Co-funded by the European Union

ΕΣΠΑ 2021-2027 Βιώσιμη Ανάπτυξη για Όλους Partnership Agreement 2021-2027

Programme Central Macedonia

Programme: "CENTRAL MACEDONIA" 2021–2027

Action: "Investments for the creation, expansion or upgrading of RTDI infrastructure in public academic or research institutions in the Region of Central Macedonia"

Project Title:

«Upgrade of PSDI research infrastructure for Processes and Materials in the field of Environment and Circular Economy: A Circular Approach to Recapturing and Employing CO_2 - CARE»

Description:

The Centre for Research & Technology Hellas (CERTH), is participating in the "Central Macedonia" Programme of the "Partnership Agreement on Regional Development 2021-2027" through the Action "Investments for the creation, expansion or up grading of RTDI infrastructure in public academic or research institutions in the Region of Central Macedonia" co-funded by the European Union and National Resources.

The project titled "**Upgrade of PSDI research infrastructure for Processes and Materials in the field of Environment and Circular Economy: A Circular Approach to Recapturing and Employing CO_2 - CARE**" aims to strengthen research in the fields of Environment and Circular Economy, with emphasis on sustainable development and addressing environmental challenges. It focuses on industrial symbiosis, valorizing CO_2 for the production of high value-added products, reducing the environmental footprint, and saving resources. Through **innovative technologies for CO_2 capture and electrochemical conversion**, it promotes the production of bio-products (derived from biological raw materials through clean processes), synthetic fuels, and clean energy, while at the same time supporting national and regional circular economy strategies, creating technological foundations that enhance innovation and the transition to sustainability.

In line with national and regional priorities of the 2021-2027 programming period, the project aims at generating new knowledge and fostering innovation through:

- Valorization of primary sector residues and secondary materials for the production of high value-added products via clean processes, such as combined CO_2 and steam electrolysis for the production of synthesis gas (syngas: H_2/CO).
- Promotion and development of low-carbon technologies for the production of chemical products, materials, and fuels from CO_2 originating from energy-intensive industries, including the development of CO_2 capture systems in Rotating Packed Bed (RPB) reactors and electrochemical reduction in PEM/AEM electrolysis cells to high value-added products (formic acid, methane, ethylene, ethanol).

Indicative expected benefits of this specific project, through its included interventions, are: the development of innovative materials, processes, and systems for CO_2 capture and electrochemical conversion into high value-added products; the promotion of low environmental footprint technologies; and the reduction of greenhouse gas emissions, contributing to a cleaner environment. At the same time, it enhances technological knowledge and the competitiveness of researchers and industry, promotes the integration of renewable energy sources and power storage, while creating new high-skilled jobs and strengthening human capital in Greece and Europe, with direct positive impacts on energy stability, the economy, and society.

The social impact of the project lies in the creation of new employment opportunities for highly qualified personnel, the empowerment of young researchers, and the strengthening of regional innovation capacity. At the same time, the project contributes to improving living conditions by reducing CO_2 emissions and supporting the transition to a sustainable, circular economy in the Region of Central Macedonia and beyond.

The objective of the project is: to establish integrated research infrastructures of strategic importance for the development of new technological foundations and the maturation of processes that ensure the transition to the circular economy and the integration of renewable energy sources into the production of useful products (bio-products, synthetic fuels, e-fuels) and clean energy. In this way, it makes a substantial contribution to reducing environmental costs, saving critical resources (water, energy), improving industrial-scale production costs, and ensuring environmental sustainability.

The project's results are:

- Establishment of advanced research infrastructure in PSDI Laboratory of CPERI/CERTH to support CO_2 capture and valorization technologies.
- Development of innovative materials, processes, and pilot-scale systems for CO_2 capture and electrochemical conversion into high value-added products.
- Strengthening of the scientific and technological knowledge base in the fields of clean energy, environment, and circular economy.
- Contribution to regional and national priorities of the RIS3 strategy and strengthening of regional and national capacity to address climate and energy challenges through circular economy solutions.

Duration: 10.06.2025 - 31.12.2027
Total Project Budget: 997.319,60 €