

DefiCO2 2026-2030 :

Faced with the climate emergency, managing carbon dioxide (CO₂) represents a major scientific, technological, and societal challenge. Beyond emissions reduction, carbon capture, storage, and utilization (CCUS) offers essential opportunities to build a circular carbon economy and achieve climate neutrality. However, the deployment of these solutions remains limited by scientific, technological, economic, and societal barriers, particularly for dispersed and heterogeneous CO₂ sources, such as methanization units, local communities, industrial facilities, and the atmosphere.

Building on the interdisciplinary momentum initiated in 2022, DefiCO2 aims to reach a new level by developing an integrated approach combining experimental sciences, engineering, and social sciences and humanities to design realistic, sustainable, and socially accepted solutions for CO₂ management and valorization. The project brings together a community of more than 200 scientists from 16 laboratories covering chemistry, biology, physics, engineering, economics, and sociology, in close collaboration with industrial and territorial partners. It builds on the structuring interactions initiated and consolidated during the first phase of the program, addresses new dimensions, including CO₂ storage, and involves additional laboratories.

DefiCO2 is structured around three main axes. The first aims to characterize CO₂ sources and to define optimal strategies between local valorization, transport, and storage, while integrating territorial and socio-economic constraints. The second axis focuses on the development of capture, conversion, and storage technologies adapted to real CO₂ stream compositions, including catalytic, biological, and mineralization approaches, and systematically integrating life cycle assessment to evaluate their environmental performance. The third axis analyzes the economic, regulatory, and societal conditions for deploying these technologies to identify viable business models, realistic deployment scenarios, and key levers to foster their acceptability and adoption.

Beyond the expected scientific advances, DefiCO2 aims to deliver structuring impacts at multiple levels. Scientifically, it will enable the development of new solutions to convert CO₂ into valuable resources (fuels, materials, and value-added molecules), thereby strengthening Grenoble's international visibility in this field. Economically and territorially, it will foster interactions with industrial stakeholders and local authorities, contributing to the transition toward a decarbonized economy. Societally, it will help inform public decision-making and strengthen public support for CCUS technologies, notably through science communication and outreach activities.

Finally, the project will contribute to the long-term structuring of the community. Interdisciplinary training programs, thematic schools, scientific workshops, and support mechanisms for students and early-career researchers will strengthen competencies at the interface of the experimental sciences, engineering, and the social sciences and humanities. A collegial, agile, and proven governance structure will ensure strategic coherence, foster collaboration, and sustain momentum beyond the project's duration, thereby positioning Grenoble as a leading national and international hub for CO₂ valorization.