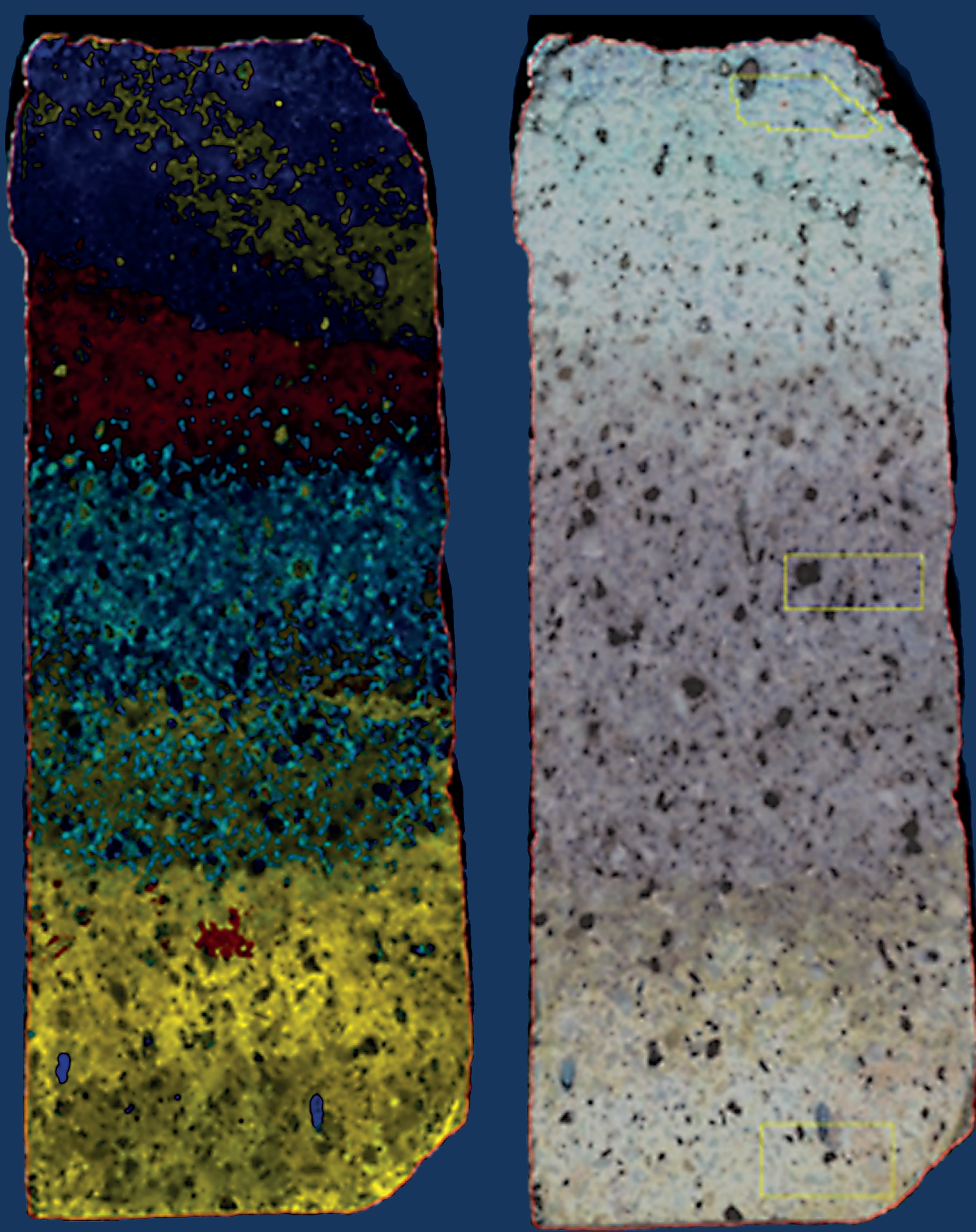


ReSoURCE

Refractory Sorting Using Revolutionizing Classification Equipment



Recycling of Refractory Products

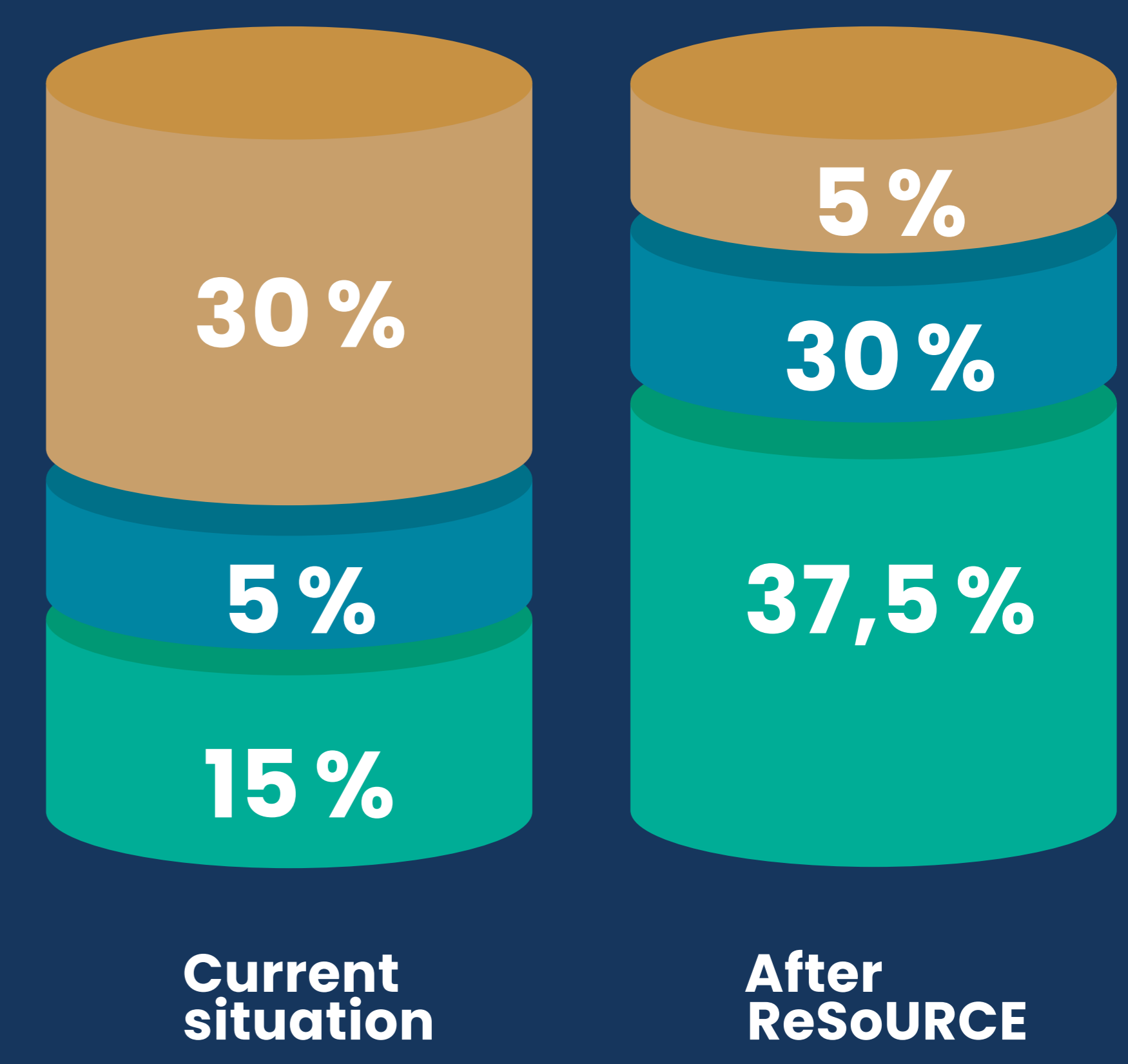
Refractory products are indispensable for all high-temperature processes above 1200 °C and are needed to produce materials such as steel, cement, glass, and nonferrous metals. Since the needs for these production processes are different, refractory producers such as RHI Magnesita supply multiple refractory product types, each of them with different chemistries and properties. This individual adjustment is what allows the products to achieve the required performance but for the recycling process, this is what poses major challenges. Reusing refractory material makes it necessary to identify and sort according to the chemical composition most precisely. Only if this sorting is done well, products of highest quality can be produced from recycling refractory material.

Refractory Industry & CO₂-Emissions

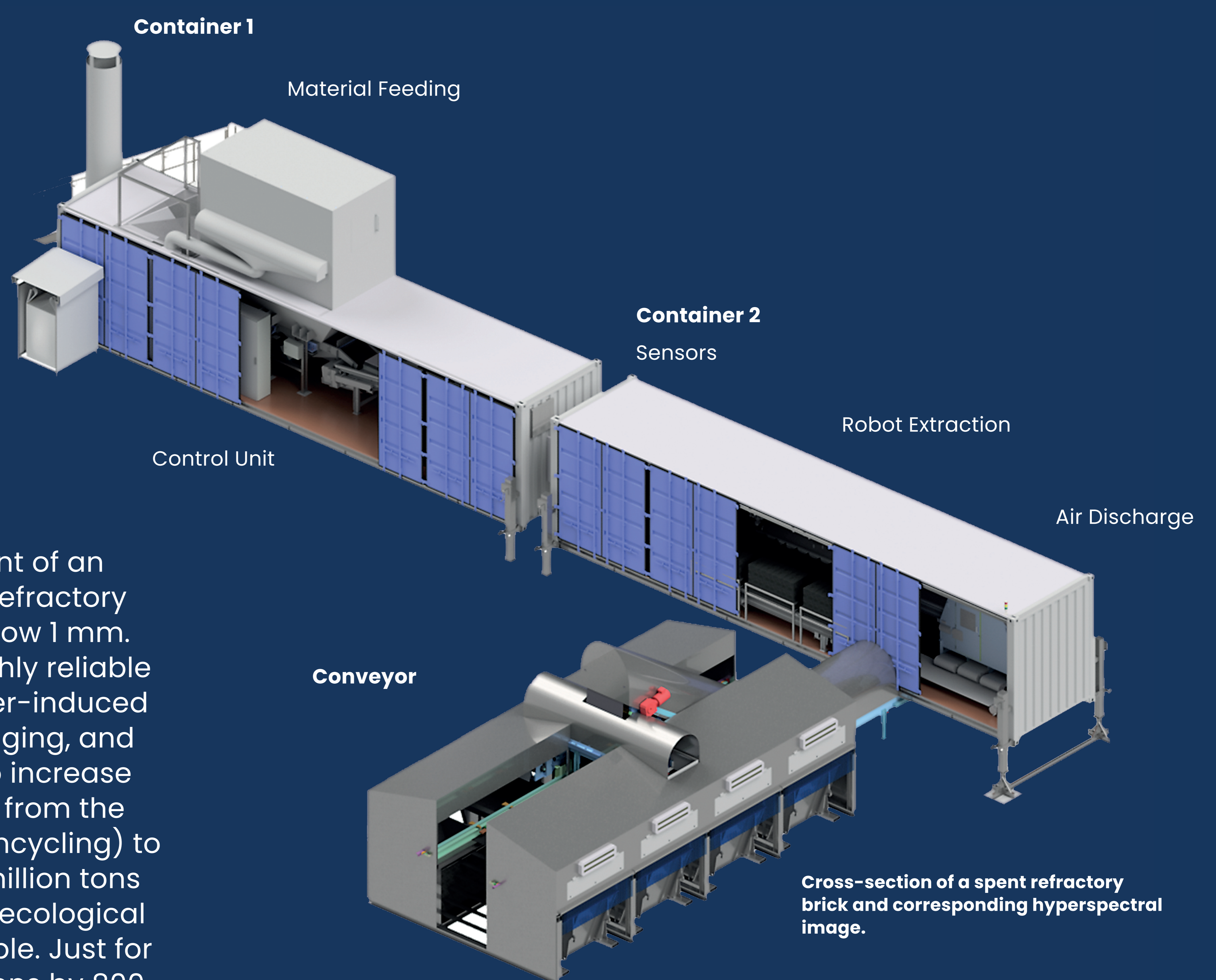
The main components of many refractory products are alumina, silica and magnesia. Magnesia for example is a mineral phase derived from the raw material magnesite. To change magnesium carbonate (magnesite) to magnesium oxide (magnesia), one needs to drive out the carbon dioxide. This is done by burning the material at high temperatures and has therefore an inevitable impact on the environment. Every industry that has a carbonate as basic raw material faces the same problem: emissions are not just coming from the burning process but already from the raw material itself when it is calcined. For this reason, the average carbon footprint of refractories in the RHI Magnesita portfolio accounts for 1.75tCO₂/t of product. Establishing a circular economy and developing an efficient recycling process for this industry is therefore essential to reduce CO₂ emissions in Europe as well as to preserve natural resources.

Theoretical recovery limit (total ~ 50%)

- Landfilling
- Downcycling
- Reuse in refractories



<https://crowdhelix.com/helixes/circular-industry/info>



Our solution

The ReSoURCE project goal is the development of an automated sensor-based system for spent refractory sorting, covering also grain sizes down to below 1 mm. If the project is successful, it will deliver a highly reliable automated sorting equipment based on laser-induced breakdown spectroscopy, hyperspectral imaging, and AI-supported data analysis. That will allow to increase the recycling of refractory breakout material from the current estimate of 7–30 % (plus 10 % of downcycling) to a total 90%. With globally approximately 14 million tons of used refractories generated annually, the ecological and societal benefits will be most considerable. Just for Europe, the team aims to reduce CO₂ emissions by 800 kilotons per year.

Project ReSoURCE is a collaborative initiative involving globally leading technology partners and the European Union. The project focuses on the green and digital transformation of refractory recycling through the innovation of the full process chain, with AI-supported multi-sensor (Laser-induced breakdown spectroscopy and hyperspectral imaging) sorting equipment as its core technology.



www.project-resource.eu



This Project is funded by the European Union's Horizon Europe Framework Programme (HORIZON), Grant Agreement Number: 101058310.