#REUSE Project:
Enzymatic CO_2 capture in a rotating packed bed and electrocatalytic CO_2 reduction to useful products

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Message from the Coordinator

Dear REUSE followers,

It has been one year since the REUSE project officially began, and I am proud of the collective dedication and teamwork shown by all our partners from day one. Together, we have made remarkable progress – our technical developments are advancing steadily; deliverables have been submitted on time, and some activities are even moving ahead of schedule.

In our labs, we have developed new catalysts that minimize tar formation in biomass gasification and are now under testing. Advanced statistical tools have been used to identify fuel blends that lower CO_2 emissions. We also engineered enzyme variants that remain stable and active during CO_2 absorption. In parallel, new catalysts and substrates for CO_2 reduction are being created, and a large-surface, zero-gap electrocatalytic cell is nearly ready for trials. To support these efforts, AI-enabled models are being built to simulate core processes and guide techno-economic analysis.

Over the past year, we successfully hosted our first webinar, attracting more than 120 participants, and published two open-access scientific papers – clear signs that REUSE is gaining visibility within the carbon capture and utilization community. Exploitation is also being rolled out, as we have also begun engaging industry partners to promote adoption of these emerging technologies.

As we move into the second year, our focus turns to experimental validation and the completion of the REUSE pilot plant – a crucial step toward demonstrating the feasibility of our enzyme-based CO_2 capture and conversion technology.

We look forward to keeping you informed and inspired as we continue our meaningful journey toward innovative, sustainable solutions for Europe's decarbonisation goals.

Warm regards,
Dr. Athanasios Papadopoulos,
Research Director,
The Centre for Research & Technology, Hellas (CERTH)

Carbon Capture in Policy and in Motion

In 2024, the European Commission launched its Industrial Carbon Management Strategy, positioning carbon capture, utilization, and storage (CCUS) as a cornerstone for decarbonizing hard-to-abate sectors such as cement, steel, and chemicals. Wider initiatives such as the Net-Zero Industry Act further demonstrate the EU's commitment to scaling innovative technologies capable of delivering measurable, permanent CO_2 reductions. The ambition is clear: capture and geologically store at least 50 million tonnes of CO_2 per year by 2030.

Momentum is also being built across Europe's industrial landscape. Over 200 CCUS projects are now in development, expected to reach 60 million tonnes of annual capture capacity by 2030, exceeding EU targets. The North Sea region continues to lead large-scale storage initiatives, while new projects are emerging in southern and eastern Europe. Industrial emitters (in cement, steel, and chemicals) are integrating capture technologies as part of their energy transition plans. At the same time, innovation is expanding the frontier: utilizing pathways now include synthetic fuels, chemicals and carbon-based building materials.

In this rapidly evolving landscape, the REUSE project is pioneering a next-generation solution – combining enzyme-enhanced CO_2 capture in a rotating packed bed with electrocatalytic to transform captured CO_2 into valuable products. This approach embodies the innovation Europe needs: compact, energy-efficient, and adaptable to industrial environments with low CO_2 concentrations.

As Europe builds policy and infrastructure to support large-scale carbon management, REUSE contributes to essential scientific and technical insights. Its first year marks a decisive step toward bridging cutting-ege research and practical pathways to circular carbon use, ensuring Europe's decarbonisation goals are met in action.

Science's Corner

Check out our latest open-access research here:

Modeling and multi-criteria assessment of polyamine-based CO_2 capture in rotating packed beds using artificial intelligence

Data-driven modeling of CO_2 capture in rotating packed beds enhanced by carbonic anhydrase using explainable artificial intelligence methods

#REUSEProjectAtAGlance!

Our first video is out!

Perhaps the first step to discover what REUSE is about is through our introduction video, where we introduce our partners and their key roles in the project.

Click here to watch.

Read our expert interview article

Grab your coffee and join this conversation with **Dr. Anthanasios Papadopoulos - 7 Questions on Enzyme-Driven Carbon Capture and Utilization**, as he sheds light on this next-geneneration carbon capture technology being developed by REUSE and how it could cut costs, reduce energy use, and reshape industrial decarbonisation in Europe. *Click here to read the full article.*

Check out project visuals

- View the REUSE Project poster.
- Have a look at our leaflet.

2025 in Pictures

REUSE Open day in Thessaloniki - celebrating 40 years of innovation at CPERI ERA in Thessaloniki.

Click here to read more.

REUSE marked its first public engagement with a highly engaged webinar, attracted over 120 participants.

Click here to read more.

1st exploitation workshop held in Viena, Identifying potential avenues for future application and scale-up of the project's outputs.

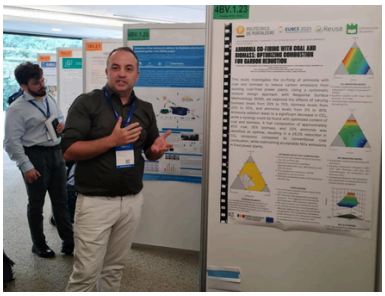
Click here to read more.

Presentation in Malaysia on how the predictive power of AI models can be utilized for enzymatic CO_2 capture in rotating packed beds.

Click here to read more.

Presentation on the Development and Corrosion Performance of Sn-Based Catalysts for Effective CO_2 Reduction to HCOOH in Stavanger.

Click here to read more.



Two poster presentations at the European Biomass Conference & Exhibition in Valencia.

Click here to read more.

Where to meet us in 2026

AMPP Annual Conference + Expo

- 15 - 19 March 2026
- Houston, Texas, USA
- Details: https://ace.ampp.org/about

36th European Biomass Conference & Exhibition

- 19 - 22 May 2026
- World Forum the Hague, Netherlands
- Details: https://www.eubce.com/

And more to be announced!

Consortium

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Media Corner

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- Follow us on LinkedIn
- Visit our website
- Watch our video
- Subscribe to our newsletter