

Latest Updates from CARMA Project

CO₂-based production of methane and proteins for the decarbonization of industrial processes

The Interreg programme region comprising Upper Austria, South Bohemia, and South Moravia is characterized by comparatively high CO₂ emissions from industry and energy production. In 2023, CO₂ emissions amounted to approximately 108 million tonnes in the Czech Republic and 69 million tonnes in Austria. While emissions in Austria are primarily driven by industry, which accounts for around 34% of total emissions, the energy sector is a major contributor in the Czech Republic, responsible for about 30% of emissions. At the same time, aquaculture remains heavily dependent on imported fishmeal and soy. Regional and sustainable alternatives for animal feed are still largely unavailable. As a result, climate protection, supply security, and sustainable food systems continue to face significant challenges.

The Interreg project CARMA (ATCZ00278), launched in April 2026, addresses precisely these challenges (see Figure 1). In the first step, CO₂ emissions from industrial sources such as steel, cement, and energy production are converted into methane (CH₄) through electrolysis. Methane is an important energy carrier for a wide range of industrial applications. In the next step, specialized microorganisms use methane to produce microbial biomass, which can serve as a sustainable alternative protein source. Its nutritional value and digestibility are evaluated in feeding trials with fish. The potential of microbial protein extends far beyond aquaculture. As a regionally produced and sustainable source of protein, it could in the future be used in poultry farming, pet nutrition, and the cosmetics industry.

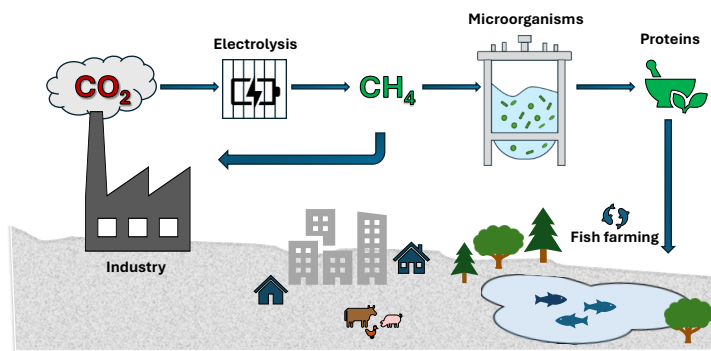


Figure 1: Overview of the CARMA innovation chain from CO₂ to CH₄ to microbial protein.

Four research institutions from Upper Austria, South Bohemia, and South Moravia are participating in this cross-border research project:



K1-MET GmbH is the lead partner of the project and is responsible for the conversion of CO₂ into CH₄ through electrolysis, as well as for the cultivation and growth optimization of methane-utilizing microorganisms.



The University of South Bohemia in České Budějovice, Faculty of Fisheries and Protection of Waters, is responsible for communication activities, biomass analysis, and fish feeding trials.



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The Mendel University in Brno, Faculty of AgriSciences, Department of Chemistry and Biochemistry, is focused on the development of 3D electrodes for CO₂ electrolysis.

First insights into the current research activities

A suitable setup for CO₂ electrolysis is currently being established in the K1-MET laboratory and electrodes for electrolysis experiments are being fabricated. Suitable methane-utilizing microorganisms, such as *Methylococcus capsulatus*, are being selected, and their cultivation in shaking flasks is being tested and optimized to achieve the highest possible cell density. Subsequently, the microbial dry biomass is analyzed and evaluated with regard to its amino acid composition. For this purpose, a method has been developed that enables rapid characterization using only small sample quantities. At JKU, the experimental setup is ordered and a modelling framework is currently set up to obtain a deeper understanding.

On 11 August 2026, an exchange meeting between the University of South Bohemia and K1-MET took place in Linz. The team visited the laboratories and discussed the progress achieved so far, as well as the next steps in the implementation of the project. Pilot cultures of methanogenic bacteria were sampled for the preparation of amino acid profiles. The next project meeting involving all partners is planned for autumn at the Faculty of Fisheries and Protection of Waters in České Budějovice.

Current communication activities

The CARMA project was featured in the June edition of the Czech **trade journal Rybníkářství**, a well-established publication dedicated to pond management, fish farming, and aquaculture. The article presents the project's objectives and highlights its innovative approach of utilizing CO₂ as a resource for the production of sustainable microbial protein.

The CARMA project was also featured at the **BioNanoNet Workshop** at JKU (8 July 2026).

In addition, the CARMA project will be presented by the University of South Bohemia in České Budějovice at the **AQUACULTURE EUROPE 2026 conference** (28 September to 1 October 2026) in Ljubljana, Slovenia through a poster presentation. In addition, the University of South Bohemia in České Budějovice organized a **specialist lecture** on methodologies for the evaluation of scientific data, the integration of information for market research purposes, and their critical assessment. The target audience consisted of doctoral candidates and researchers working in the fields of fish nutrition, feed ingredients, and the evaluation of protein sources. The lecture was delivered by the Editor-in-Chief of the journal *Reviews in Aquaculture* (Wiley), which is ranked as the leading scientific journal in the field of fisheries and aquaculture.

Would you like to learn more about the conversion of CO₂ into sustainable protein?

Stay informed about the progress and results of the CARMA project and become part of our innovation network. As a member of the stakeholder network, you will receive regular project updates, access to the latest research findings, and invitations to events and workshops.

Register for the [CARMA network](#) today!



The project is co-funded by the European Regional Development Fund (programme Interreg Austria – Czechia 2021–2027).