Pioneering Carbon Circularity for a Sustainable Future

Carbon capture and utilization (CCU) is at the heart of the REUSE project. REUSE introduces an innovative approach to capture CO_2 from biogenic flue gases and transform it into valuable products like carbon monoxide (CO) and formic acid (FA).

Did you know?
Over 230 Mt of CO_2 is used annually in industries, with untapped potential to transform millions more into sustainable resources.

Project Vision

REUSE envisions a carbon-neutral future by integrating cutting-edge technologies to minimize emissions and maximize the reuse of carbon.

Project Partners

Project Coordinator

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

V-SQUARED

universidade de aveiro

Manchester Metropolitan University

UNIVERSITY OF LEICESTER

tbw RESEARCH

Newcastle University

novozymes

ces CLEAN ENERGY SOLUTIONS

etaflorence renewable energies

Website

Linkedin page

info@reuseproject.eu

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Enzymatic CO_2 capture in a rotating packed bed and electrocatalytic CO_2 reduction to useful products

Reuse

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 CO_2 absorption.

Conduct life cycle assessments to demonstrate the project's circular economy potential and environmental benefits.

Design a CO_2 reduction cell with advanced catalysts for efficient CO_2 conversion.

Integrate these components into a TRL 5 pilot plant for continuous operation.

Rotating packed bed CO2 absorber on the left and rotating solvent regenerator on the right at the Translational Energy Research Centre, University of Sheffield, UK.
Credit: Newcastle University

Innovative Approach

REUSE combines two transformative technologies:

Rotating Packed Beds (RPBs): Compact, efficient systems that enhance CO_2 absorption using immobilized enzymes.

CO_2 Reduction (CO_2R) Cells: Advanced electrocatalytic cells that convert captured CO_2 into CO and FA using renewable energy.

CO_2 Utilization Pathwayve Approach

Captured CO_2 is transported via solvent systems to CO_2R cells, where it undergoes reduction. The process operates isothermally at 40°C, powered by renewable electricity, avoiding high-temperature regeneration methods.