Abstract CO_2-based Fuels and Chemicals Conference 2026

UNICO$_2$RN - Flexible and efficient capture and bioconversion of CO_2 to materials and ingredients

Heleen De Wever, VITO

The EU aims for climate neutrality by 2050, with a target of a 55% emission reduction by 2030. While the energy sector can transition to renewables, chemicals and materials still depend on carbon. Their production is a major source of global emissions, making sustainable alternatives essential to meeting EU climate goals. CO_2, as a renewable resource, offers a viable solution for replacing fossil-based feedstocks in industry.

UNICO$_2$RN is an upscaling project funded by the European Union and Circular Biobased Europe (CBE), which aims to show how biogenic CO_2 can be converted into microbial proteins, biodegradable polyesters (PHAs), and amino acids using CO_2 capture technology and fermentation. This process will improve efficiency, reduce energy consumption by up to 80%, and cut greenhouse gas emissions by 75% when fossil fuels are substituted in these processes.

The project will

- Demonstrate cost-efficient capture and conversion of CO_2 from two types of biogenic CO_2 sources through the use of MOF (Metal Organic Framework)-based CO_2 capture and aerobic gas fermentation technologies
- Create a flexible, industrial-scale system for producing microbial proteins, PHAs, and amino acids from biogenic CO_2, spanning the process from raw CO_2 to final products.
- Boost productivity for targeted microbial products
- Showcase the flexibility and replicability of the proposed solutions for various types of biogenic CO_2 emissions
- Conduct product performance testing across four value chains
- Demonstrate the sustainability of processes and products through an integrated sustainability assessment, ensuring the products are Safe-and-Sustainable-by-Design.
- Promote the EU's transition to sustainable materials by advancing bio-based alternatives to fossil-based plastic and composites.
- Develop market uptake strategies and communicate results to stakeholders to encourage industry adoption of sustainable CO_2-based products.

The project consortium consists of 10 partners, including 6 SMEs and 2 large companies.

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