EU Horizon program: Horizon-CL4-2021-TWIN Transition

Reducing environmental footprint, improving circularity in extractive and processing value chains (IA)

Refractory Sorting Using Revolutionizing Classification Equipment

Grant Agreement No 101058310

WP 9: "Technology utilisation and cross-project cooperation"

D9.4 –Second report on networking and joint activities

ReSoURCE

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Document description	The purpose of this report in task T9.4 is to present an overview of the networking and joint activities completed by the ReSoURCE consortium by the 30th month of the project to generate enhanced collaborations with other relevant international organizations and projects on the topic of refractory materials, circular economy, raw materials and green transition.

Document revision history

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		Modification reason	Author
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V1.0	29/11/2024	Final version for submission to EC	Hamza Cinar

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Executive Summary

The work reported in this deliverable refers to ReSoURCE project (Resource - Refractory Sorting Using Revolutionizing Classification Equipment) in the framework of WP9 – Technology utilization and cross-project collaboration.

The aim of the document is to provide an overview of the activities implemented by 30th month of the project and the general plan of the framework of joint cooperation for the coming years. The document covers further opportunities for clustering within the "Circular Industry Helix" on the Crowdhelix platform, its up-to-date status, where the ReSoURCE project has been sharing relevant insights and results along with other projects dealing with additive manufacturing, advanced materials and circular economy. The document also aims to discuss the importance of clustering activities and the opportunity to realize synergies around the use of common technologies or approaches to waste management and resource recovery.

Collaborations with the sister projects ""Hephaestus" (Grant Agreement No. 101058696), coordinated by Rina Consulting," and " ROTATE" (Grant Agreement No. 101058651), coordinated by ANEFA," both funded by HORIZON Europe Programme and part of the Horizon-CL4-2021-TWIN Transition Programme, are also described in the report. The goal of these partnerships is to improve value chains' environmental impact and circularity. The report also highlights potential clustering prospects in the future, with a focus on sustainability and innovation. Furthermore, the clustering efforts have been expanded to include the RAWMINA project (https://rawmina.eu/) as well. By encouraging the sharing of knowledge and creative ideas, these collaborations made it possible to work together to advance sustainability and increase the project's efficiency. Future clustering opportunities are also highlighted in this report, with a particular emphasis on innovation and sustainability. One of which is the established communication with IS2H4C project in order to implement joint activities by early 2025.

1. 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.

2. 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.

3. 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_2 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_2 emissions, energy consumption, and landfill capacity, as well as contribute to the digital transformation of manual processes and upskilling of the workforce.

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. In addition to the sister projects funded under the same call, the two projects "BioICEP" and "Thermodust" equally considered as a part of the ReSoURCE Project Cluster:

BioICEP: Through creative waste plastic biotransformation, this project aims to advance a circular economy model for plastics. In order to meet the huge demand for these sustainable materials, BioICEP is working to develop a triple-action depolymerization system that will turn waste plastics into useful bioproducts and bioplastics.

Thermodust: By developing a unique material with improved transfer performance, ThermoDust aims to transform thermal management in new materials. This initiative, which is intended for Additive Manufacturing, is a noteworthy development in material science with potential uses in a number of industries that demand effective thermal control. All together, these initiatives foster the cluster's emphasis on innovation and sustainability by utilizing state-of-the-art research and development to address urgent environmental issues in several industries.

The sister projects and the other projects involved as a part of the ReSoURCE cluster are given 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

Figure 1 – ReSoURCE Project's Sister Projects

In addition to the ReSoURCE‘s defined sister projects and related other clustering projects, a stakeholder mapping were put in practice in order to find out and analyse possible collaboration opportunities througout and after the project. Within the stakeholder mapping, a wide variety of possible collaborators were defined:

Projects like DOT, Plastfri, and REVaMP focus on environmentally friendly production methods and technology retrofits. SWIRup is an image sensor project funded by the European Commission that could help the commercial and earth observation sectors with its hyperspectral imaging applications. NanoQi is concerned with the characterization of nanomaterials for advanced manufacturing, which is pertinent to industries such as coatings and solar cells. The goal of illuMINEation is to digitize mining operations in order to improve environmental performance, efficiency, and safety. Also, companies which promote production technology in the European manufacturing sector, such as EFFRA has been listed among possible collaboration opportunities. The other initiatives, Clean Steel Partnership and the Processes4Planet Co-programmed Partnership are to revolutionize the European steel sector and attain climate neutrality and circularity by 2050. Through training, research, and teaching programs, Cerame-Unie and ECREF represent and assist the ceramic and refractory sectors, respectively. Vesuvius, Imerys, and Sidenor are examples of Early Adopters and End Users who are well-positioned to adopt and profit from cutting-edge technology in industries including high-temperature processes, steel production, and refractory materials. Suppliers and research facilities that specialize in material sciences, especially refractory solutions and laser processing, include Refratechnik and the University of Malaga UMA Laser Lab are also considered as possible collaborators for joint activities or initivatives who could either become direct beneficiaries of the ReSoURCE project results or supporting intitiatives to foster the dissemiantion and exploitation.

4. Clustering activities and tools of the ReSoURCE project

4.1. 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.

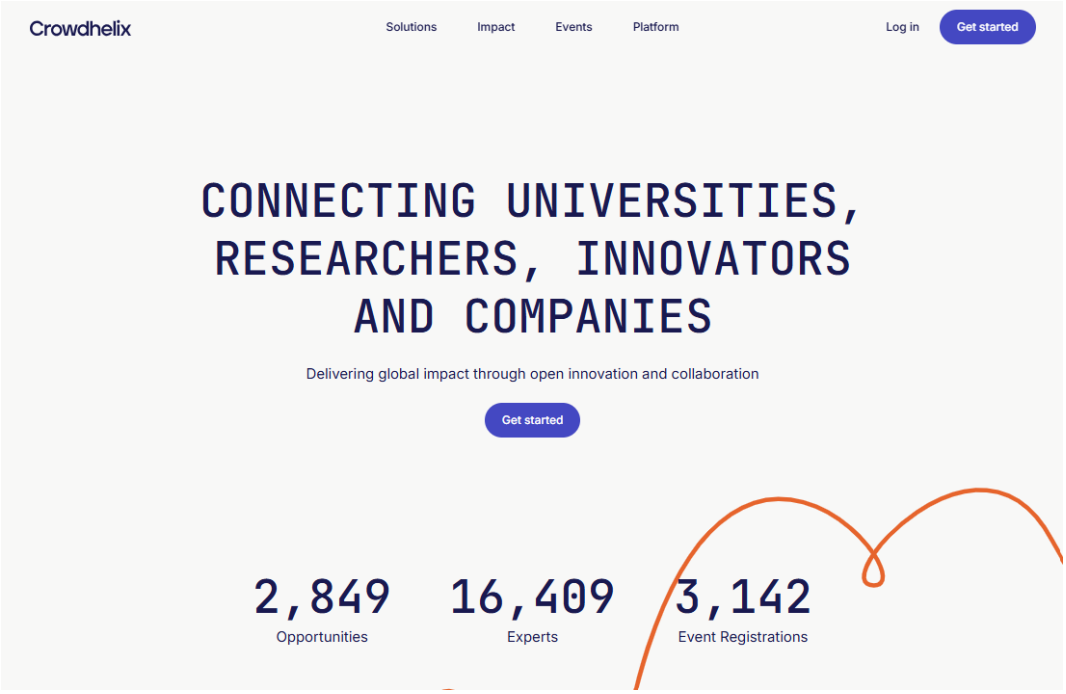


Figure 2 – Crowdhelix Platform

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.

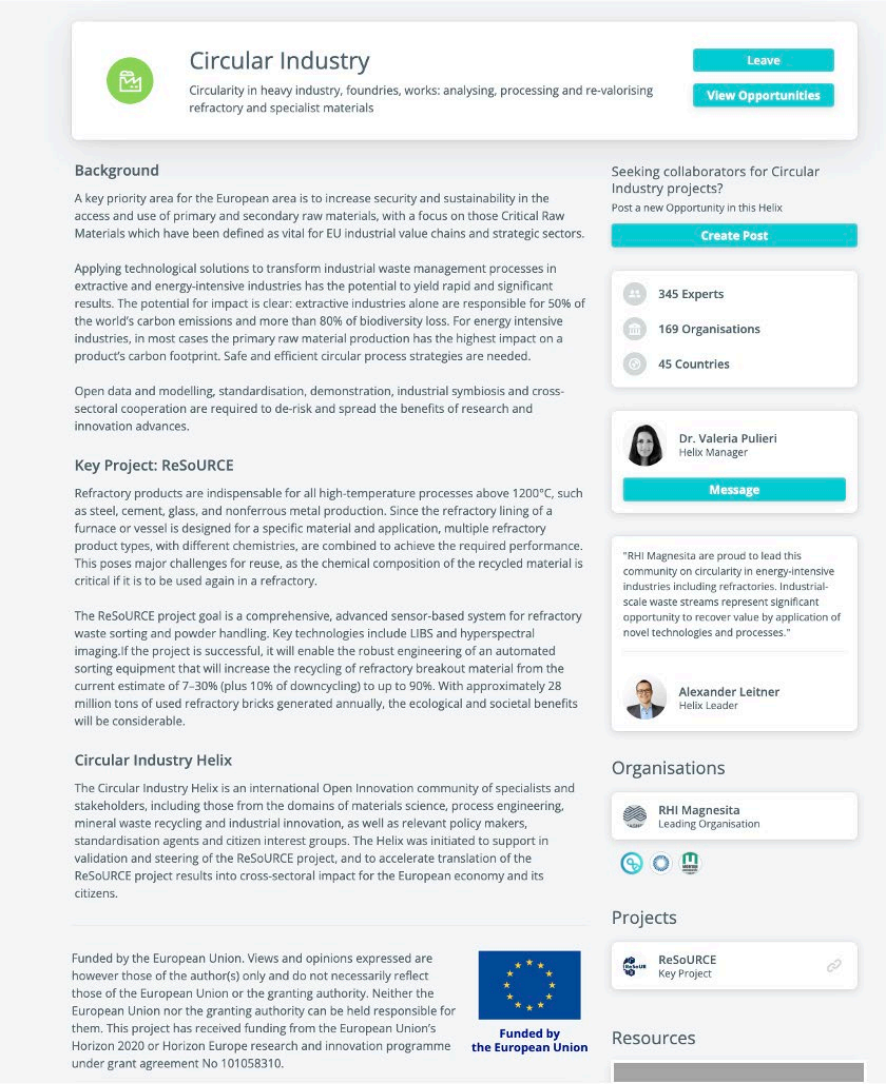


Figure 3 – Circular Industry Helix by M.18 of the Project

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.

The Helix community has been promoted throughout the research and innovation ecosystems since its launch on March 2023. By month 18, it has reached 345 experts and 169 organizations from 45 countries. By month 30 of the ReSoURCE project, the platform hosts 602 experts and 261 organizations from 53 countries.

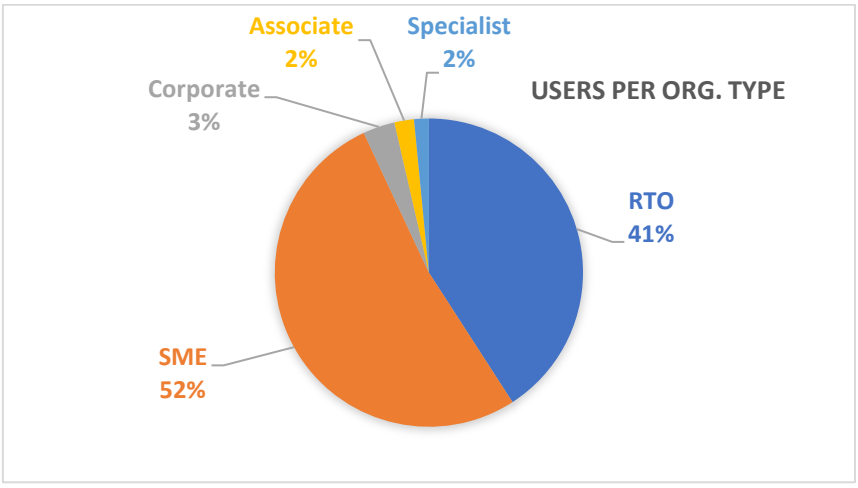


Figure 4 – Users on the Circular Industry Helix Status per Organization Type

With 203 users, Small and Medium-sized Enterprises (SMEs) make up a large portion of the platform's user base per organization type, demonstrating the considerable interest and involvement of smaller companies in circular industry activities. With 159 users, Research and Technology Organizations (RTOs) come in second, showing a strong presence from the research community. Thirteen corporate entities are also participating, which perhaps adds broader industry viewpoints to the platform. Additionally, with 8 and 6 users, respectively, Associates and Specialists have a lesser but significant presence, contributing essential expertise and a variety of perspectives to the helix's cooperative efforts.

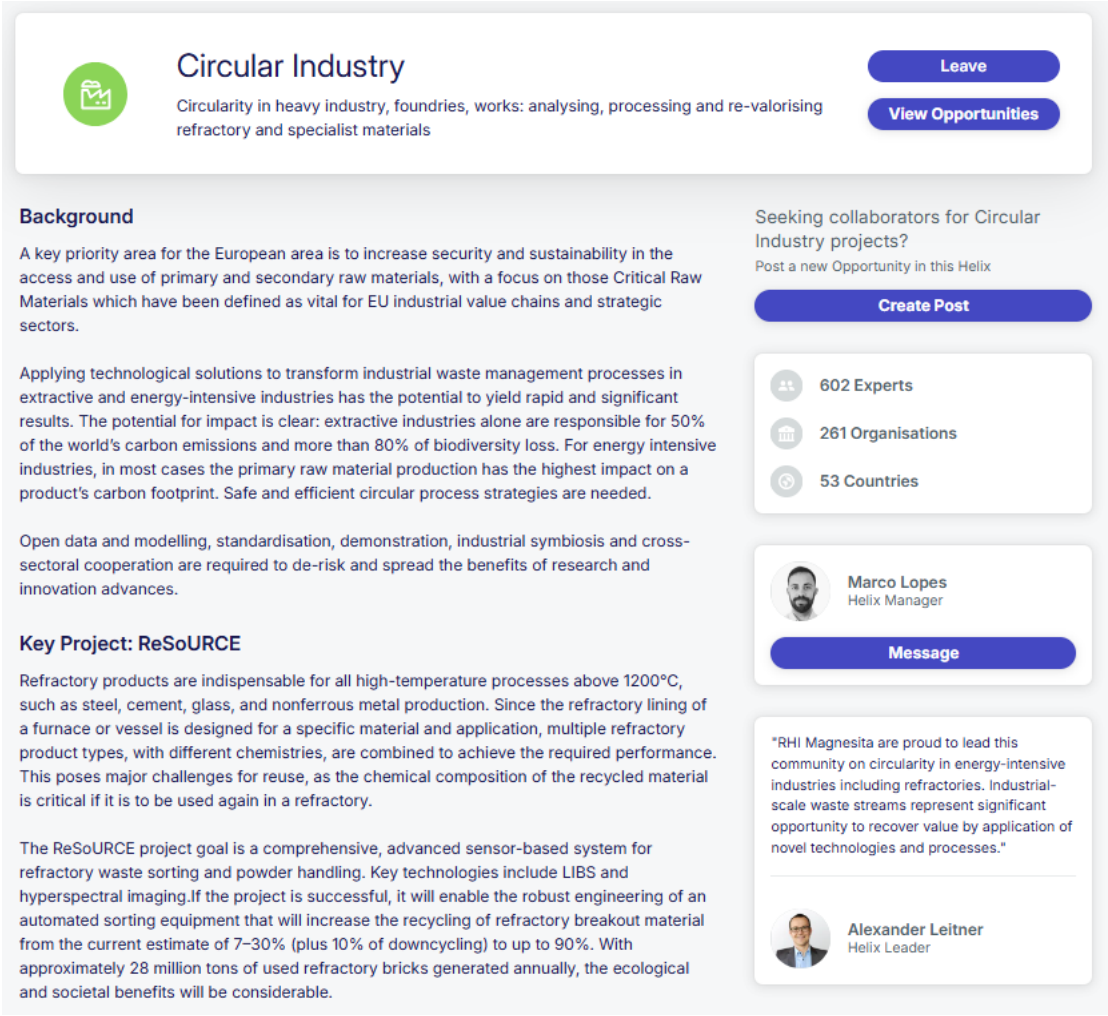


Figure 5 – Circular Industry Helix Status by M.30 of the Project

A total of **912** messages have been sent and received among this vibrant community, demonstrating a cooperative and information-rich setting where participants exchange ideas, look for ways to work together, and talk about advancements in circular industry projects.

The Circular Industry Helix Community also provides a vibrant platform to share and support the exploitation of the project results. In that sense, in 2024, two key exploitable results (KERs) of the project has been published on the helix. Both results aim to reduce the carbon emissions and improve material sustainability. The goal of CPI, a ReSoURCE project partner, has been to find creative, non-refractory uses for leftover refractory materials produced during refractory lining removal. The materials that are manufactured have significant value-added applications in numerous sectors. Spent

refractory linings from the steel and cement industries were milled to create the two primary components. CPI has created economical techniques to mill the materials to an appropriate size for integration into polymer systems, with an emphasis on utilizing the leftover material as additives in polymer composite systems. "mRefCem and mRefFerro" materials offer the possibility of increased sustainability. Both materials' "Technical Data Sheets" are available in the Knowledge Vault area of the project website as well: https://www.project-resource.eu/knowledgevault/ .

Figure 6 – Circular Industry Helix Post on KER: mRefFerro

Figure 7 – Circular Industry Helix Post on KER: mRefFerro

4.2. The events and other activities

Organizing 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) organized 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 were discussed in a meeting with the sister projects ROTATE and HEPHAESTUS, scheduled by the end of 2023, and the ReSoURCE consortium coordinated the organization of a joint "TWIN GREEN AND DIGITAL kick-off event" with the above mentioned sister projects and other funded projects in the first quarter of 2024.

5. The clustering activities implemented by M30

This section provides insights to the networking and joint activities taking place after M18. This should be considered as a continuation of the information already provided in deliverable, D 9.3 First report on networking and joint activities submitted in November 2023.

5.1. EIT Raw Materials – Raw Materials Summit 2024

Researchers from the ReSoURCE project participated in the Raw Materials Summit, organized by EIT Raw Materials, which took place from May 14th to 16th 2024. During the summit, they were part of networking and clustering meetings, making a significant contribution to this premier raw materials event in Europe. The summit provided an excellent opportunity for the ReSoURCE project team to connect with key industry participants, decision-makers, and researchers, emphasizing sustainable sourcing, circular economies, and material advances. Especially, the exchange with many of the attending start-ups led to valuable new contacts, which are essential for promoting and driving innovation. These new collaborations and investigated joint potentials for developing material recovery and recycling technologies, are crucial to the project's long-term goals.

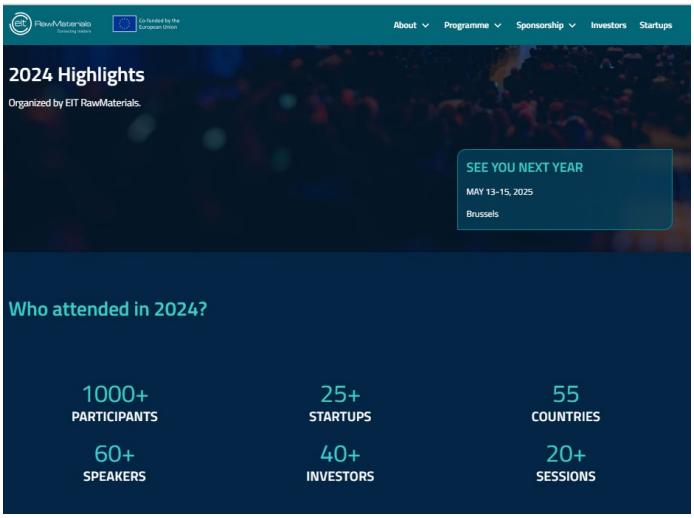


Figure 8 – EIT Raw Materials Summit Stats

To increase the project's visibility, ReSoURCE representatives also participated in a dedicated workshop along with three other Horizon Europe-funded projects: ROTATE, Hephaestus, and RawMina (Leaflet in Annex). The workshop, titled "Accelerating the Adoption of Circular Strategies in the Raw Materials and Steel Industries" focused on groundbreaking technologies that are driving circular strategies in the raw materials, refractories and steel industries. Project advisor Susana Xarà introduced the topic with an interview addressing the need for improvements in the extractive, refractories and steel industries. This was followed by presentations from project representatives, who shared their innovative solutions with the diverse audience, including international industry professionals, research center and university representatives. A key highlight of the workshop was the roundtable discussion, where ReSoURCE led a session regarding industrial synergies having, e.g., engaging discussions with stakeholders from construction industry and PhD students. These conversations highlighted the potential for collaboration between refractory and construction industry, with PhD students contributing fresh perspectives and innovative ideas. The fully booked room and the active participation from the audience underscored the strong interest and the significance of advancing innovation in these fields.

Figure 9 – EIT Raw Materials Summit – Workshop: Accelerating the Adoption of Circular Strategies in the Raw Materials and Steel Industries

The revolutionary potential of breakthrough technologies in the raw materials and steel industries was highlighted at the workshop "Accelerating the Adoption of Circular Strategies in the Raw Materials and Steel Industries,". Susana Xarà (HaDEA) conducted the three engaging sessions, which started with a summary of EU-funded projects Hephaestus, ROTATE, and ReSoURCE, highlighting their state-of-the-art technology. Experts from all four participating projects, including Marco Lopes (RAWMINA), Simone Neuhold (ReSoURCE), and others, participated in a roundtable discussion after Dr. Valeria Pulieri (Crowdhelix) presented techniques for engaging stakeholders in circularity and industry transformation. Circular strategies, Industry 5.0 and industrial transformation, and industrial synergies were among the main issues covered. There were lively debates about how the steel, refractory, and construction industries should work together. The importance of the Raw Minerals Helix and Circular Industry Helix communities as forums for promoting cooperation and furthering sustainability objectives was emphasized by these sessions. A wide range of participants, including researchers, policymakers, and representatives of civil society, contributed to the presentations and interactive discussions, highlighting the workshop's significance as a turning point for fostering innovation and stakeholder collaboration across value chains.

Figure 10 – EIT Raw Materials Summit – ReSoURCE Participation

In order to reach a larger professional audience, the workshop was disseminated through different channels such as LinkedIn. By drawing interest from stakeholders in a variety of industries and encouraging online interaction around the innovations and circular methods addressed, this digital outreach increased the event's prominence.

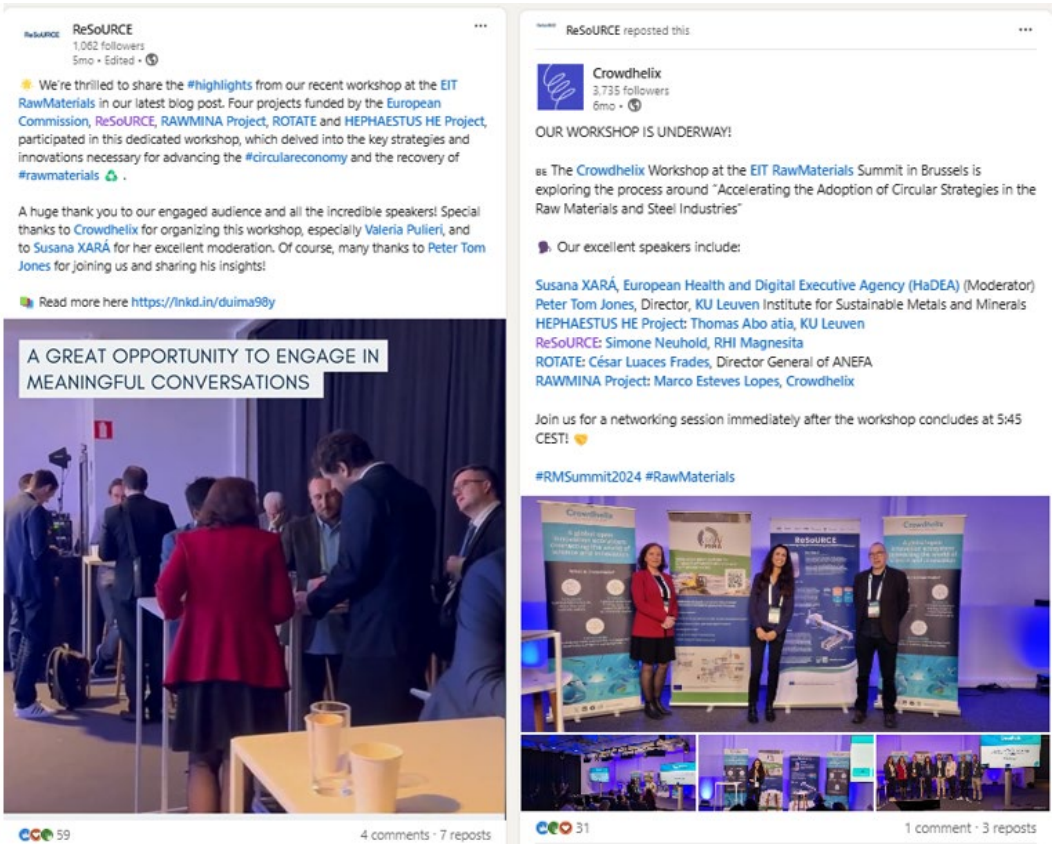


Figure 11 – EIT Raw Materials Summit – Visibility Posts

The ReSoURCE project was a prominent participant of the EIT Raw Materials Summit 2024 alongside ROTATE, Hephaestus, and RAWMINA projects. The discussion centered on developing synergies in the steel and raw materials industries, industry change, and circular strategies. The event's specifics and results were also posted on the ReSoURCE project website, which increased its exposure to a wider audience and strengthened the project's contribution to the advancement of sustainability and innovation in the sector (https://www.project-resource.eu/news/resource-attends-eit-raw-materials-summit-2024/) The workshop concluded with an interactive roundtable session on "How to engage stakeholders in circular strategies and industry transformation," which began with a presentation of the digital communities around circular industry and raw materials from the open innovation platform Crowdhelix. The session featured three engaging discussions that provided takeaways at the societal, environmental, and innovation levels, aiming to engage the audience and create new connections for the future exploitation of the projects' outcomes. The following topics were discussed:

- Circular strategies
- Industrial transformation towards Industry 5.0
- Industrial synergies

Figure 12 – EIT Raw Materials Summit – Project Dissemination Materials

5.2. North East Automotive Alliance Expo 2024

The event was attended by researchers Claire Defty and Ananda Roy on behalf of the ReSoURCE Project on 26th September 2024. It was an expo for growing networking and clustering initiatives in the automotive industry. The Expo, which was organized by the North East Automotive Alliance, brought together top manufacturers, suppliers, innovators, and stakeholders to talk about sustainability, developments, and problems facing the automotive sector. Claire and Ananda had insightful conversations on sustainable practices and the circular economy, which complemented the project's goals of encouraging creativity and resource efficiency.

Figure 13 – North East Automotive Alliance Expo 2024 Poster

Future clustering initiatives may benefit from the connections made during the event with businesses and academic institutions interested in switching to greener solutions. The team discovered common interests and chances for cooperation in integrating circular industry practices into automotive supply chains by outlining the project's objectives and sharing views with leaders in the field. This Expo helped the project's goal of creating a cooperative ecosystem to speed up sustainable changes across industries in addition to giving awareness to its projects.

Claire Defty and Ananda Roy successfully raised the ReSoURCE project's profile in the automotive sector at the North East Automotive Expo 2024. Speaking on behalf of the project, they emphasized ReSoURCE's initiatives to advance sustainable material use and the concepts of the circular economy, two important areas in the automobile industry's transition to greener production. They presented ReSoURCE's impact and goals to a range of stakeholders, including manufacturers and industry innovators. Being present at the Expo gave the project a great opportunity to reach a wider audience, promoting awareness of ReSoURCE's contribution to improving sustainability in the automobile industry and opening the door for more collaborations.

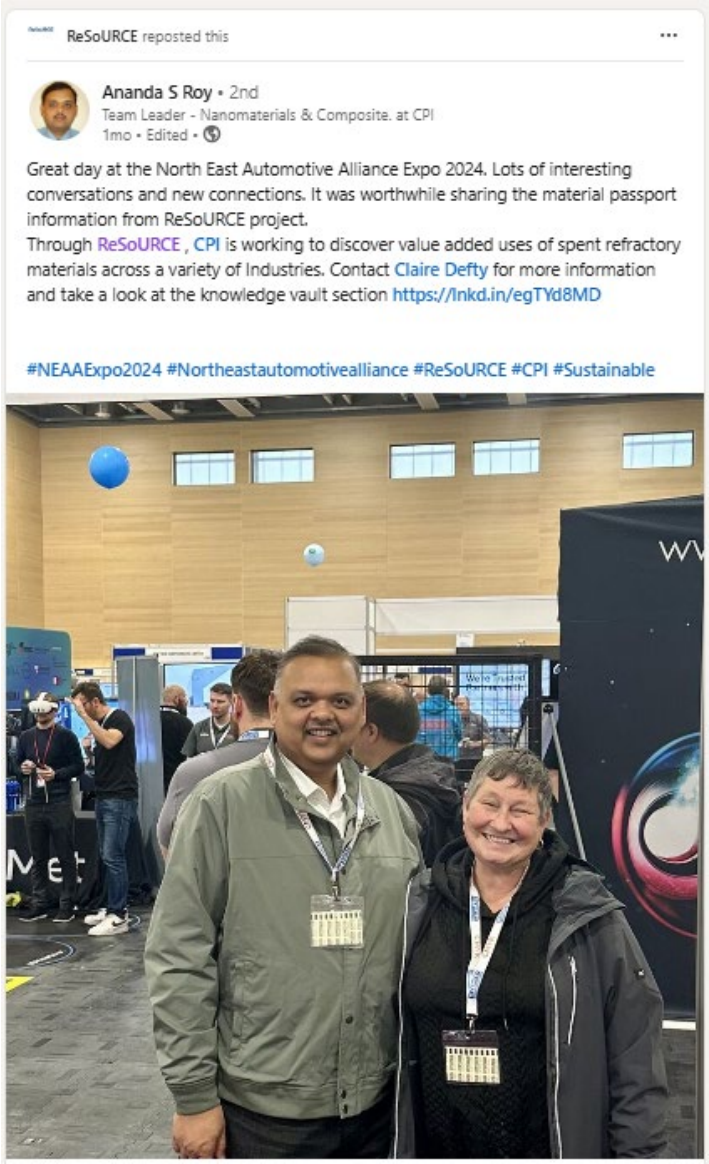


Figure 14 – Representatives of ReSoURCE project attending North East Automotive Alliance Expo 2024

(https://www.linkedin.com/feed/update/urn:li:activity:7245454993892233216/)

As a part of the networking and clustering activities, ReSoURCE representatives established contacts with 17 businesses at the NEAA Expo 2024, concentrating on environmentally friendly uses of recycled materials in the materials and automotive industries. Some examples of the contacts are; GV Engineering Ltd., which indicated a desire to work together. Zentia, which enabled continuous communication after receiving samples and verifying comments.. Paltech was present in a meeting on October 3, 2024, where samples were to be sent by CPI and additional talks with RHIM were scheduled. Applications of recycled materials piqued the interest of Polymer Compounders, Nefab, and Avon Group. The list of the established contacts are as follows:

	Company	*Contact*	*Position*	*Email*	*Website*
1	Isoclad	Rob Palmer	MD	robert.palmer@isoclad.co.uk	https://www.isoclad.co.uk/
2	Forteq	Steve Roberts	Business Development Manager	steve.roberts@forteq-group.com	www.forteq-group.com
3	ACCEDO GROUP ltd	Ben Richardson	Director	ben.richardson@accedogroup.co.uk	www.accedogroup.co.uk
4		Carl Lamb		carl.lamb@accedogroup.co.uk	
5	NEFAB	Phil Bell	Business Development Manager	phil.bell@nefab.com	www.nefab.co.uk
6	Avon Group	Paul Radford	Business Development Manager	pradford@tsa-ltd.co.uk	www.avon-group.co.uk
7		David Smith	Sales Manager	david@gbbelting.co.uk	gbbelting.co.uk
8		Jeremy Byrne	Managing Director	jeremy@gbbelting.co.uk	gbbelting.co.uk
9	GV Engineering Ltd	Paul Brown	Sales representative	sales@gvengineering.co.uk	www.gvengineering.co.uk
10	RTC	Simon Cave	Business Support Specialist	simon.cave@rtcnorth.co.uk	
11	Zentia	Gavin Scott	Technical Manager	gscott@zentia.com	
12	Paltech	Adrian Doyle		adriandoyle@paltech.ie;	paltech.ie
13	Paltech	Keith Doyle		keithdoyle@paltech.ie	
14	Polymer compounders	Richard Clay		r.clay@polymer-compounders.co.uk	
15	Arpower	Will Illingworth		will.illingworth@arpower.co.uk	
16	Nefab	Phil Bell		phil.bell@nefab.com	
17	Ljamiers	Matthew Carless		matthew.carless@ljamiers.co.uk	

5.3. Circular Economy Conference: Industrial By-Product Utilization and Value Creation

The ReSoURCE project was presented at the CIRCON2024 - Circular Economy Conference: Industrial By-Product Utilization and Value Creation in Jamshedpur, India on 3-4 October 2024. This event brought together experts from the industry, research and academia to address the pressing need to hashtag#recycle and re-purpose by-products in the metallurgical sector. In the case of spent hashtag#refractories, they remain often underutilized due to a lack of mature technologies, yet hold an immense potential for achieving a sustainable,

Figure 15 – Circular Economy Conference: Industrial By-Product Utilization and Value Creation Poster

On behalf of RHI Magnesita, Josu A. and Manas Kumar Panja presented the ReSoURCE Project as part of his talk on Recycling of Refractories: Towards Sustainable Steel in India. This innovative, sensor-based automated sorting equipment, which will offer a new standard for recycling refractories, was met with great enthusiasm.

5.4. Second Process Industry Conference: Shaping the Transformation

On October 23–24, 2024, in Brussels, the ReSoURCE project took part in the Second Process Industry Conference: Shaping the Transformation. Alongside business executives and EU policymakers, the event gave ReSoURCE academics a forum to address decarbonization, the circular economy, and energy efficiency. The project strengthened its role in promoting green transformation in the process industries by connecting with important stakeholders and investigating prospects for cooperation on sustainable industrial practices through seminars and networking sessions.

Figure 16 – Second Process Industry Conference: Shaping the Transformation Event Poster

5.5. Workshop: “Unlocking New Opportunities with Recycled Refractory Materials” organized by ReSoURCE Project

The online workshop is planned to be delivered by 4th of December 2024 as a part of the ReSoURCE project which will be essential to bring together stakeholders to discuss the innovative ways to recycle refractory materials. The goal of this event is to showcase the most recent developments and prospects in the sustainable management of refractory materials, which are essential to many high-temperature industrial operations. Participants talked about obstacles and exchanged ideas on how to improve resource efficiency, decrease waste, and increase circularity in the refractory industry. The workshop demonstrated the ReSoURCE project's dedication to environmental innovation and reaffirmed the value of sustainable practices in promoting a circular economy through presentations and group discussions.

A group of experienced researcher will be presenting a variety of viewpoints from research and industry on the environmental, financial, and technological facets of recycling refractory. Academic and research representatives will be providing insights about new technological advances and advancements. The speakers' combined experience will allow for a thorough understanding of the industry's present problems and new developments, which in turn led to fruitful conversations about cooperation and best practices for promoting circularity in refractory materials. The event was enhanced by the combination of research and industry voices, which made it an engaging forum for strategy creation and information sharing.

In order to have a synergy and to have different inputs, the similar initiatives working on similar fields are invited (Sister Projects) to the event. The sister projects and other clustering initiatives are expected to contribute a multitude of resources and experience, enhancing the impact of the workshop. Through collaborative research, shared platforms, and joint events, ReSoURCE and its clustering partners may enhance their effect, promote knowledge sharing, and support the circularity and climate neutrality goals of the European Commission. In order to reach to a wider attendance, the workshop has been promoted through social media, project website and within the Circular Industry Helix, hosted by the project partner Crowdhelix.

Website Announcement: https://www.project-resource.eu/news/unlocking-new-opportunities-with-recycled-refractory-materials-workshop/

Circular Industry Helix Post: https://platform.crowdhelix.com/opportunities/join-us-for-unlocking-new-opportunities-with-recycled-refractory-materials-workshop-online-4-december-2024-2pm-cet-3982

Linkedin Post: https://www.linkedin.com/posts/project-resource_recycled-sustainable-refractories-activity-7262076195238780928-KeT6/?utm_source=share&utm_medium=member_desktop

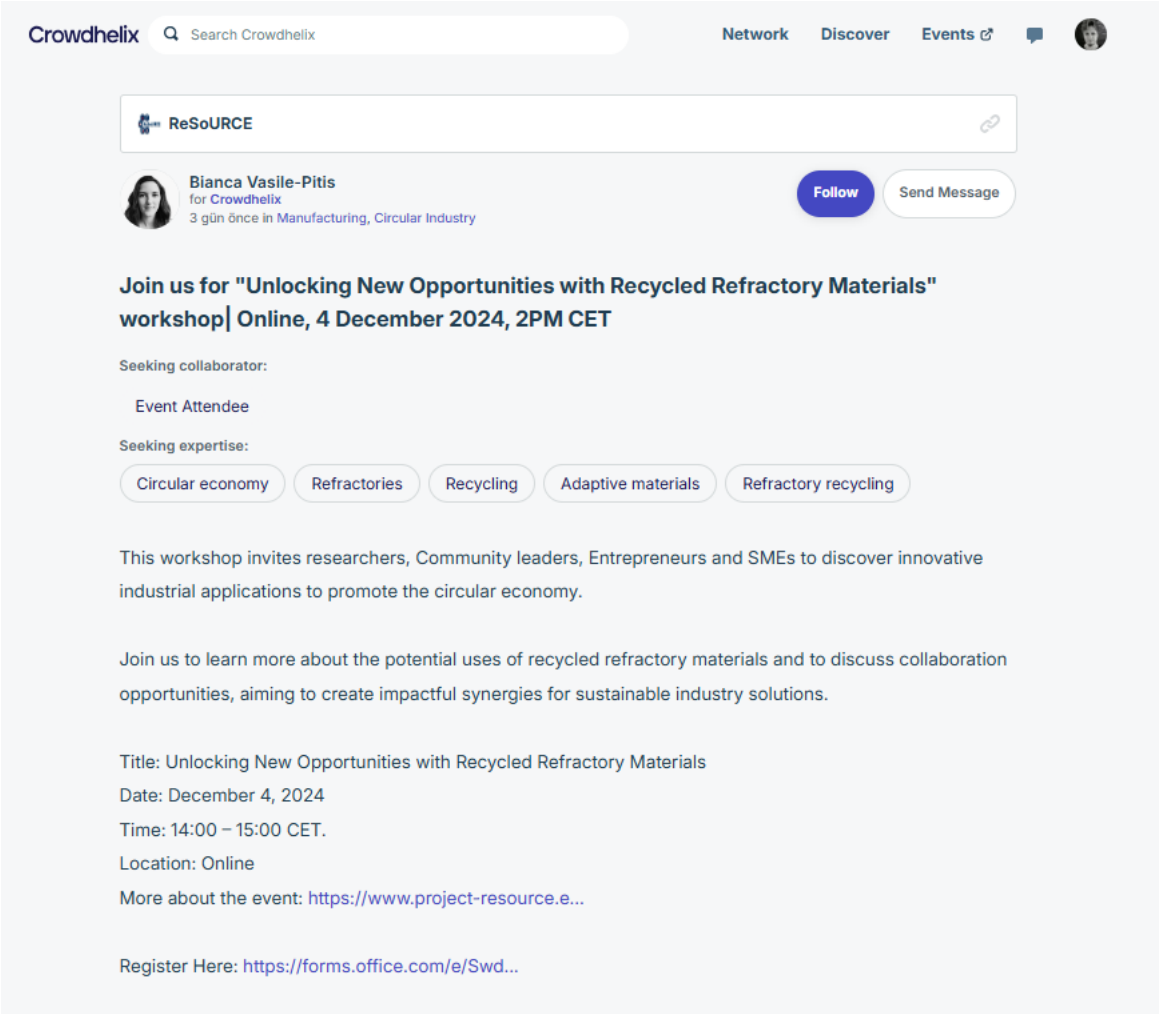


Figure 17 – Helix Annoluncement "Unlocking New Opportunities with Recycled Refractory Materials"Workshop

In addition to the Helix announcements, the workshop has been also shared by the consortium members through the websites in order to reach out more researchers working in the similar fields.

Figure 18 – Website Annoluncement by CPI "Unlocking New Opportunities with Recycled Refractory Materials"Workshop

Hosted by ReSoURCE, the workshop will equally highlight and promote the two results of the Project; mRefCem and mRefFerro, derived from recycled refractories, offering reduced carbon footprints for various industries. Attendees, including researchers and SMEs, will explore collaboration opportunities, sustainable material applications, and carbon reduction strategies. Speakers include experts from RHI Magnesita, Crowdhelix, and CPI. In order to share the workshop, the Project results and any other possible events and outputs of the Project with wider audience, related Linkedin groups have been gathered. As an example, the Linkedin post considering the workshop has reached the following stats:

Post URL	https://www.linkedin.com/feed/update/urn:li:share:7262428401813131264
Post Date	Nov 13, 2024
Post Publish Time	11:37 AM
Post Performance	
Impressions	290
Members reached	180
Reactions	5
Comments	3
Reposts	4
Reactions Highlights Nov 13, 2024 to Nov 14, 2024	
Top job title	Project Manager
Top location	Tyneside Area
Top industry	Higher Education
Comments Highlights Nov 13, 2024 to Nov 14, 2024	
Top job title	Project Manager
Top location	Tyneside Area
Top industry	Research Services

ReSoURCE
1,049 followers
2d • Edited •

Unlocking New Opportunities with Recycled Refractory Materials Workshop ♻️
The ReSoURCE Project, in collaboration with CPI and Crowdhelix, is excited to host an insightful workshop on **December 4, 14:00 – 15:00 CET** focused on the potential of #recycled refractory materials. This event will gather researchers, industry leaders, entrepreneurs, and SMEs to explore innovative, #sustainable solutions that reduce carbon footprints across various industries.

💡 **Why Attend?**
- **Discover Collaboration Opportunities:** Connect with experts across sectors interested in the applications of recycled refractory materials.
- **Promote Circular Economy:** Learn about integrating recycled refractory materials into products to minimize waste and maximize resource lifecycle.
- **Reduce Carbon Footprint:** Hear about practical applications that lower carbon emissions while meeting sustainability goals.

The workshop will showcase materials like **mRefCem** and **mRefFerro**—fine powder materials derived from spent #refractories used in the cement and steel industries. By replacing traditional fillers, these materials can significantly #reduce the carbon footprint of new products. To check the technical data sheets, please visit https://lnkd.in/dY6Eb9x7.

🗓️ **Register now** to join us in exploring the environmental and economic benefits of recycled refractory materials and discovering new collaboration opportunities! https://lnkd.in/dJ5Ctm2Z

👉 To know more about the workshop, please visit our News section https://lnkd.in/dRk5sE9B

#CircularEconomy #Innovation #Refractory #recycling

39 3 comments · 10 reposts

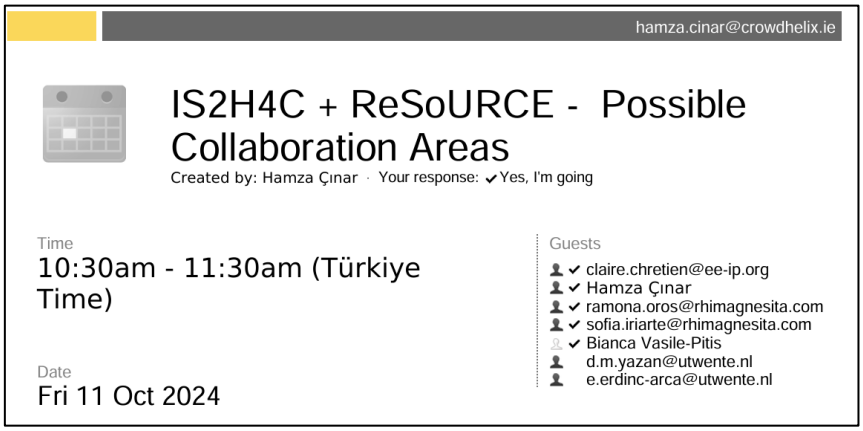
Figure 19 – Linkedin Annoluncement "Unlocking New Opportunities with Recycled Refractory Materials"Workshop

6. 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.
- To have joint activities with initiatives working on the similar topics.
- To have online workshops with related initiatives

In that sense, a series of contacts were established with the projects funded under the same call or working on related areas of research and innovation. One of the examples of this initiatives is the meeting with the representatives of “Sustainable Circular Economy Transition: From Industrial Symbiosis to Hubs for Circularity (IS2H4C) Project (https://is2h4c-project.eu/). During the meeting, the collaboration areas for joint activities such as a joint webinar to be delivered by early 2025 were discussed.



Plans for collaborative, customized workshops (both online and in-person) will be included in the "Next steps and the clustering roadmap" section based on the workshop outcomes. These workshops will be centered on presenting the outcomes of the ReSoURCE project to related industries, guaranteeing focused participation, and encouraging additional use of the project's discoveries. This strategy will promote closer industry cooperation and make it easier for important ideas to be shared across pertinent industries.

For the next period, the following events and synergies are considered for possible attendance and collaboration:

- ICR® 2025, Scientific conference and trade fair, 17-18 September 2025 - Aachen, Germany
- RAW MATERIALS SUMMIT 2025 - 13 May 2025 - 15 May 2025 – Brussels, Belgium
- ECerS XIX / European Ceramic Society, 31 August - 4 September 2025 – Dresden, Germany
- Circular Economy Summit, March 2025 - Munich, Germany

7. Conclusions

By Month 30 of the project, the ReSoURCE project has demonstrated substantial progress in fostering impactful collaborations and establishing a strong foundation for advancing circular economy principles in the extractive and processing value chains. Through its strategic networking operations and clustering activities, important milestones have been reached. In addition to increasing the project's visibility, these initiatives have fostered collaborations that are essential for the creation of creative solutions for sustainability.

The project's dedication to accomplishing common goals has been emphasized by significant partnerships with sister projects ROTATE and HEPHAESTUS under the Horizon-CL4-2021-TWIN Transition Programme. The foundation for a coordinated clustering roadmap that will direct future partnerships has been established by the talks and activities with these projects. The alignment of methodological and technological methods, collaborative event participation, and the investigation of chances to tackle common problems in resource efficiency, recycling, and waste management are some specific outcomes.

The ReSoURCE project's clustering efforts have been supported by the Circular Industry Helix, which is hosted on the Crowdhelix platform. Through the facilitation of contacts between more than 260 organizations from 53 countries, this platform has promoted networking possibilities, allowed for a dynamic flow of ideas, and helped spread the project's Key Exploitable Results (KERs), including mRefCem and mRefFerro. These materials, which are made from recycled refractory materials, are creative ways to improve material sustainability and lower carbon footprints.

In addition, participation in a number of well-known events has strengthened the project's circular economy contributions and helped the project team to establish new communications for possible joint activities with similar initiatives. These include attending the EIT Raw Materials Summit 2024, the North East Automotive Alliance Expo 2024, and the Materials Helix Event in Dublin.

Apart from these achievements, the ReSoURCE project has taken the initiative to spread awareness of the clustering framework outside of its direct collaborations. The project has increased its impact and opened up new avenues for innovation by collaborating with larger projects like the BioICEP and Thermodust projects and building relationships with industry players in the industrial, refractory, and automotive sectors. The clustering roadmap lists a number of important tasks for the future, such as developing cooperative marketing collateral, coordinating communication campaigns, and organizing events in conjunction with sister organizations and other related endeavors. The project hopes to increase its influence, spur innovation, and guarantee the sustainability of its results by utilizing these tactics.

Ultimately, the ReSoURCE project's clustering initiatives demonstrate how well-coordinated clustering initiatives can optimize project impacts and generate long-term value for stakeholders in various industries. These pillars will foster a cooperative environment that propels sustainable advancements in resource management and circular economy principles as the project progresses.

8. Annexes

Annex 1

Crowdhelix
COLLABORATION INTELLIGENCE

ReSoURCE R8TATE
HEPHAESTUS
RAW MINA

RAW MATERIALS SUMMIT

Date(s): 15-16 May 2024,
Timings: 9-18
Location & Venue: Brussels, The Egg Conference Venue

Workshop: "**Accelerating the Adoption of Circular Strategies in the Raw Materials and Steel Industries**" Context: Groundbreaking technologies that accelerate the adoption of Circular Strategies in the Raw Materials and Steel Industries are the focus of four Horizon Europe-funded projects: ReSoURCE, ROTATE, Hephaestus, and RawMina. The Crowdhelix Raw Materials Summit presents the opportunity to explore these pioneering innovations, and to participate in a roundtable discussion designed to showcase strategies that stimulate stakeholder engagement in circularity and industry transformation. This event promises to be a catalyst for meaningful dialogue, insights, and connections, shaping a more sustainable and resilient future for European innovation and industry. Date: 16 May Time: 16,00 - 17,45 Venue: The EGG Bruxelles
16.00 - 16.30 Welcome and introduction - Crowdhelix Session 1: **"Why we need to improve the extractive, refractories and steel industries"** Moderator: Susana Xarà, HaDEA **Speakers**: - Peter Tom Jones, Director, KU Leuven Institute for Sustainable Metals and Minerals - Philipp Hartlieb — "The role of technology for shaping the European mine of the future". Chair of Mining Engineering and Mineral Economics, Montanuniversität Leoben

Aim of the session: to provide a high-level view of the global context of the extractive, refractory and steel industries.
16.30 - 17.00 Session 2: **"Overview of the EU-funded projects Hephaestus, Rotate and ReSoURCE and their technologies"** Moderator: Susana Xarà, HaDEA Opening of the session: Short video about the three projects Speakers: Hephaestus project: Thomas Abo Atia, KU Leuven ReSoURCE project: Simone Neuhold, RHI Magnesita Rotate project: César Luaces Frades, Director General of ANEFA RAWMINA project: Marco Lopes, Crowdhelix Q&A Aim of the session: Provide an insight into the projects, technologies and expected impacts. HaDEAs' remarks on the way forward for these initiatives and how their results can be better exploited and integrated into the EC vision for 2050
17.00 - 17.45 Roundtable: **"How to engage stakeholders in circular strategies and industry transformation"** Introduction to the working groups by Crowdhelix: Valeria Pulieri, Impact Acceleration Manager "**The Raw materials and Circular Industry Helixes as vibrant communities where innovative collaborations can thrive"** Start of the 3 roundtables/working groups with audience participation - one per project for 20 min. Topics: a. Circular strategies (with César Luaces Frades, Director General of ANEFA); b. Industrial transformation and Industry 5.0 (with Thomas Abo Atia, KU Leuven) c. Industrial synergies (with Simone Neuhold, RHI Magnesita) Final remarks Aim of the session: Provide takeaways at a societal, environmental and innovation level to engage the audience and create new connections for future exploitation of the project outcomes.

JOIN CROWDHELIX FOR AN INTERACTIVE WORKSHOP

Accelerating the Adoption of Circular Strategies in the Raw Materials and Steel Industries

DATE	TIME	PLACE
16 May 2024	4pm - 5:45pm CEST	The Egg, Brussels

Groundbreaking technologies that accelerate the adoption of Circular Strategies in the Raw Materials and Steel Industries are the focus of four Horizon Europe-funded projects:

ReSoURCE R8TATE HEPHAESTUS RAWMINA

The Crowdhelix workshop at the Raw Materials Summit explores these pioneering innovations and our workshop discussion is designed to showcase strategies that stimulate stakeholder engagement in circularity and industry transformation.

RAW MINERALS HELIX COMMUNITY

RAWMINA Raw Minerals Helix

The Raw Minerals Helix is an international community of specialists in CRMs recovery and related disciplines in the Crowdhelix global collaboration network. The helix includes researchers, industry actors, ethics specialists and policy makers, civil society (end users) and participants of other relevant projects and relevant actors across Europe/the world. The RAWMINA Horizon 2020 Project is a key project in the helix, aimed at developing and demonstrating an innovative pilot system for the clean and sustainable production of non-energy, non-agricultural raw materials from Mine Waste.

216 Experts | **132 Organisations** | **38 Countries**

The RAWMINA project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 958252.

CIRCULAR INDUSTRY HELIX COMMUNITY

ReSoURCE Circular Industry Helix

The Circular Industry Helix community of specialists and stakeholders, includes 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. 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. The Helix was initiated to support the validation and steering of the ReSoURCE project, a comprehensive, advanced sensor-based system for refractory waste sorting and powder handling.

471 Experts | **214 Organisations** | **49 Countries**

The ReSoURCE project is funded by the European Union's Horizon Europe Framework Programme (HORIZON) under the Grant Agreement Number: 101058310.

AGENDA

16:00 - 16:30: Session 1

"Why we need to improve the extractive, refractories and steel industries"
Moderator: Susana Xarà, HaDEA

Speakers:

- Peter Tom Jones, Director, KU Leuven Institute for Sustainable Metals and Minerals
- Philipp Hartlieb — "The role of technology for shaping the European mine of the Future", Chair of Mining Engineering and Mineral Economics, Montanuniversität Leoben.

16.30 - 17.00: Session 2

"Overview of the EU-funded projects Hephaestus, Rotate and ReSoURCE and their technologies"
Moderator: Susana Xarà, HaDEA

Speakers:

- Hephaestus project: Thomas Abo Atia, Research Manager, KU Leuven
- ReSoURCE project: Simone Neuhold, Research Associate for Recycling, RHI Magnesita
- Rotate project: César Luaces Frades, Director General of ANEFA
- RAWMINA project: Marco Lopes, Impact Accelerator Manager, Crowdhelix

17.00 - 17.45: Roundtable

"How to engage stakeholders in circular strategies and industry transformation"
Introduction to the working groups by Crowdhelix: Dr Valeria Pulieri, Impact Acceleration Manager

"The Raw materials and Circular Industry Helixes as vibrant communities where innovative collaborations can thrive"

Topics:

a. Circular strategies;
b. Industrial transformation and Industry 5.0;
c. Industrial synergies

Crowdhelix
COLLABORATION INTELLIGENCE

Annex 2

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

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

Funded by the European Union

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