



SEMPRE-BIO

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Securing domestic production of cost-competitive biomethane

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SEMPRE-BIO at glance

Goals:

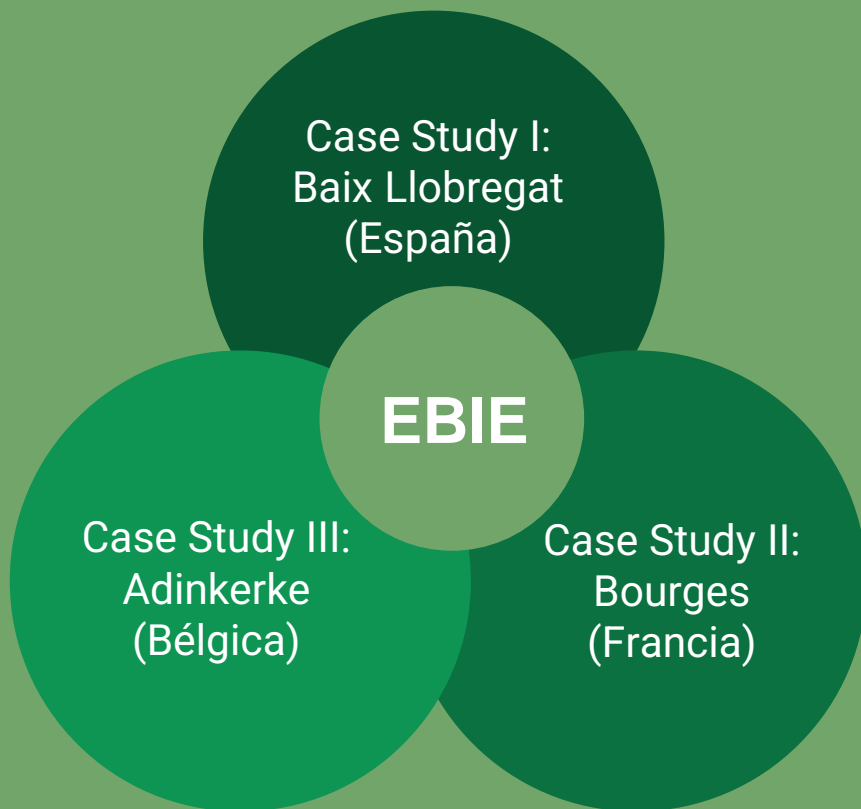
1. demonstrate novel and cost-effective biomethane production solutions and pathways,
2. increase the market up-take of biomethane related technologies,
3. support circular economy,
4. reduce dependence on fossil fuels.

Three Innovation Ecosystems will be co-developed to demonstrate the need for specific retrofitting and scale-up approaches tailored to the dissimilar scenarios existing across Europe.



🕒 42 months 🌍 16 partners / 6 countries

€ 9.93 M€ of public funding



European biomethane innovation ecosystem





Case study I: Baix Llobregat (ES)

Partners & relevant stakeholders:

- **Feedstock & site:** Wastewater treatment plant anaerobic digestion biogas



Aigües de Barcelona



- **Technology:** Biogas/CO₂ methanation (P2G) & electrolysis



Technical University of Denmark

CETAQUA
CENTRO TECNOLÓGICO DEL AGUA

ProPuls



SINTEF

- **Final use of biomethane:** Compression to CNG and use for public transportation



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Progress

- Basic engineering phase of PEMEL commenced, with PROPULS actively engaged in the PID and HAZOP processes.
- Stack manufacturing currently underway, with contributions from both SINTEF and PROPULS.
- Biomethanation plant, the basic engineering for CS-I, in the conceptual engineering stage, utilizing data from DTU and incorporating insights from previous lab/pilot scale experiments.





Case study II: Bourges (FR)

Partners & relevant stakeholders:

➤ **Feedstock:** Green waste from the city of Bourges



➤ **Site:** Eco Pôle de Marmagne

➤ **Technology:** pyrolysis
& CO methanation



➤ **Economic valuation:**



SINTEF



➤ **Final use of biomethane:** Injection to grid



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Progress




- Design in progress utilizing the initial data from DTU and data from previous lab/pilot scale experiments.
- Identification of several suppliers for biomethanation with selection process ongoing.
- Selection of anaerobic digestion (AD) plant equipment adapted to CSII methanation underway.
- An order has been placed for pyrolysis equipment, with manufacturing currently in progress. Commissioning is scheduled for October.





Case study III: Adinkerke (BE)

Partners & relevant stakeholders:

- **Feedstock & site:** Cattle manure and organic biological waste as cosubstrate - Farm De Zwanebloem
- **Technology:** cryogenic separation 
- **Economic valuation:**  
- **Final use of biomethane:** Bio-LNG to be stored locally and collected by truck periodically
- **Other outcomes:** CO₂ valorisation (proteins, biopolymers, microalgae, purple bacteria)





Progress – Integrating biomethane upgrading technology for greenfield scenarios

- AD plant is under construction. Planned by the end of September.
- Biogas production planned by November 2023.
- Permits for the Demo Plant in Adinkerke in progress.
- Continuous pilot tests:
 - Anaerobic digestion tests with pure manure are finalized
 - Microalgae production test for WP4
 - CO2 capture test
 - Cryopolish tests





Progress – Advanced technologies for efficient valorization of CO₂ from biomethane streams

- Production of marketable biopolymers and biochemicals from CO₂
 - Tender published with requirements for the construction of Hybrid fermenter.
- Production of marketable alternative protein sources from CO₂
 - Start-up of the conventional photobioreactor of 500 L at INNOLAB place.
 - Tender published with requirements for the construction of PBR with the objective to start the construction in October.
 - Conducting experiments at lab-scale for the identification of the optimal operational conditions.





Expected outcomes



- 01** Increase the cost-effectiveness of conversion in biomethane production.
- 02** Diversify conversion technologies for biomethane.
- 03** Contribute to the acceptance of biomethane technologies in the gas market.
- 04** Contribute to the demonstration on a semi-industrial scale of new conversion technologies to produce biomethane from wastewater, wood biomass and manure.





Expected impacts

- BM price 55-75 €/MWh.
- Modularization: CAPEX decrease of 10%.
- New revenue streams from liquid CO₂.
- +15% production from non-dominant technologies and feedstocks.
- Push market uptake.
- Participate in Biorefine Cluster Europe.
- Goals:
 - 10 plants CS-I in 10 years
 - 65 plants CS-II in 10 years
 - 150 plants CS-III in 10 years
- 2050 production 4.5 bcm (3.2% total BM).





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