

Revolutionize Carbon Capture and Its Reutilization: the Kick-off of the Horizon Europe Project "REUSE"



**Thessaloniki,
Greece –
October 31,
2024**

The REUSE project, an ambitious initiative funded by the Horizon Europe research programme, officially launched on October 30-31, 2024, in Thessaloniki, Greece. This groundbreaking project aims to develop advanced technologies for carbon capture and utilization (CCU), addressing one of the most pressing challenges in the fight against climate change.

Addressing Current CCU Challenges

While carbon capture and utilization technologies have shown promise, current methods face significant limitations. Existing CCU applications primarily focus on direct use in fertilizer production and enhanced oil recovery, with only about 230 Mt of CO₂ utilized annually. New utilization pathways for synthetic fuels, chemicals, and building materials are emerging, but their scale remains limited. The REUSE project aims to overcome these challenges by developing more efficient and versatile CCU technologies that can significantly increase CO₂ utilization across various industries.

Innovative Approach to Carbon Capture and Utilization

REUSE proposes a novel concept that combines several cutting-edge technologies:

- A Rotating Packed Bed (RPB) absorber using immobilized Carbonic Anhydrase (CA) enzyme and advanced solvents for efficient CO₂ capture.
- A CO₂ reduction (CO₂R) cell to transform captured CO₂ into valuable products such as carbon monoxide (CO) and formic acid (FA).

This integrated system aims to achieve higher efficiency and lower energy consumption compared to conventional CCU methods.

Key Project Objectives

- Develop and test an 80 kWth pilot-scale fluidized bed unit for co-gasification/combustion.
- Create an RPB absorber with fiber-immobilized CA for enhanced CO₂ absorption.
- Design a CO₂R cell with advanced catalysts for efficient CO₂ conversion.
- Integrate these components into a TRL 5 pilot plant for continuous operation.
- Conduct life cycle assessments to demonstrate the project's circular economy potential and environmental benefits.

Broader Impact and Knowledge Sharing

The REUSE project goes beyond technological development by addressing:

- Socio-economic aspects and Sustainable Development Goals (SDGs).
- Potential impacts on regions transitioning from fossil fuels.
- Creation of a REUSE Observatory to discuss regulatory frameworks and policy-making strategies.
- Establishment of a REUSE Knowledge HUB for education and professional development.

Consortium and Collaboration

REUSE brings together a consortium of leading research institutions and industry partners from across Europe, including: **the Centre for Research & Technology Hellas (Greece), Manchester Metropolitan University (UK), University of Leicester (UK), Newcastle University (UK), Universidade de Aveiro (Portugal), Novozymes (Denmark), CES Clean Energy Solutions (Austria), Y Squared (Greece), TBW Research (Austria), and ETA-Florence Renewable Energy (Italy)**. The project will also collaborate with other relevant initiatives through an International Stakeholder Forum and guidance from an External Advisory Board of recognized experts.

"We are excited to embark on this journey to develop next-generation carbon capture and utilization technologies. REUSE has the potential to significantly contribute to Europe's climate goals and circular economy ambitions."

Sakis Papadopoulos,
The REUSE Project Coordinator

More on REUSE

Email: info@reuse-horizon.eu
Website: reuse-horizon.eu

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This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101172954. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.