

**EU Horizon program: Horizon-CL4-2021-TWIN Transition**  
 Reducing environmental footprint, improving circularity in extractive and  
 processing value chains (IA)  
 Grant Agreement No 101058310

**WP 9: “Technology utilisation and cross-project cooperation”**  
 D9.3 – First report on networking and joint activities

# ReSoURCE

## Project website and social media channels

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Document description	The purpose of this report in task T9.3 is to present an overview of the networking and joint activities completed by the ReSoURCE consortium in the first 18 months of the project to generate enhanced collaborations with other relevant international organisations and projects on the topic of refractory materials, circular economy, raw materials, green transition.

## Document revision history

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V0.1	23/11/2023	1 <sup>st</sup> version	Valeria Pulieri
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## 1. Executive Summary

The aim of the document is to provide an overview of the first activities implemented and the general plan of the framework of joint cooperation for the coming years.

In addition, the document will provide further opportunities for clustering within the "Materials Helix" on the Crowdhelix platform, where the ReSoURCE project has also shared relevant insights with other projects dealing with additive manufacturing, advanced materials and circular economy.

The document aims to discuss the importance of clustering activities and the opportunity to realise synergies around the use of common technologies or approaches to waste management and resource recovery.

In 2023, the ReSoURCE project launched clustering activities with the following "sister" HORIZON projects:

- "Hephaestus" (Grant Agreement No. 101058696), coordinated by Rina Consulting,
- "ROTATE" (Grant Agreement No. 101058651), coordinated by ANEFA.

Both projects were funded under the Horizon-CL4-2021-TWIN Transition Programme "Reducing environmental footprint, improving circularity in extractive and processing value chains (IA)" and both started in 2022.

## 2. Introduction

Clustering activities in European funded projects are instrumental in promoting collaboration, enhancing impact, aligning with policies, fostering innovation, and creating a supportive ecosystem for research and development initiatives. These activities contribute significantly to the success and effectiveness of large-scale, multi-stakeholder projects supported by European funding programs.

The ReSoURCE project has been funded under the Horizon-CL4-2021-TWIN Transition Programme "Reducing environmental footprint, improving circularity in extractive and processing value chains (IA)" and for the clustering activities focused on the related "sister projects" ROTATE and HEPHAESTUS with which a roadmap of activities has been started with the aim of paving a common way for mutual enhancement of the project results.

In the clustering activities, consortium member Crowdhelix, in addition to the preliminary programme outlined with the sister projects, included further networking opportunities to provide visibility and strengthen collaborative relationships between the ReSoURCE project and other projects implementing new innovative solutions and new technologies for the circular economy and in particular for scientific and innovation progress on advanced and low impact materials.

## 3. Objectives

Clustering activities play a crucial role for collaborative research and innovation projects. Among the main functions to be looked at, the following are those with more relevance:

- **Collaboration and Knowledge Exchange:**  
Clustering activities facilitate collaboration and the exchange of knowledge among diverse stakeholders and clusters bring together projects with similar or complementary goals, enabling participants to share insights, methodologies, and outcomes. This collaboration helps avoid duplication of efforts and promotes synergy.
- **Enhance Impact and Visibility:**  
Through clustering it's possible to enhance the impact of individual projects by creating synergies and promoting a collective impact. By grouping related projects, there's a higher likelihood of achieving broader and more significant outcomes.  
Clustering also increases the visibility of the projects within the European research and innovation landscape, as well as on the global stage. This visibility is essential for attracting attention, potential collaborations, further funding opportunities and impact acceleration.
- **Cross-Sectoral Collaboration:**  
Clustering activities encourage collaboration across different sectors, disciplines, and industries. This cross-sectoral approach is vital for addressing complex challenges that often require interdisciplinary solutions.
- **Policy Alignment and Harmonization:**  
Clustering allows projects to align with European Union (EU) policies and priorities. By grouping projects with similar policy objectives, it becomes easier to ensure that the overall impact aligns with the strategic goals set by the EU. This alignment helps in harmonizing efforts and ensures that the funded projects collectively contribute to the overarching policy objectives of the EU.
- **Capacity Building and Networking:**  
Clustering activities provide a platform for capacity building and networking. Participants can learn from each other, share best practices, and build long-lasting connections.  
Networking opportunities created through clustering can extend beyond the duration of individual projects, fostering a sustained collaborative environment for future initiatives.
- **Impact, Innovation and Exploitation:**  
Clustering activities contribute to fostering innovation by bringing together projects that explore different facets of a technology or idea. This comprehensive approach often leads to breakthroughs and accelerates the innovation process.  
Moreover, clustering can facilitate the commercialization of research outcomes by connecting research projects with industry partners and potential end-users.

## 4. The ReSoURCE project cluster

The clustering ecosystem with other aligned projects includes some projects listed in the table below as well as other projects belonging to the network of the Crowdhelix platform: they are basically the result of networking activities coming from related helixes close to the Circular Industry Helix.

The main objective of the cluster is not only to increase the knowledge of best practices in refractory recycling, but also to promote the exchange of new ideas and R&D initiatives for the application and replication of the technologies developed in the projects of the cluster.

The three projects, HEPHAESTUS, ReSoURCE, and ROTATE, are all focused on **sustainability and efficiency in resource extraction and processing**, with an emphasis on recycling and minimizing environmental impact. They are funded by the European Union in the call HORIZON-CL4-2021-TWIN-TRANSITION-01-20 and aim to provide solutions that can be implemented across various sectors related to mining, quarrying, and metallurgy.

**HEPHAESTUS** aims to develop a set of scalable and tunable unit operations for treating multiple process wastes from primary mineral and metallurgical streams. The project focuses on **transforming waste into usable materials**, such as transforming dust into metal alloy or into mineral wool, extracting zinc from dust, and converting CO<sub>2</sub> gas into methanol or formic acid. It also includes hydrometallurgical processes to produce recyclable Fe-rich residues and recover metals from electric arc furnace (EAF) dust.

**ReSoURCE**, on the other hand, is centered on refractory recycling. Its main goal is the **green and digital transformation of refractory recycling**, using AI-supported multi-sensor sorting equipment as its core technology. This project is expected to lead to significant reductions in CO<sub>2</sub> emissions, energy consumption, and landfill capacity, as well as contribute to the digital transformation of manual processes and upskilling of the workforce.

Lastly, the **ROTATE** project is focused on providing environmental solutions to facilitate synergies between diverse industrial sectors related to mining and quarrying. Its main goals include boosting efficiency at extractive sites, enhancing circularity and waste valorization, developing sustainable processes along the mining and quarrying productive chain, and improving social awareness about the strategic importance of these sectors. The project aims to provide **profitable and replicable solutions for the mining and quarrying market** regarding cut-off grade decrease, eco-friendly extraction & processing, circularity, and social acceptance. The project also focuses on increasing efficiency and recovery rate of critical raw materials, reducing emissions, valorizing waste, and fostering site rehabilitation and biodiversity management.

The sister projects and the other projects involved so far in the clustering activities are described in the table below:

## Sister projects

Name	Description	Sector
Hephaestus	The HEPHAESTUS project explores the innovative use of robots and autonomous systems in construction, a field where the incidence of such technologies is minor to non-existent. The project aims to increase market readiness and acceptance of key developments in cable robots and curtain walls.	Robotics and autonomous systems use in the construction sector
ROTATE	ROTATE aims to provide environmental solutions that will contribute to facilitate the generation of synergies between diverse industrial sectors related to mining and quarrying.	Mining and quarrying
Convert2Green	Convert2Green will establish an Open Innovation Test Bed (OITB) to complement the European Open Innovation Ecosystem. It will complete eco-impact analysis from raw material to product-as-a-service. The project will be the first OITB that establishes the procedures and contract models for licensing of joint ownership of intellectual property rights. The project will integrate its services with the whole European innovation ecosystem.	Open Innovation Test Bed (OITB) for raw materials
BioICEP	The project aims to demonstrate a seamless sustainable pathway to a circular economy for plastics by developing an advanced energy, carbon and cost efficient biotransformation of waste plastics through a triple action depolymerisation system to meet the high market demand for bioproducts and bioplastics.	Mixed plastics degradation
Thermodust	ThermoDust aims to achieve a real breakthrough in investigating new flexible materials, for engineering a radically new material (ThermoDust) with outstanding transfer performance and suitable for Additive Manufacturing.	Thermal management for new materials

## 5. Clustering activities and tools of the ReSoURCE project

### 5.1. The Circular Industry Helix

The Circular Industry Helix serves as a virtual hub for the exchange of knowledge, networking, and open innovation opportunities. Functioning as a collaborative platform, it unites a diverse community of over 160 cross-disciplinary and cross-sector organizations from Europe and beyond. Given the all-encompassing nature of the ReSoURCE project, the Circular Industry Helix is intricately linked with the initiatives of various other Helix Communities, such as Climate, Digital, Manufacturing, Materials, and Raw Minerals.

Hosted by the Crowdhelix Platform, an expansive pan-European Open Innovation Network and Technology Platform, **the Circular Industry Helix** connects universities, research organizations, SMEs, large multinational corporations, investors, end-users, and other industry stakeholders.

This connection facilitates collaboration, innovation, and growth.

The network boasts more than 700 member organizations spanning 57 countries, with the potential to engage over 600,000 research and innovation stakeholders from its existing membership base.

The platform is supported by a tailored technology platform, AI, and machine learning tools and the network encompasses over 45 virtual thematic areas or clusters, known as "Helixes," covering diverse research and innovation fields.

The Circular Industry Helix is the place where sister projects and other clustering projects can come together, not only to create new interactions and knowledge sharing, but also to showcase the Key Exploitable Results (KERs) that can be collected in the 'Results' feature of the Helix.

In addition, networking on the platform will be complemented by a series of events, webinars and roundtables (virtual and face-to-face), which will strengthen relationships with other stakeholders and projects, bringing further opportunities for growth in terms of R&D, impact acceleration and commercialisation.

**Circular Industry**  
Circularity in heavy industry, foundries, works: analysing, processing and re-valourising refractory and specialist materials

[Leave](#)  
[View Opportunities](#)

**Background**  
A key priority area for the European area is to increase security and sustainability in the access and use of primary and secondary raw materials, with a focus on those Critical Raw Materials which have been defined as vital for EU industrial value chains and strategic sectors.

Applying technological solutions to transform industrial waste management processes in extractive and energy-intensive industries has the potential to yield rapid and significant results. The potential for impact is clear: extractive industries alone are responsible for 50% of the world's carbon emissions and more than 80% of biodiversity loss. For energy intensive industries, in most cases the primary raw material production has the highest impact on a product's carbon footprint. Safe and efficient circular process strategies are needed.

Open data and modelling, standardisation, demonstration, industrial symbiosis and cross-sectoral cooperation are required to de-risk and spread the benefits of research and innovation advances.

**Key Project: ReSoURCE**  
Refractory products are indispensable for all high-temperature processes above 1200°C, such as steel, cement, glass, and nonferrous metal production. Since the refractory lining of a furnace or vessel is designed for a specific material and application, multiple refractory product types, with different chemistries, are combined to achieve the required performance. This poses major challenges for reuse, as the chemical composition of the recycled material is critical if it is to be used again in a refractory.

The ReSoURCE project goal is a comprehensive, advanced sensor-based system for refractory waste sorting and powder handling. Key technologies include LIBS and hyperspectral imaging. If the project is successful, it will enable the robust engineering of an automated sorting equipment that will increase the recycling of refractory breakout material from the current estimate of 7-30% (plus 10% of downcycling) to up to 90%. With approximately 28 million tons of used refractory bricks generated annually, the ecological and societal benefits will be considerable.

**Circular Industry Helix**  
The Circular Industry Helix is an international Open Innovation community of specialists and stakeholders, including those from the domains of materials science, process engineering, mineral waste recycling and industrial innovation, as well as relevant policy makers, standardisation agents and citizen interest groups. The Helix was initiated to support in validation and steering of the ReSoURCE project, and to accelerate translation of the ReSoURCE project results into cross-sectoral impact for the European economy and its citizens.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the granting authority. Neither the European Union nor the granting authority can be held responsible for them. This project has received funding from the European Union's Horizon 2020 or Horizon Europe research and innovation programme under grant agreement No 101058310.

**Seeking collaborators for Circular Industry projects?**  
Post a new Opportunity in this Helix  
[Create Post](#)

345 Experts  
169 Organisations  
45 Countries

**Dr. Valeria Pulieri**  
Helix Manager  
[Message](#)

"RHI Magnesita are proud to lead this community on circularity in energy-intensive industries including refractories. Industrial-scale waste streams represent significant opportunity to recover value by application of novel technologies and processes."

**Alexander Leitner**  
Helix Leader

**Organisations**  
RHI Magnesita  
Leading Organisation

**Projects**  
ReSoURCE  
Key Project

**Resources**

## 5.2. The events and other activities

Organising and participating in events for clustering activities is a very fundamental element that makes it possible to promote collaboration, knowledge exchange and synergy between different projects and stakeholders. For the purposes of clustering activities, the planning of networking events with projects related to the field are key moments for the development of a robust and interconnected cluster, where it's possible to activate the transfer of knowledge between experts and researchers and also business-oriented actors, enriching their understanding and expertise in the respective field.

The numerous events (more than 20 per year) organised by the partner Crowdhelix and involving the platform's stakeholders (more than 700 members in total) offer a wide range of opportunities to promote the common objectives of the clustered projects and to increase their visibility and recognition. Crowdhelix's strategic approach is to trigger new collaborations in different but related fields, stimulating cross-participation and interdisciplinary cooperation.

In total, Crowdhelix and its partner SINTEF are expected to participate in five events throughout the duration of the project with the projects funded in the same call.

A general plan for 2024 will be discussed in a meeting with the sister projects ROTATE and HEPHAESTUS, scheduled before the end of 2023, and the ReSoURCE consortium will coordinate the organisation of a joint "TWIN GREEN AND DIGITAL kick-off event" (the title may change) with the above mentioned sister projects and other funded projects in the first quarter of 2024.

The aim of the event will be to showcase innovative solutions and practices, to promote e-promoting and to mobilise resources.

## 6. The clustering activities implemented at M18

### 6.1. The meetings with the sister project ROTATE and HEPHAESTUS

Two virtual meetings with the sister projects were held in April and June 2023.

The official start of networking activities with the sister projects took place during the cluster event with the ROTATE and HEPHAESTUS projects (HORIZON-CL4-2021-TWIN-TRANSITION-01-20) **on the 20<sup>th</sup> April 2023** (see the agenda of the event - Annex 1). Contacts established during this event provided to address the way for an update meeting in June and the idea to collaborate to a series of events and initiatives, also benefitting from the Crowdhelix network.

The project advisor Ms Susana Xará from HaDEA organised this first meeting with the participation of 20 people from the consortia of the ReSoURCE, ROTATE and HEPHAESTUS projects and Daniel Cios, Policy Officer at DG Grow.

The meeting provided an opportunity to officially launch the cooperation between the projects and to exchange initial key information on activities and objectives, and to jointly identify the main points of cooperation to be taken forward.

The main points of discussion that emerged from the meeting were:

- To give visibility to the technologies of the projects and work together to bridge the technology gap faced by the projects;
- To address the social aspects of industrial material waste recycling by presenting the pilot activities to the community and providing an understanding of how these wastes impact on society;
- To focus on knowledge transfer methodology, including participation in conferences and events.

The three projects agreed to discuss further actions at a second meeting on **1<sup>st</sup> June 2023**.

The points of discussion were:

- Identifying common themes and issues;
- Sharing common knowledge and tips for project exploitation;
- The Circular Industry Helix to support networking and project impact;
- A roadmap of events to participate in together.



## 6.2. The presentation of ROTATE at the Crowdhelix Research and Technology Organizations (RTOs) event in Barcelona

On the 23rd and 24th of October, Crowdhelix organised the annual "RTO & Corporate Members' Event" in Barcelona, in collaboration with the Leitat Technological Centre.

The event was dedicated to Open Innovation, focusing on the exchange of technologies and research results between members of academia, companies and investors.



**Crowdhelix** **LEITAT**  
managing technologies

**AGENDA**  
Crowdhelix Annual RTO & Corporate Members' Event  
Tuesday, 24th of October

08:30	<b>Coffee &amp; Networking</b>
09:00	<b>DFactory Tour</b>
10:00	<b>Welcome to Day 2</b> Michael Browne - CEO, Crowdhelix
10:05	<b>Open Innovation - Bridging the Gap Between RTOs and Businesses</b> Xavier Marcet - Founder and President at Lead To Change, President of the Institute for Advanced Architecture of Catalonia
10:50	<b>Open Innovation Driving Industry 4.0 and the Digitalisation of Manufacturing and Industrial Processes</b> Lorena Viladés Santos - Project Director, Asociación Nacional de Empresarios Fabricantes de Áridos, ANEFA
11:10	<b>Using Open Innovation to Deliver Venture Building Success</b> David Domingo - Business Development Director, The Collider
11:40	<b>Refreshment Break &amp; Networking</b>
12:10	<b>DFactory Residents - Open Innovation Examples</b> Fujitsu
13:10	<b>Closing remarks and Close of Crowdhelix RTO Event 2023</b> Michael Browne - CEO, Crowdhelix
13:25	<b>Lunch &amp; Networking</b>

The aim of the event was to promote Open Innovation to generate new partnerships and value chains internationally and cross-sectorally, providing an opportunity to foster collaboration with research organisations and companies from across Europe.

The event was hosted at DFactory and was attended by around 100 participants.

The project "ROTATE" was presented by Lorena Viladés Santos, from the Asociación Nacional de Empresarios Fabricantes de Áridos – ANEFA and she discussed about the ROTATE and the DIGIECOQUARRY projects during the session "How Europe is promoting the sustainable, circular and digital management of raw materials."

The session encouraged RTOs and investors to engage in a discussion on how new technologies are changing the scenario for more efficient approaches to raw material recycling.

Figure 1 - Agenda of the 2nd day of the Crowdhelix RTOs and Corporates event

**SPEAKER ANNOUNCED**  
**Crowdhelix Annual RTO & Corporate Members' Event**  
 Powering collaboration through open innovation

**REGISTER TODAY**

**Crowdhelix**  
**LEITAT**  
Building Technologies

23-24 October 2023

DFactory Barcelona, Spain



**Top speaker, Lorena Viladés Santos presents:**  
 'How Europe is promoting the sustainable, circular and digital management of raw materials'

**Lorena Viladés Santos**, Project Manager en Asociación Nacional de Empresarios Fabricantes de Áridos - ANEFA



Figure 2 - LinkedIn promotion on the Crowdhelix profile

**Our two EU-funded innovation projects** ANEFA



	 DEQ	 R8
Name	DIGIECOQUARRY Innovative Digital Sustainable Aggregates Systems	ROTATE Circular Ecological Essential & Critical Raw Materials
Programme	Horizon 2020	Horizon Europe
Topic	Raw materials innovation actions: exploration and Earth observation in support of sustainable mining	Reducing environmental footprint, improving circularity in extractive and processing value chains
Funding	13 000 000 €	11 500 000 €
Duration	4 years June 2021 – June 2025	4 years September 2022 – September 2026
Partners	25	21

Figure 3 - Presentation of the EU projects Rotate and Digital EcoQuarry

### 6.3. The “Materials Helix event”, Dublin, 22-23 November 2023

The Material Helix Event is a networking event organized by Crowdhelix in the framework of the annual activities implemented for the knowledge exchange, new partnerships and open innovation opportunities among the digital communities of the Crowdhelix platform.

The event, organized in collaboration with AMBER, Advanced Materials and Bioengineering Research Centre in Dublin, was dedicated to fostering collaboration and bring together coordinators, stakeholders and partners dealing with the new materials field and targeting specific Horizon Europe calls currently open.

The aim of the event was to provide opportunity to network with like-minded professionals and explore exciting opportunities related to some of the Horizon Europe calls in Cluster 4 and Cluster 6, such as:

- Twin Green and Digital Transition,
- Digital and emerging technologies for competitiveness and fit for the Green Deal,
- Circular economy and bioeconomy sectors,
- Resilient value chains
- Tools and technologies for a healthy society



The event, attended by 60 participants, was held in Dublin on the 22 and 23 November (see the agenda of the event in Annex 2) and hosted at the Trinity College Dublin (Paccar Studios, Naughton Institute).

The clustering session organized by Crowdhelix in the form of a panel discussion was: **“Materials Innovation for Circular Economy”**

The moderator of the session was Dr Vincent Jamier - Director of international projects office at Leitat Technological Center and n.4 panel Members took part to the session:

- for the ReSoURCE project: Dr Chandana Ratnayake, Chief Scientist at SINTEF Industry
- for the Convert2Green project: Dr Colin Keogh, Senior Innovation & Commercialisation Consultant, Inlecom Commercial Pathways
- for the ThermoDust project: Dr Rocco Lupoi, Co-Director, SFI-EPSC Centre for Doctoral Training in Advanced Characterization of Materials
- for the BioICEP project: Dr Brennan Fournet, Materials Research Institute’s Assistant Director, Technological University of the Shannon



*Figure 4 - A snapshot of the EU projects Discussion*

The panel discussion focused on the description of the four projects mentioned above (including, of course, the ReSoURCE project) and technological breakthroughs to promote material sustainability within the circular economy framework, highlighting several promising innovations.

Waste valorisation, downcycling and upcycling were emphasised, promoting the idea of waste as a valuable resource.

The development of sensor-based sorting technologies and related digital technologies (artificial intelligence, machine learning, advanced modelling, digital twinning, blockchain, etc.) were discussed to improve feedstock stability, enable better tracking and verification of material sources and production processes, and thus promote efficient recycling.

The use of 3D printing for sustainable manufacturing was explored, with a focus on additive manufacturing to reduce material waste. Biodegradable materials, in particular innovations in bioplastics derived from renewable resources, were recognised for their potential to reduce the environmental impact of traditional plastics.

Circular design principles, such as designing for disassembly, were discussed to enable easy separation and recycling of components, contributing to more efficient material reuse.

The panel discussion focused on optimising collaboration between industry, research institutions and government bodies to accelerate materials innovation in support of a circular economy.

Effective strategies for cross-sector collaboration were highlighted, including joint research initiatives such as the European Union's funding programmes (e.g. 'Horizon 2020', 'Horizon Europe', 'Made in Europe', etc.), which support collaborative projects involving industry, research institutions and government bodies, focusing on sustainable materials, recycling technologies and circular design principles.

The discussion covered a wide range of approaches such as open innovation platforms, collaborative platforms, public-private partnerships, technology roadmaps, incentives and funding schemes, cross-sector working groups, policy development and advocacy, knowledge sharing, capacity building and standardisation efforts.

In exploring how companies and researchers can maintain a competitive edge in materials science trends for continuous innovation and environmental improvement, panellists underlined the importance of staying ahead in the field. Key strategies highlighted included prioritising continuous learning and professional development, fostering networking and collaboration, engaging in technology scouting and open innovation, adopting a cross-disciplinary approach and embracing emerging technologies. The discussion underlined the importance of proactively staying informed, emphasising that staying ahead of the curve allows companies and researchers to drive innovation and improve their environmental impact. Overall, the panellists emphasised the proactive integration of emerging trends in materials science as a key element for success in both innovation and environmental sustainability within the business and research sectors.

Chandana focused on ReSoURCE and the role of SINTEF describing the use of testing infrastructure in particulate materials, powders, and bulk solids. These elements play a crucial role in various unit operations within the process industry, impacting process efficiency, resource utilization, product yield, emissions, and more.

In the pitch presentations session, Dr Chandana Ratnayake - SINTEF presented the ReSoURCE poster (see Annex 3), together with other posters presented by:

- Evelyn Moreno Calvo - Leitao Technological Center
- Vincent Jamier - Leitao Technological Center
- Hossein Rajabinejad - CRANN Institute, Trinity College Dublin



Figure 5 – Dr Chandana Ratnayake (SINTEF) and Dr Karen Galwin (CrowdHelix) at the poster session

## 7. Next steps and the clustering roadmap

The main steps identified as upcoming cluster activities are:

- Create a joint short video to raise awareness of the importance of improving the sustainability of extractive activities.
- Strengthen the exchange and coordinated communication activities between the communication managers of the respective projects and identify joint activities for the promotion of the projects and the production of a short video with common elements.
- Include sister projects in each other's websites.

Additionally, conferences of interest that could be considered for the presentation of project results were identified:

- XII European Congress of Refractory Raw Materials, Machinery & Installation, Sevilla, 13-14 March 2024
- Global Conference on Waste Management and Recycling, Berlin, 28-29 March 2024
- Mineral Recycling Forum, Dubrovnik, 22-24 April 2024
- International Colloquium on Refractories ICR<sup>®</sup>, 18-19 September 2024
- EU raw materials week, November 2024

## 8. Conclusions

The collaboration with the sister projects ROTATE and HEPHAESTUS has started successfully and we've already designed a clustering roadmap, which will be finalised in the first weeks of 2024, in order to properly plan the collaborative activities ahead and at the same time provide as much coverage as possible to the 3 projects, thus increasing the stakeholder audience and stimulating the impact of the project's main exploitable results.

Collaboration in science and innovation is the engine that can boost and spark intuitions, groundbreaking solutions and cross-collaborative ideas that can flourish through contamination of different backgrounds and knowledge exchange.

For this reason, the positive results achieved by sistering activities in the strict sense, combined with the cross-contamination of different projects in networking events with different purposes, seems to be a good recipe to follow in the coming months and years in order to maximise the impact of the ReSoURCE project.

The clustering activities will continue with the aim of promoting the impact of the project's KERs and as well supporting a fruitful platform of new ideas and innovative solutions that can increase resource and energy efficiency and contribute to the European Green Deal by achieving the goals of climate neutrality, circularity, zero pollution and system protection, sustainable use and restoration.

## Annex 1



EUROPEAN HEALTH AND DIGITAL EXECUTIVE  
AGENCY (HADEA)

Digital, Industry and Space  
**Industry**

### CLUSTER EVENT

#### **HORIZON-CL4-2021-TWIN-TRANSITION-01-20** **REDUCING ENVIRONMENTAL FOOTPRINT, IMPROVING CIRCULARITY IN** **EXTRACTIVE AND PROCESSING VALUE CHAINS**

**20 APRIL 2023**

### AGENDA

- 14:30 Welcome and introductory presentation of the participating coordinators**  
*Susana Xará* - Project Adviser, **HaDEA**  
*tbd* - Policy Officer, **DG RTD**  
*Cesar LUACES FRADES* – Project **ROTATE** || ASOCIACION NACIONAL DE EMPRESARIOS FABRICANTES DE ARIDOS || Spain  
*Enrico SALVATORE* – Project **HEPHAESTUS** || RINA CONSULTING SPA || Italy  
*Saranya AZHAARUDEEN* – Project **ReSoURCE** || RHI MAGNESITA GMBH || Austria
- 14:45 Introduction of the other participants from each project**
- 15:00 Presentation of the projects (max 20 min), followed by a Q&A session for each**
- 10:00 **ROTATE** - *Project Coordinator & others*
- 10:30 **HEPHAESTUS** - *Project Coordinator & others*
- 11:00 **ReSoURCE** - *Project Coordinator & others*
- 16:30 Horizon Results Booster** – *Susana Xará*
- 16:45 Discussion about possible synergies and next steps** - *all*
- 17:15 Conclusion** - *Susana Xará*



## Projects



### **ROTATE - CIRCULAR ECOLOGICAL ESSENTIAL & CRITICAL RAW MATERIALS**

**Start date:** 1 September 2022 **End date:** 31 August 2026

**Coordinated by:** ASOCIACION NACIONAL DE EMPRESARIOS FABRICANTES DE ARIDOS, Spain

**Partners:**

ASOCIACION EMPRESARIAL DE INVESTIGACION CENTRO TECNOLOGICO DEL MARMOL,PIEDRA Y MATERIALES, Spain

CENTRE INTERPROFESSIONNEL TECHNIQUE D'ETUDES DE LA POLLUTION ATMOSPHERIQUE ASSOCIATION, France

CHALMERS TEKNISKA HOGSKOLA AB, Sweden

METSO OUTOTEC FINLAND OY, Finland

UNIVERSIDAD POLITECNICA DE MADRID, Spain

HORMISORIA SL, Spain

TEKNOLOGISK INSTITUT, Denmark

UNIVERSITE DE LIEGE, Belgium

INVESTORNET-GATE2GROWTH APS, Denmark

CANTERAS INDUSTRIALES SL, Spain

ADVANCED MINERAL PROCESSING SL, Spain

AGREPOR AGREGADOS -EXTRACCAO DE INERTES, SA, Portugal

ROCTIM AB, Sweden

FUNDACION TORMES-EB, Spain

AKKA HIGH TECH, France

AKKA I&S, France

LAFARGEHOLCIM GRANULATS, France

VELDE INDUSTRI AS, Norway

VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V., Belgium

ZABALA INNOVATION CONSULTING, S.A., Spain

MPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE, United Kingdom



**HEPHAESTUS - Heavy and Extractive industry wastes PHAsing out through ESG Tailings  
Upcycling Synergy**

**Start date:** 1 June 2022      **End date:** 30 November 2026

**Coordinated by:** RINA CONSULTING SPA, Italy

**Partners:**

RINA CONSULTING - CENTRO SVILUPPO MATERIALI SPA, Italy

ETHNICON METSOVION POLYTECHNION, Greece

GENIKI METALLEUTIKI KAI METALLOURGIKI ANONIMI ETAIRIA - (GENERAL  
MINING AND METALLURGICAL COMPANY S.A.), Greece

ADVANCED MINERALS AND RECYCLING INDUSTRIAL SOLUTIONS IKE, Greece

MYTILINAIOS ANONIMI ETAIREIA, Greece

KATHOLIEKE UNIVERSITEIT LEUVEN, Belgium

AIT EUROPA ENGINEERING SRL, Italy

ENGITEC TECHNOLOGIES SPA, Italy

ACCIAI SPECIALI TERNI SPA, Italy

# ReSoURCE

**ReSoURCE - Refractory Sorting Using Revolutionising Classification Equipment**

**Start date:** 1 June 2022

**End date:** 30 November 2025

**Coordinated by:** RHI MAGNESITA GMBH, Austria

**Partners:**

LSA-LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH

INNOLAS LASER GMBH

NORSK ELEKTRO OPTIKK AS

FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN  
FORSCHUNG EV

MONTANUNIVERSITAET LEOBEN

SINTEF AS

CROWDHELIX LIMITED

CENTRE FOR PROCESS INNOVATION LIMITED LBG

## Participants

### ROTATE:

Cesar Luaces Frades	<a href="mailto:cluacesfrades@aridos.org">cluacesfrades@aridos.org</a>	
Leire Martiarena	<a href="mailto:LMARTIARENA@zabala.es">LMARTIARENA@zabala.es</a>	Social aspects leader
Angeliki Karapiperi	<a href="mailto:a.karapiperi@upm.es">a.karapiperi@upm.es</a>	Clustering activities leader
Lorena Viladés	<a href="mailto:medioambiente@aridos.org">medioambiente@aridos.org</a>	Dissemination and communication leader and coordination team member
Paulo Romero	<a href="mailto:proyectos@aridos.org">proyectos@aridos.org</a>	Coordination team member

### HEPHAESTUS:

Andrea TROPEOLI	<a href="mailto:Andrea.Tropeoli@ext.rina.org">Andrea.Tropeoli@ext.rina.org</a>	CSM
Loredana Di SANTE	<a href="mailto:loredana.disante@rina.org">loredana.disante@rina.org</a>	CSM
Marco SIMONI	<a href="mailto:marco.simoni@rina.org">marco.simoni@rina.org</a>	CSM
Giorgian Dinu	<a href="mailto:giorgian.dinu@kuleuven.be">giorgian.dinu@kuleuven.be</a>	KUL
Thomas Abo Atia	<a href="mailto:thomas.aboatia@kuleuven.be">thomas.aboatia@kuleuven.be</a>	KUL
Dimitrios Sparis	<a href="mailto:dimsparis@gmail.com">dimsparis@gmail.com</a>	NTUA
Enrico Salvatore	<a href="mailto:enrico.salvatore@rina.org">enrico.salvatore@rina.org</a>	RINA
Fabio CALZIA	<a href="mailto:fabio.calzia@rina.org">fabio.calzia@rina.org</a>	RINA
Lorenzo DALL'ORO	<a href="mailto:lorenzo.dalloro@rina.org">lorenzo.dalloro@rina.org</a>	RINA

### ReSoURCE:

Saranya Azhaarudeen (Project coordinator, RHIM) - <a href="mailto:Saranya.Azhaarudeen@RHIMagnesita.com">Saranya.Azhaarudeen@RHIMagnesita.com</a>
Alexander Leitner (Technical coordinator, RHIM) - <a href="mailto:Alexander.Leitner@RHIMagnesita.com">Alexander.Leitner@RHIMagnesita.com</a>
Carmen Loew (Dissemination manager, RHIM) - <a href="mailto:Carmen.Loew@rhimagnesita.com">Carmen.Loew@rhimagnesita.com</a>
Valeria Pulieri (Exploitation manager, Crowdhelix) - <a href="mailto:valeria.pulieri@crowdhelix.com">valeria.pulieri@crowdhelix.com</a>
Akhilesh Srivastava (Dissemination & exploitation, SINTEF) - <a href="mailto:akhilesh.srivastava@sintef.no">akhilesh.srivastava@sintef.no</a>
Karl Friedrich (Academic activities, Montanuniversität Leoben) - <a href="mailto:karl.friedrich@unileoben.ac.at">karl.friedrich@unileoben.ac.at</a>

## Annex 2



### Material Helix Event

Wednesday 22nd November 2023

Paccar Studios, Naughton Institute, Trinity College Dublin

- 13:00      **Registration and refreshments**
- 13:30      **Welcome address**  
Prof. Sinéad Ryan - Dean of Research
- 13:40      **Introduction to AMBER and Materials Helix**  
Dr Lorraine Byrne, Executive Director
- 13:55      **CrowdHelix Platform, Material Helix for Impact Acceleration and Future Collaboration**  
Dr. Karen Galvin, Head of Network Engagement, CrowdHelix
- 14:10      **Session by the Irish National Contact Points:**
- Dr Sergio Fernandez-Ceballos, National Delegate and National Contact Point for Horizon Europe Cluster 4 - Digital, Industry and Space
  - Mark Sweeney, National Contact Point for Horizon Europe Cluster 5 - Climate, Energy and Mobility, Cluster 6 - Food, bioeconomy, natural resources, agriculture and environment, and NCP for Climate Adaptation Mission
- 14:50      **Demystifying Coordination - Panel Discussion**  
**Moderator:** Deirdre Caden, International Engagement Manager, AMBER
- Panel Members:**
- Mark Mitchison, Assistant Professor in Quantum Science - Coordinator of ASPECTS project, Trinity College Dublin
  - Parvaneh Mokarian, Research Associate Professor in School of Chemistry and Principal Investigator at (SFI) Science Foundation Ireland Advanced Materials and BioEngineering Research Centre (AMBER), Trinity College Dublin
  - Dr. Sibiu Chullanayil Padmanabhan, Research Fellow, Trinity College Dublin
- 15:30      **Refreshment break**



- 15:50 Economy**      **EU Projects panel discussion: Materials Innovation For Circular Economy**
- Moderator:** Dr Vincent Jamier - Director of international projects office at Leitac Technological Center
- Panel Members:**
- ReSoURCE project - Chandana Ratnayake, Chief Scientist, SINTEF Industry
  - Convert2Green project - Colin Keogh, Senior Innovation & Commercialisation Consultant, Inlecom Commercial Pathways
  - ThermoDust project - Rocco Lupoi, Co-Director, SFI-EPSC Centre for Doctoral Training in Advanced Characterization of Materials
  - BioICEP project - Dr Brennan Fournet, Materials Research Institute's Assistant Director, Technological University of the Shannon
- 16:35**      **Pitch Presentations from Coordinators**
- Evelyn Moreno Calvo - Leitac Technological Center
  - Chandana Ratnayake - SINTEF
  - Vincent Jamier - Leitac Technological Center
  - Hossein Rajabinejad - CRANN Institute, Trinity College Dublin
- 16:55**      **Posters session**
- 17:30**      **Networking - Drink Reception**
- 19:30**      **Networking dinner**



**Crowdhelix**  
COLLABORATION INTELLIGENCE

## **Material Helix Event**

**Thursday 23rd November 2023**

**Paccar Studios, Naughton Institute, Trinity College Dublin**

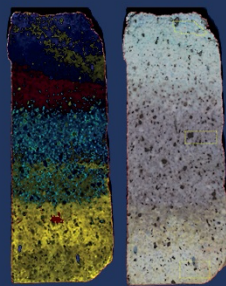
- 09:00**      **AMBER Tour at the Advanced Microscopy Laboratory and the Additive Research Laboratory**
- 10:30**      **Welcome & Recap of Day 1**
- 10:40**      **Impact acceleration**  
Dr. Emma Siddall, Coordinator of Horizon Europe Pillar 2 supports and a senior Horizon Europe impact specialist in the central Research Development Office in Trinity College Dublin
- 11:00**      **Advanced Materials Initiative**  
Lars Montelius, Professor, Lund University
- 11:30**      **Intro to Parallel Session**
- 11:40**      **Parallel Break - working on Horizon Europe Calls**
- 13:00**      **Next steps - Presentations and feedback from breakout sessions**
- 13:20**      **Closing remarks**
- 13:30**      **Posters & Networking Lunch**

# Annex 3



# ReSoURCE

## Refractory Sorting Using Revolutionizing Classification Equipment



### Recycling of Refractory Products

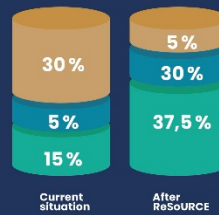
Refractory products are indispensable for all high-temperature processes above 1200°C and are needed to produce materials such as steel, cement, glass, and nonferrous metals. Since the needs for these production processes are different, RHI Magnesita supplies multiple refractory product types, each of 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 & CO<sub>2</sub>-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 1.75 tCO<sub>2</sub>/t of product. Establishing a circular economy and developing an efficient recycling process for this industry is therefore essential to reduce CO<sub>2</sub> emissions in Europe as well as to preserve natural resources.

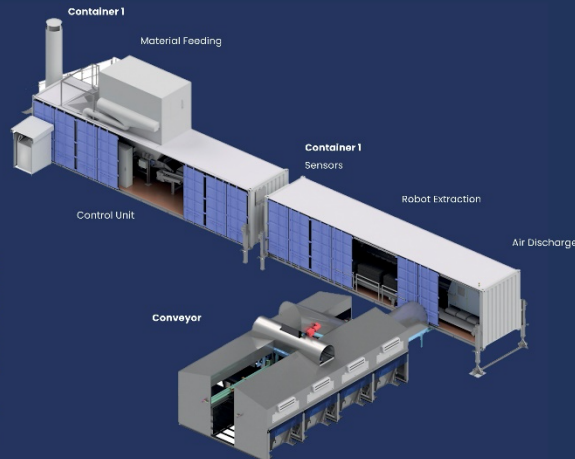
Theoretical recovery limit (total ~ 50%)

- Landfilling
- Downcycling
- Reuse in refractories



### Our solution

The ReSoURCE project goal is the development of an automated sensor-based system for size sorting covering also grain sizes down to 10 µm. If the project is successful, it will deliver an automated sorting equipment that will allow the recycling of refractory breakout material with a current estimate of 7-30% (plus 10% of dust) of a total 90%. With globally approximately 1.5 million tons of used refractories generated annually, and societal benefits will be most significant for Europe, the team aims to reduce CO<sub>2</sub> emissions by 800 kilo tons 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. The project is funded by the EU's Horizon Europe Framework Programme, under the Grant Agreement Number: 101058310 ([www.project-resource.eu](http://www.project-resource.eu)).



[www.project-resource.eu](http://www.project-resource.eu)



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