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PRESS RELEASE

EU-funded Research Project UNICO₂RN Converts Biogenic CO₂ into Proteins and Bioplastics

Utilising biogenic CO₂ emissions through circular solutions

Hürth, 24 February 2026: The EU-funded research project UNICO₂RN has officially started in June of 2025, bringing together European research organisations and industrial partners to demonstrate how biogenic carbon dioxide (CO₂) can be used as a feedstock for producing proteins and bioplastics. The project focuses on CO₂ from biological sources such as biomass processing, fermentation and organic waste treatment, where CO₂ is generated as an unavoidable by-product of existing industrial processes.

Unlike fossil-based CO₂ emissions, biogenic CO₂ is part of the short-term carbon cycle and does not introduce additional carbon into the atmosphere. By targeting these streams, UNICO₂RN builds on existing bio-based infrastructures and enables the integration of CO₂ utilisation into established industrial value chains.

UNICO₂RN uses captured biogenic CO₂ as a carbon source to produce microbial proteins for food and animal feed and polyhydroxyalkanoates (PHA), biopolymers for biodegradable plastics and for durable material applications. In doing so, the project demonstrates how unavoidable CO₂ emissions from bio-based industries can be converted into market-relevant products.

Combining CO₂ Capture with Industrial Bioconversion

UNICO₂RN integrates two complementary technological approaches. While metal-organic framework (MOF)-based systems are used for the efficient capture of CO₂ in high purity from biogenic point sources, the CO₂ is then converted through aerobic gas fermentation using hydrogen-oxidising bacteria, which transform CO₂ and hydrogen into microbial biomass and biopolymers.

The process chain is designed as a modular and flexible system enabling it to handle CO₂ streams of different concentrations and purities. UNICO₂RN will demonstrate the process chain at two industrial sites under near-commercial conditions (Technology Readiness Level 7), covering CO₂ capture, bioconversion and downstream processing. These demonstrations will validate the production of microbial proteins suitable for food and feed applications as well as PHA-based materials that can replace conventional fossil-based plastics.

European Cooperation with a Focus on Safety and Sustainability

Alongside technological development, UNICO₂RN includes comprehensive safety, environmental and sustainability assessments. Life cycle, techno-economic and social impact analyses will support safe process design, responsible scale-up and alignment with emerging EU sustainability and certification frameworks for CO₂-based products.

With these objectives ahead, the UNICO₂RN consortium brings together ten partners from across Europe combining expertise from industry and research. The project is coordinated by VITO (BE) and implemented by a European consortium consisting of AERBIO (NL), CO₂BioClean (DE), IDENER (ES), Lesaffre (FR), NIZO Food Research (NL), nova-Institute (DE), NUADA (UK), SABIO Biomaterials (IT) and Veolia (BE).

Further information about the project is available at <https://unico2rn.eu>. Interested readers may also register for the project newsletter via the website to receive updates on project activities and results.

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Since the mid-1990s, the nova-Institute has been dedicated to sustainability and today focuses primarily on renewable carbon cycles. As an independent research institute, it supports companies – particularly from the chemical, plastics, and materials industries – in the use of renewable carbon derived from biomass, direct CO₂ utilisation (CCU), and recycling.

With a multidisciplinary team of scientists, the nova-Institute participates in international innovation projects and provides science-based management consulting. The institute follows a holistic approach: its experts analyse which technologies and raw materials are suitable for specific products, in which markets their application is feasible, which regulatory frameworks apply, how sustainable the solutions are, and how they can be successfully positioned in the market.

Based on these analyses, the team develops tailored strategies to support the transformation from fossil to renewable carbon. Around 50 experts from various disciplines work together to drive the defossilisation of industry – for a climate-neutral future.

More information: www.nova-institute.eu – www.renewable-carbon.eu

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