

# waste2CRM

**Determination of the potential for acquiring critical raw materials from mining wastes, and development the method for their effective recovery.**

## Waste2CRM Project Launched!

At the beginning of September 2024, a new R&D project has been launched under The Research Fund for Coal and Steel (RFCS), entitled: “Determination of the potential for acquiring critical raw materials from mining wastes, and the development of the method for their effective recovery” (acronym: Waste2CRM).

**RFCS** is a EU funding programme supporting research projects in the coal and steel sectors. The subject of the research will be mining waste from hard coal and lignite mines stored in post-mining dumps (coal waste heaps). Critical raw materials are materials necessary for developing the European Union economy, used in many sectors of the economy, such as: renewable energy, electronics, space, telecommunication, automotive, medical and defence industries.

Due to their strategic importance, the European Commission has developed a list of critical raw materials for the EU, which is regularly revised and updated. It includes, among others: elements such as lithium, antimony, beryllium, cobalt, indium, gallium, germanium, magnesium, niobium, tantalum, tungsten, platinum group metals such as platinum, palladium, iridium, rhodium, ruthenium, osmium and rare earth metals, namely: yttrium, scandium and lanthanides, especially neodymium and dysprosium.

The project aims to determine the potential and prospects for using mining waste as an alternative source of critical raw materials, as well as to develop a methodology for their effective recovery.

The subject of the research will be mining waste deposited in mine dumps, originating from hard coal mining. Thanks to cooperation with foreign entities, the database will also be supplemented with waste from Greece and Spain, including waste from brown coal (lignite). The international consortium implementing the project includes research entities from Poland, including the Institute of Energy and Fuel Processing Technology in Zabrze, which acts as the coordinator, the Central Mining Institute – State Research Institute, the Łukasiewicz Research Network – Institute of Non-Ferrous Metals, as well as the Laboratory of the Economic Geology from the University of Patras in Greece and Systra Subterra in Spain.



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October 2024

## Kick-off meeting of Waste2CRM project

On October 21st, the Institute of Energy and Fuel Processing Technology in Zabrze hosted the Kick-off meeting on the waste2CRM project. The meeting was attended by representatives of all project partners. In addition to discussing important issues related to the course of work within the project, guests had the opportunity to see the research infrastructure of the Institute.



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February 2025

## Samples collection in Poland!

Between November 2024 and February 2025, a sampling campaign was carried out in Poland on coal-waste spoil heaps by **GIG-PIB Central Mining Institute**. Six samples were collected from sites representing distinct lithostratigraphic settings: the Cracow Sandstone Series, the Mudstone Series, the Upper Silesian Sandstone Series, and the Paralic Series. Additionally, samples were taken from three operating coal mines. The aim is to determine whether - and how - these geological differences affect the concentrations of Critical Raw Materials (CRM), including Rare Earth Elements (REE).



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March 2025

## Workshop “Exploration and Exploitation of Industrial Minerals: Case Studies from the Greek Extractive Industry”

On 8 March, at the Conference and Cultural Center of the University of Patras, the UPatras S.E.G. Student Chapter organized a seminar entitled “Exploration and Exploitation of Industrial Minerals: Case Studies from the Greek Extractive Industry”. This seminar brought together people from both academia and industry to discuss current developments, methodologies, and challenges in the exploration and utilization of industrial minerals in the Greek area.

During the seminar, a presentation about “**Determination of the potential for acquiring critical raw materials from mining wastes, and development the method of their effective recovery – waste2CRM**” was given by Professor Stavros Kalaitzidis.

**JOINT UPATRAS, NKUA AND AUTH SEG STUDENT CHAPTERS SEMINAR**  
ORGANIZED BY UPATRAS S.E.G.

**EXPLORATION AND EXPLOITATION OF INDUSTRIAL MINERALS: CASE STUDIES FROM THE GREEK EXTRACTIVE INDUSTRY**

**Speakers:**  
 Konstantinos Ythoulkas, Chief Geologist at GEOHELLAS S.A.  
 George Tsoupanis, General Director of mining and geological exploration at TERNA MAG S.A.  
 Dr. Ioannis Kapageridis, Associate Professor: Department of Mineral Resources Engineering, University of Western Macedonia  
 Dr. Stavros Kalaitzidis, Professor: Academic Advisor of UPATRAS SEG Student Chapter  
 Dr. Stefanos Kilias, Professor: Academic Advisor of NKUA SEG Student Chapter  
 Dr. Vasilios Melfos, Professor: Academic Advisor of AUTH SEG Student Chapter  
 Dr. Pavlos Avramidis, Professor and Dr. Nikolaos Avramitis, Postdoctoral Researcher: Geology Department, University of Patras

Thank to our Sponsors:  
 EAKE, HANSHIKIMHO IATPON, and other logos.

**Event Details:**  
 Saturday 8th March 2025  
 Conference & Cultural Center of the University of Patras



A geological cross-section diagram showing various layers of earth. From top to bottom, the layers are: Clay, Sand, Clay, Marl, Sand, Lignite, Clay, Clay, Sand, Alternations of Clay and Sand, Sand, and Clay. A vertical scale on the right indicates a depth of 500 meters.

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May 2025

## Unlocking Hidden Resources: Turning Coal Waste into Critical Raw Materials.

As part of the European Waste2CRM project, funded under the RFCS program by the European Commission, members of the SYSTRA Subterra R&D team - Amanda Gomez Marfil and Beatriz García Bernabéu - visited the facilities of Fundación Santa Bárbara. During the visit, they collected samples from two coal waste dumps located in Laciaña and El Bierzo (León, Spain). The Waste2CRM project focuses on valorizing coal waste by exploring its potential to contain critical raw materials and developing effective recovery methods. Through applied engineering, we are advancing sustainability, circular economy principles, and the green transition.



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**May 2025**

## Waste2CRM at the TGK1 & TGK2 Annual Meeting – RFCS 2025!

We were pleased to take part in the annual joint meeting of the TGK1 & TGK2 Technical Groups, held under the **EU’s Research Executive Agency (REA)** within the RFCS – **Research Fund for Coal and Steel**.

The event was kindly hosted by the Technical University of Crete (Greece)

Alongside 11 European Research Executive Agency (REA) under the RFCS, we had the opportunity to:

- ✓ Share insights on innovative technologies for resource recovery, post-mining land use, and industrial green transition
- ✓ Join policy-oriented discussions on aligning research with the goals of the European Green Deal
- ✓ Participate in a strategic roundtable on societal impact, industrial scalability, and cross-programme synergies

A valuable platform to exchange knowledge, build partnerships, and contribute to the sustainable transformation of Europe’s industrial landscape.

Many thanks to the whole organizing team for the smooth coordination and for creating such an engaging and collaborative atmosphere throughout the event!



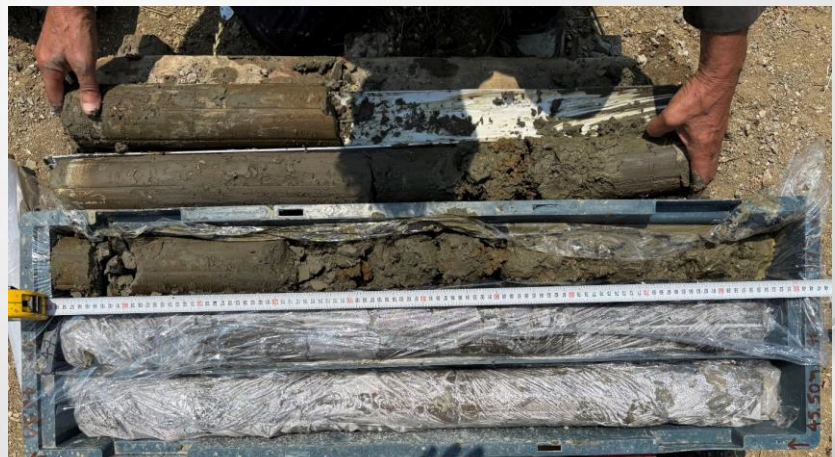
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June 2025

## Drilling and Sampling Campaign in Prosilio Mine, Northern Greece.

In June 2025, a field sampling campaign was conducted at Prosilio Mine, located in northern Greece, by members of the Laboratory of Economic Geology, Department of Geology, University of Patras. Prof. Dr. Stavros Kalaitzidis and Ph.D. candidate Efthymios Ntourois supervised the drilling operations, and collected samples from two 50 m deep continues coring drillholes on the xylite waste dumps. The work aims to evaluate the occurrence and concentrations of Critical Raw Materials (CRM), including **Rare Earth Elements (REE)**, within these wastes and to assess the feasibility of their recovery. Findings will inform the potential valorization of xylite dumps and contribute to circular-economy and sustainability objectives in the region. We acknowledge the collaboration of Metalleftiki Kozanis GP for providing mine access and logistics support and the Geotest Consulting Engineers SA drilling company.



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July 2025

## First technical progress meeting of Waste2CRM project !

On July 2–3, 2025, the project meeting for "Determination of the potential for acquiring critical raw materials from mining wastes, and development of the method for their effective recovery" Waste2CRM - co-funded by the Research Fund for Coal and Steel - took place at Główny Instytut Górnictwa – Państwowy instytut Badawczy (GIG). All project partners were present: GIG (host), Instytut Technologii Paliw i Energii (ITPE), Łukasiewicz – Instytut Metali Nieżelaznych (IMN), SYSTRA Subterra and University of Patras SEG. The meeting focused on reviewing the current progress of the project, presenting key conclusions from the implementation of Work Package 2 (WP2), and planning and coordinating the next stages of work. A highlight of the meeting was a technical field trip to JSW KWK Budryk, the deepest active hard coal mine in Europe. Participants had the opportunity to observe the various stages of coking coal extraction and witness the challenging working conditions underground, including seeing a shearer in operation at the coal face. For many attendees, it was their first-ever descent underground - and straight to a depth of 1290 meters! An unforgettable and eye-opening experience.



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**Semptember 2025**

## Workshop at the Mineral Engineering Conference 2025!

On 23 September, at Kocierz Resort in Targanice, alongside the **Mineral Engineering Conference 2025**, we held a workshop for the Waste2CRM project - "Determination of the potential for acquiring critical raw materials from mining wastes and development of the method for their effective recovery." Participants had the opportunity to:

- ✓ learn about the importance of Critical Raw Materials (CRM) for the EU's sustainable economic development and security,
- ✓ understand the challenges of limited availability and import dependence on third countries,
- ✓ hear about the European Commission's response, including the Critical Raw Materials Act (CRMA).

A key pathway to strengthen domestic CRM supply is the **Waste2CRM** initiative - recovering CRM from coal and lignite mining waste deposits. During the workshop we presented the project concept, walked through the implementation stages, and shared the current status. Many thanks to all attendees for the engagement and insightful questions! MEC conferences series brings together voices from mineral engineering, recycling, and academia-specialists studying mineral resources - alongside research institutions, industry leaders, and mining authorities.

