Progress in Biogas VI
University of Hohenheim
Stuttgart – Germany
2 - 4 September 2024

SEMPRE-BIO

Synergizing Sustainability: Cetaqua's Pioneering Biomethane Projects Fueling Europe's Climate Neutrality

SEMPRE-BIO: SEcuring doMestic PRoduction of cost-Effective BIOmethane

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CETAQUA
WATER TECHNOLOGY CENTRE

Pioneering public-private partnership model

Main activities

1. R&D

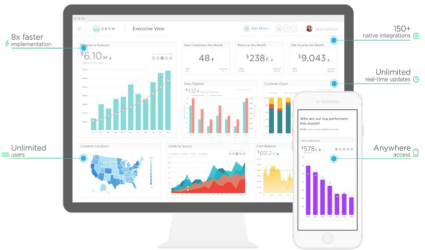
- Water resource management
- Critical infrastructure management and resilience
- Biofactory and resource recovery
- Environmental, economic and social sustainability
- Water 4.0

+450
Privately funded projects

+100
Publicly funded projects

2. KNOWLEDGE-BASED SERVICES

3. DIGITAL SERVICES



SEMPRE-BIO at glance

Goals

1. Demonstrate novel and cost-effective biomethane production solutions and pathways.

1. Increase the market up-take of biomethane related technologies.

1. Support circular economy.

1. Reduce dependence on fossil fuels.

Numbers

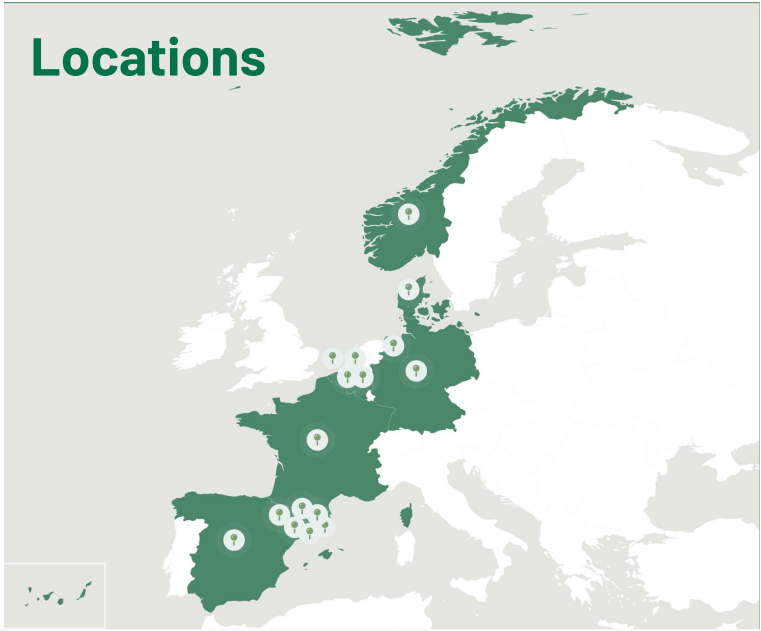
42 Months

16 Partners

6 Countries

9.9M Funding

Locations



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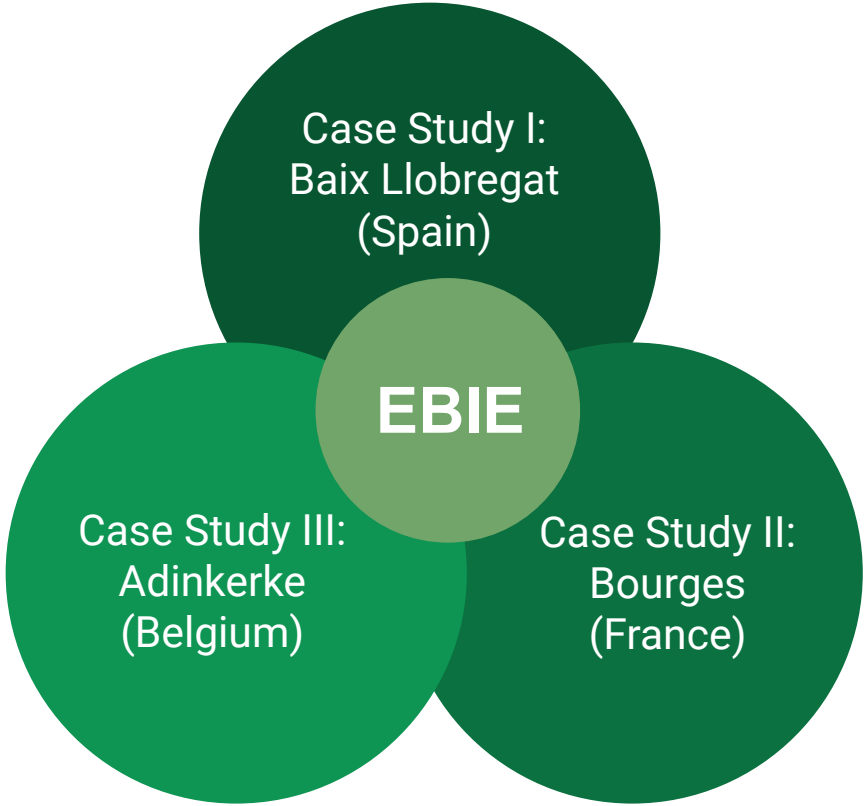

European Biomethane Innovation Ecosystem

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Case Study I: Baix Llobregat (Spain)

Feedstock	Technology		Site	Final use of biomethane
Wastewater	CO^2 Biomethanation	Electrolysis	Case Study 1: El Prat de Ll (ES)	Compression to CNG for public transportation

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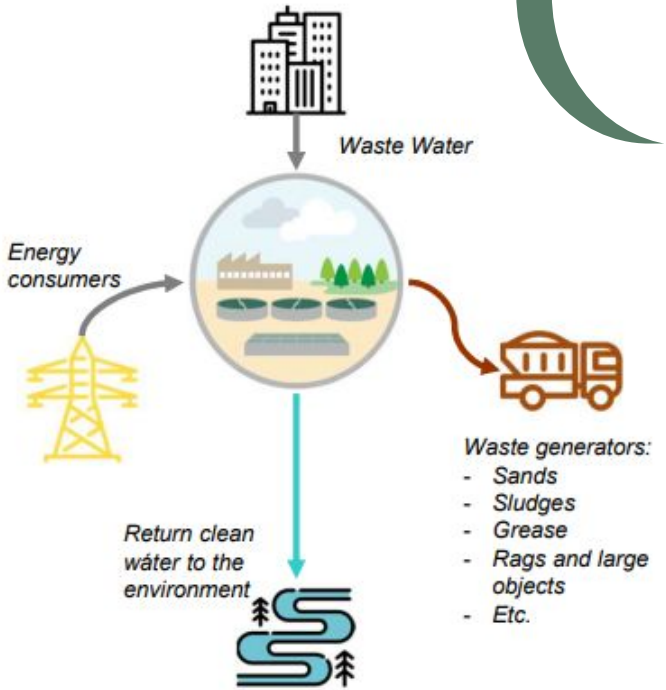
Aigües de Barcelona · CETAQUA CENTRO TECNOLÓGICO DEL AGUA · ProPuls · DTU · SINTEF · DBFZ · TMB

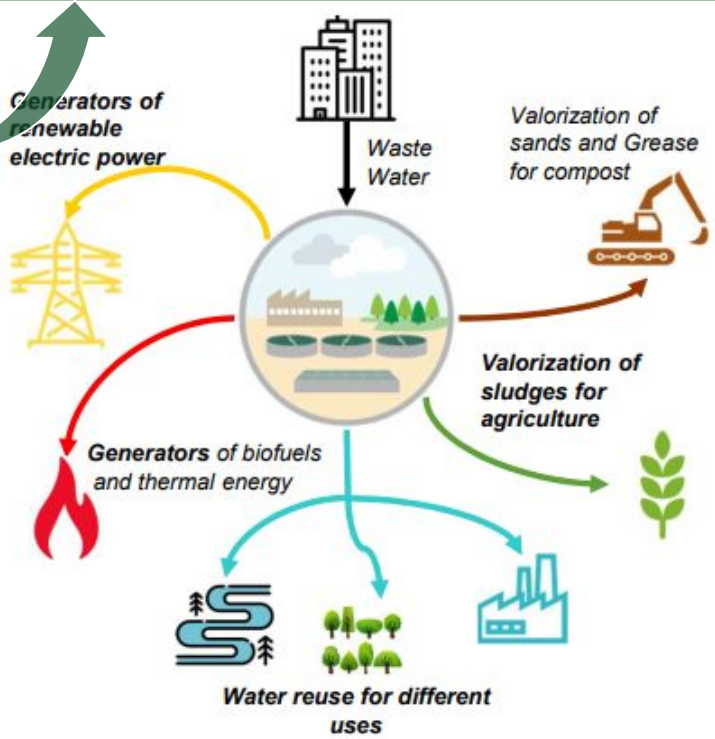
Case Study I: Baix Llobregat (Spain)

Aigües de Barcelona

Old Paradigm: Sewage Treatment Plant



New Paradigm: Biofactory



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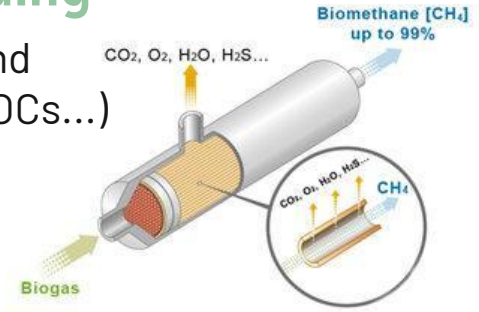
Metanation vs Upgrading

Conventional upgrading

Separating CO_2 from CH_4 and purifying (H_2S, siloxanes, VOCs...)

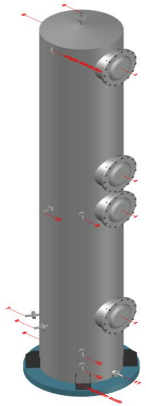


	WWTP Biogás [vol.%]	Biomethane for injection [vol.%]	Biomethane for mobility [vol.%]
CO_2 [vol.%]	**30-40%**	<2%	<5%*
CH_4 [vol.%]	**60-70%**	>90%	>90%*
H_2 [vol.%]	0%	<5%	<2%
H_2S [ppm]	5000-300	<3	<3

*For transport: CO_2+N_2+O_2 max. 5%, O_2 max. 1%, Methane number min. 70, Wobbe index below 41.9-49.0 MJ/Sm^3, LHV min. 44 MJ/kg

Methanation

Addition of H_2 to biogas to convert CO_2 to CH_4 through methanogens.



Increase of biomethane sales by 50-80% (all carbon is valorized).
High electrical consumption (H_2 generation) and CAPEX (electrolyzer).

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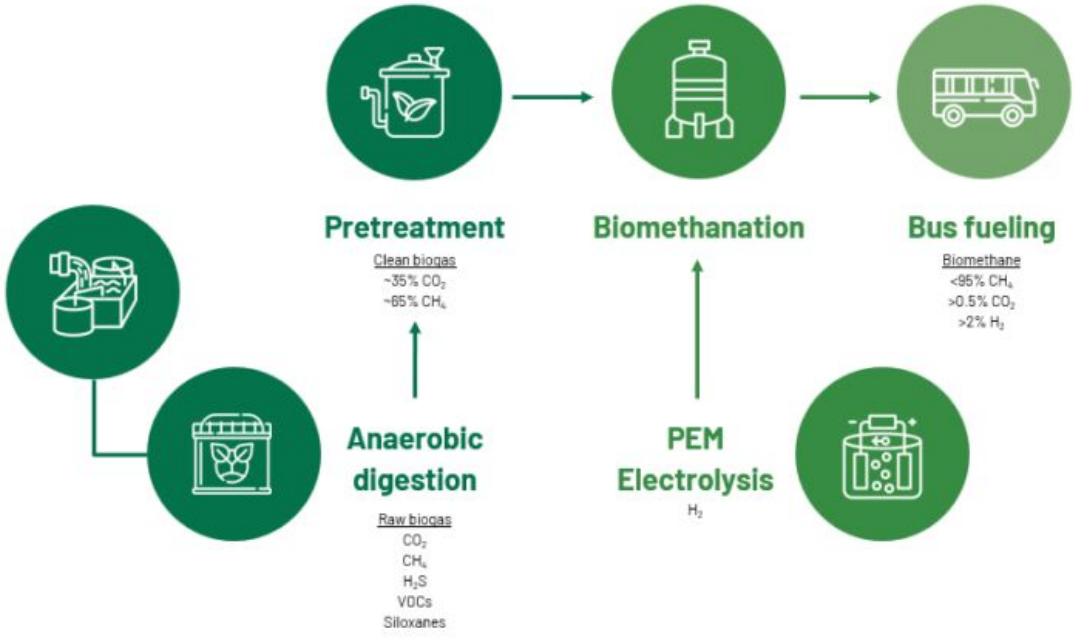
Case Study I: Baix Llobregat (Spain)



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Biomethanation Demoplant

7. Production Optimization
2026

6. Operation

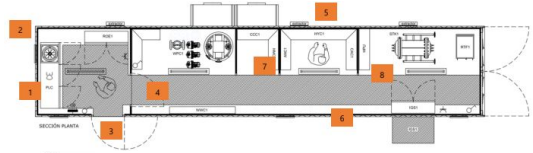
5. Start-up
February 2025

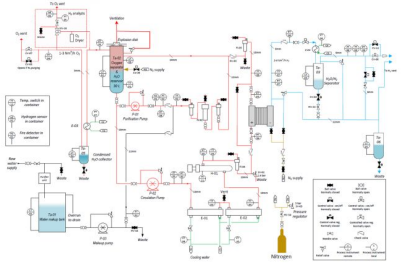
4. Baix Llobregat case (CS1)Construction

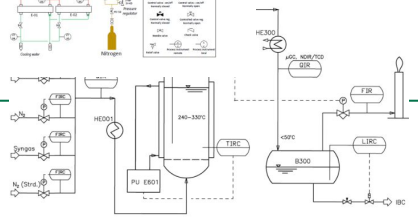
3. Baix Llobregat case (CS1) demo design

2. Reactor configuration experimentation and optimization

1. Project Start
November 2022







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Predecessor Project

Life Nimbus: Non-IMpact BUS

39 Months

4 Partners

1 Countries

€ 1.9M Funding

7. Production Optimization
May 2024

6. Batch operation

5. New operational strategy
NIMBUS RE-Start up. **February 2024**

4. Identification of limiting factors

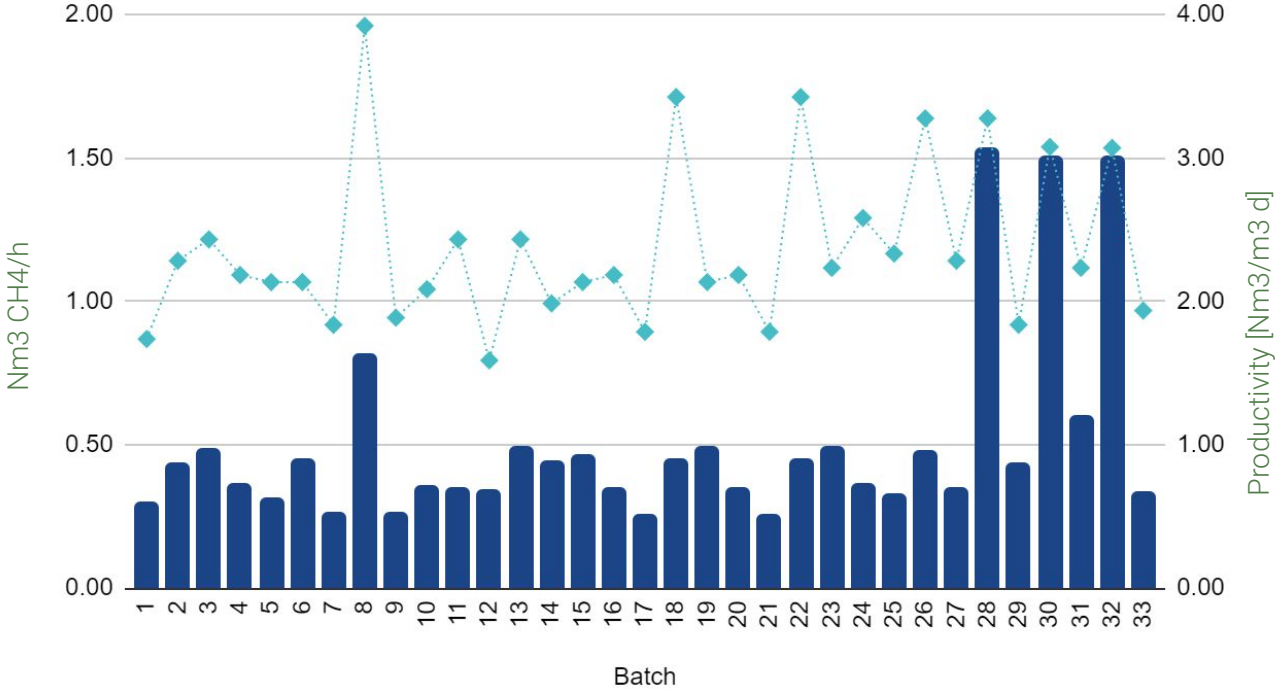
3. Bus fuel-up

2. Batch and continuous operation

1. Start-up
July 2023

Co-funded by the European Union

Results: Life Nimbus



CH_4 = 95 - 98 %

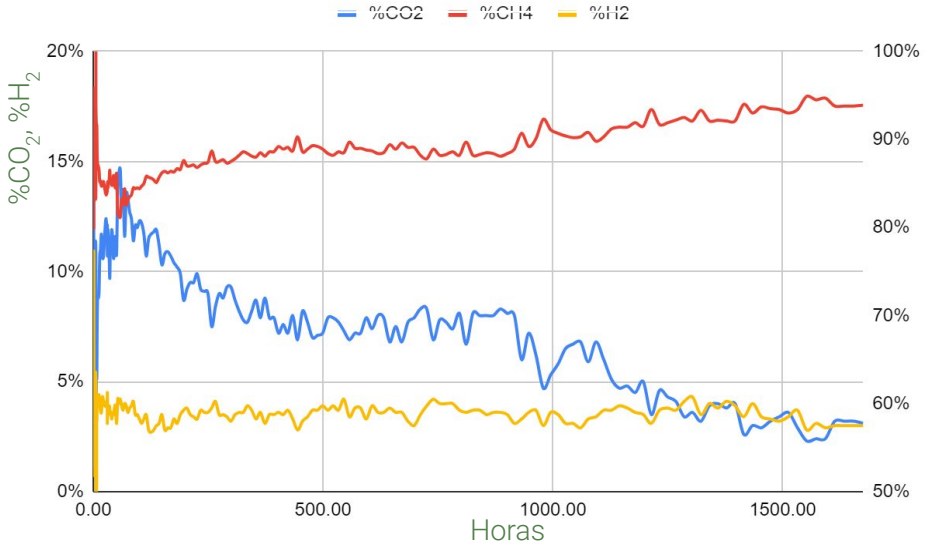
148 Kg CH_4

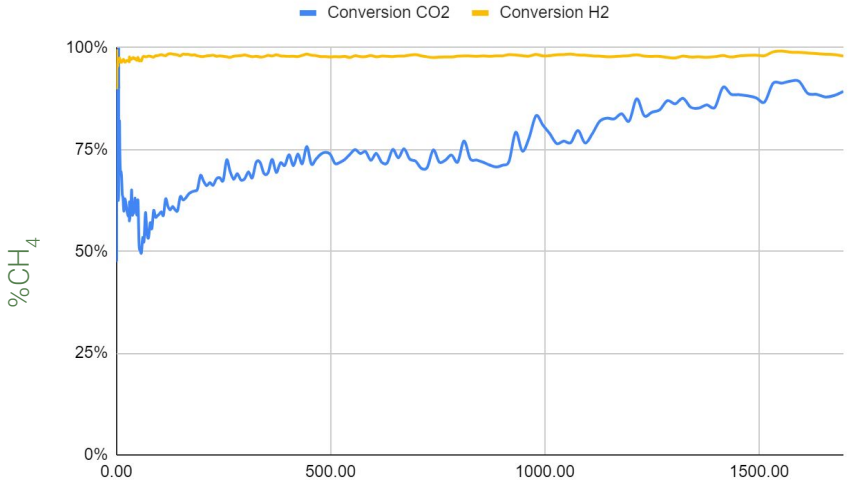
246 Km

sep - oct 23 = 0,04 Nm^3/h

mar- abr 24 = 0,3 - 0,5 Nm^3/h

Results: Life Nimbus





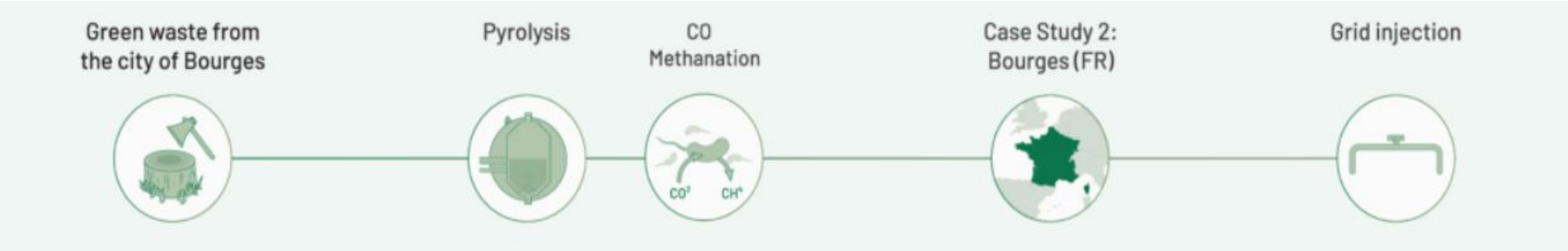
Case Study 2: Bourges (France)

Feedstock

Technology

Site

Final use of biomethane



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terrawatt DBFZ DTU SINTEF

Case Study 3: Adinkerke (Belgium)

Feedstock	Technology	Site	Final use of biomethane
Cattle manure and organic biological waste as co-substrate	Cryo separation	Case Study 3: TBD (BE)	Stored locally

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CRYO inox · Beta Biodiversitat, Ecologia, Tecnologia Ambiental i Alimentària · DBFZ · SINTEF · Innolab · UNIVERSITEIT GENT

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.

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