



With the contribution of the LIFE Programme
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LIFE20 CCM/GR/001642

DEMONSTRATION OF A MOBILE UNIT FOR HYBRID ENERGY STORAGE BASED ON CO₂ CAPTURE AND RENEWABLE ENERGY SOURCES

6TH NEWSLETTER

2026

FROM AGIOS DIMITRIOS TO LAVRIO: RELOCATION AND CONTINUED OPERATION OF THE MOBILE HYBRID ENERGY STORAGE UNIT

Following the successful demonstration at the Agios Dimitrios PPC Power Plant in Western Macedonia, the mobile hybrid energy storage unit of the LIFE CO₂toCH₄ project has been relocated to the Lavrio Technological Cultural Park (LTCP) in Attica. This transition marks a critical milestone in the project's lifecycle: moving from an industrial power plant environment to a technology park setting, where the unit's operational flexibility and independence from a fixed emission source can be further validated. The relocation demonstrates a core design objective of the system: its mobility and adaptability to different operational contexts.

The relocation to LTCP serves a distinct and deliberate technical purpose, introducing a fundamentally different CO₂ feedstock scenario. At Agios Dimitrios, the unit was positioned adjacent to the desulfurisation unit of the plant's fifth chimney and operated with synthetic flue gas as its CO₂ source. At LTCP, the unit is coupled with a biogas production unit available at the park, and CO₂ is derived directly from the biogas stream. This represents a significant and meaningful shift in the technology's application scope: biogas, produced through anaerobic digestion of organic waste, agricultural residues, or sewage sludge, typically contains 35–45% CO₂, which would otherwise be vented to the atmosphere. By feeding this CO₂ fraction into the biomethanation system, the mobile unit effectively upgrades raw biogas into high-purity biomethane, valorising a waste gas stream.

This biogas-coupled configuration directly demonstrates the transferability of the LIFE CO₂toCH₄ technology to the biogas sector, one of the primary target sectors for replication identified in the project's exploitation strategy, and validates the unit's ability to operate with a biogenic, rather than fossil-derived, CO₂ source. More broadly, it confirms the system's core design objective: a flexible, mobile solution capable of operating across diverse CO₂ sources and deployment contexts, from industrial power plants to biogas facilities, and ultimately to remote

PROJECT BENEFICIARIES



or non-interconnected energy systems, such as islands or off-grid communities.

The mobile unit was transported from the Agios Dimitrios Power Plant in Western Macedonia to the LTCP in Lavrio after the demonstration phase was completed. The unit was reinstalled at the park's facilities and integrated with the existing research infrastructure. Restart procedures included inoculum management by the ELGO and AUTH teams to maintain microbial community activity after transport, as well as system checks of the PEM electrolyser, membrane separation unit, and PLC control systems. The first Living Lab event at LTCP took place on 18th December 2025, marking the official opening of the Lavrio demonstration activities to the public.

The Lavrio validation phase represents the final technical demonstration step before the project's completion in June 2026. Key objectives include achieving stable biomethanation under the new operational conditions, collecting performance data to support the project's final environmental, economic, and social impact assessment, and demonstrating the replicability and transferability of the technology to sectors beyond power generation, including agri-food processing, biogas upgrading, and carbon-intensive industries.

The LIFE CO₂toCH₄ project continues to validate that biological methanation, integrated within a smart, mobile hybrid energy storage unit, represents a viable and scalable pathway toward the EU's climate neutrality goals.



Figure 1. The mobile unit installed at LTCP.

NEWS & EVENTS

The LIFE CO₂toCH₄ **final conference** was successfully held as part of **Forward Green & Renewable EnergyTech 2026** in Thessaloniki, highlighting the role of CO₂ utilisation technologies in the energy transition and industrial decarbonisation.

At the Open Stage of HELEXPO, the event was opened by Apostolos Antoniadis, who presented the project's vision and strategy. The discussion was moderated by Polina Asimakidou, LIFE Projects Manager, PPC Renewables, and featured Solonas Ioannou, Secretary General of the Hellenic Biogas Producers Association, Dimitris Exarchos, Decarbonization PMO Manager at Titan Cement Group, Vasilina Sarla, Representative of the General Secretariat for Energy and Mineral Raw Materials, and Dr. Christos Roumpos, Director of Mining Studies, Operation and Mine Closure, PPC.

The discussion highlighted the growing interest of industry in CCUS technologies, the decisive role of CO₂ emission costs in shaping viable investments, as well as the challenges and opportunities of the regulatory framework for implementing such solutions in Greece. At the same time, the prospects of the LIFE CO₂toCH₄ technology were presented, confirming the importance of developing integrated solutions for the energy valorisation of CO₂.

The strong participation and high quality of the dialogue confirmed the importance of synergies between industry, public authorities, and research in accelerating the green transition.



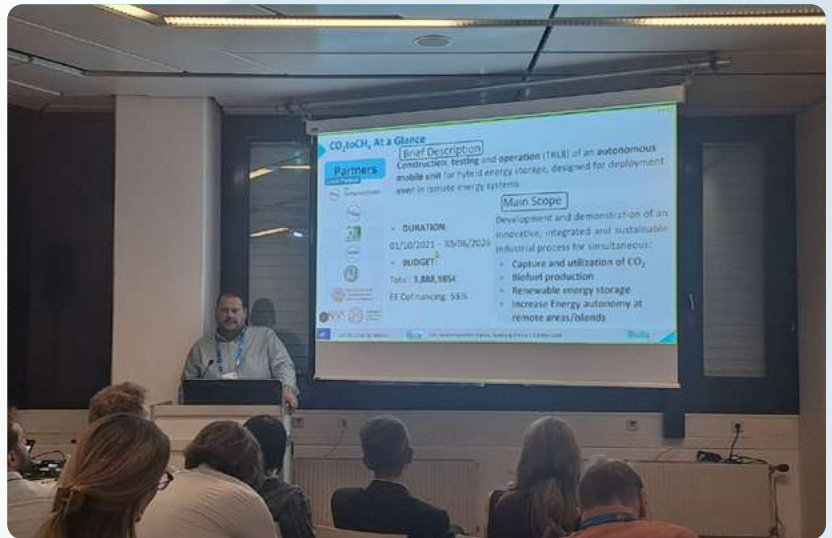


The LIFE CO₂toCH₄ project was proudly presented at the **European Geosciences Union (EGU) General Assembly 2026**, held in Vienna, Austria, from 3–8 May 2026.

With more than 22,000 participants from 125 countries and over 20,000 scientific presentations, EGU is one of the world's largest scientific gatherings in the fields of geosciences, environment, and climate research.

The presentation, delivered by the project coordinator, focused on the replication and transferability potential of the LIFE CO₂toCH₄ technology, highlighting how innovative Carbon Capture and Utilization (CCU) pathways can support industrial decarbonization, the Just Transition of coal-dependent regions and the development of circular carbon solutions.

The project attracted considerable interest from the international scientific community, generating fruitful discussions on biomethane production, hybrid energy storage systems, and the opportunities for scaling up and transferring the LIFE CO₂toCH₄ concept to different industrial sectors.



LIVING LAB AT THE LAVRION TECHNOLOGICAL CULTURAL PARK

The second LIFE CO₂toCH₄ Living Lab took place on 19 February 2026 at the Lavrio Technological Cultural Park, focusing on the LIFE CO₂toCH₄ project (LIFE20 CCM/GR/001642). The event brought together students and teachers from the 3rd Experimental Junior High School of Agia Varvara "Antonis Samarakis", as well as registered visitors, creating a diverse audience with strong interest in green transition technologies.

The day began with a detailed presentation of the LIFE CO₂toCH₄ project by Maria Kasidoni. The presentation focused on the conversion of carbon dioxide into renewable biomethane through the process of biomethanation, highlight-

ing the role of technology in utilizing CO₂ as a valuable raw material. Particular emphasis was placed on the project's contribution to reducing greenhouse gas emissions, strengthening the circular economy, and developing sustainable energy systems.

In addition, Konstantinos Passadis presented our project, highlighting innovative solutions for bio-waste management and the production of bioproducts, as well as the LANDFEED project, which aims to use sustainable local resources to produce organic fertilizers, improve soil health, and reduce environmental impacts.

This was followed by a guided tour of the modern facilities of the Technological Park, and more specifically the CO₂toCH₄ unit, where participants had the opportunity to learn firsthand about the operation of the system and its environmental benefits.

Afterwards, participants joined a guided tour of the Lavrio Technological Cultural Park facilities, led by Ms Balopita, who presented the historical significance of the site and highlighted its transformation from a centre of industrial activity into a modern hub of research and innovation.

The 2nd Living Lab highlighted the CO₂toCH₄ project as a core example of innovation and sustainable energy transition, strengthening dialogue among researchers, students, and citizens, while actively promoting knowledge dissemination on the utilization of CO₂ and the production of renewable biomethane.



CO2toCH4 BENEFICIARIES



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CO2toCH4 SUMMARY PROJECT DATA

Total Eligible Project Budget: 3,888,985 Euro

Project Implementation period: 4 years

EU financial contribution requested: 2,138,941 Euro
(= 55.00% of total eligible budget)

The project implementation started in October 2021 and it is expected to be completed by June 2026, in selected regions of Greece and Italy.

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