SEMPRE-BIO

B-WaterSmart

Energy recovery in WWTP through waste gases
Training Action on tool #10

SEMPRE-BIO

SEcuring doMestic PRoduction of cost-Effective BIOmethane

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CENTRO TECNOLÓGICO DEL AGUA

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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.

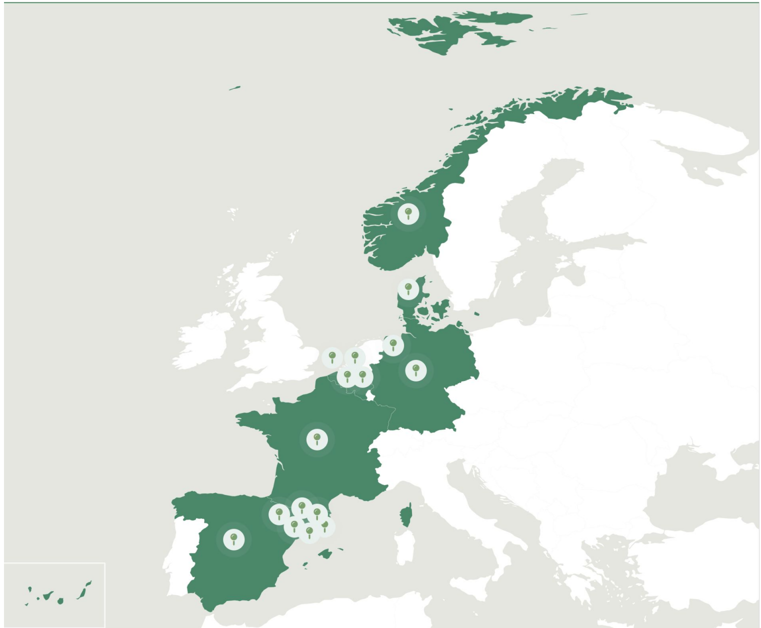
Numbers

42 Months

16 Partners

6 Countries

9.9M Funding



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NIMBUS

Goals

Foster circular economy:

- Generation of biomethane from sewage sludge.
- Conversion of energy to gas (Power to Gas).
- Use as a sustainable fuel for public transportation.
- Reduce carbon emissions.

Numbers

39 Months

4 Partners

1 Countries

1.9M Funding

Co-funded by the European Union

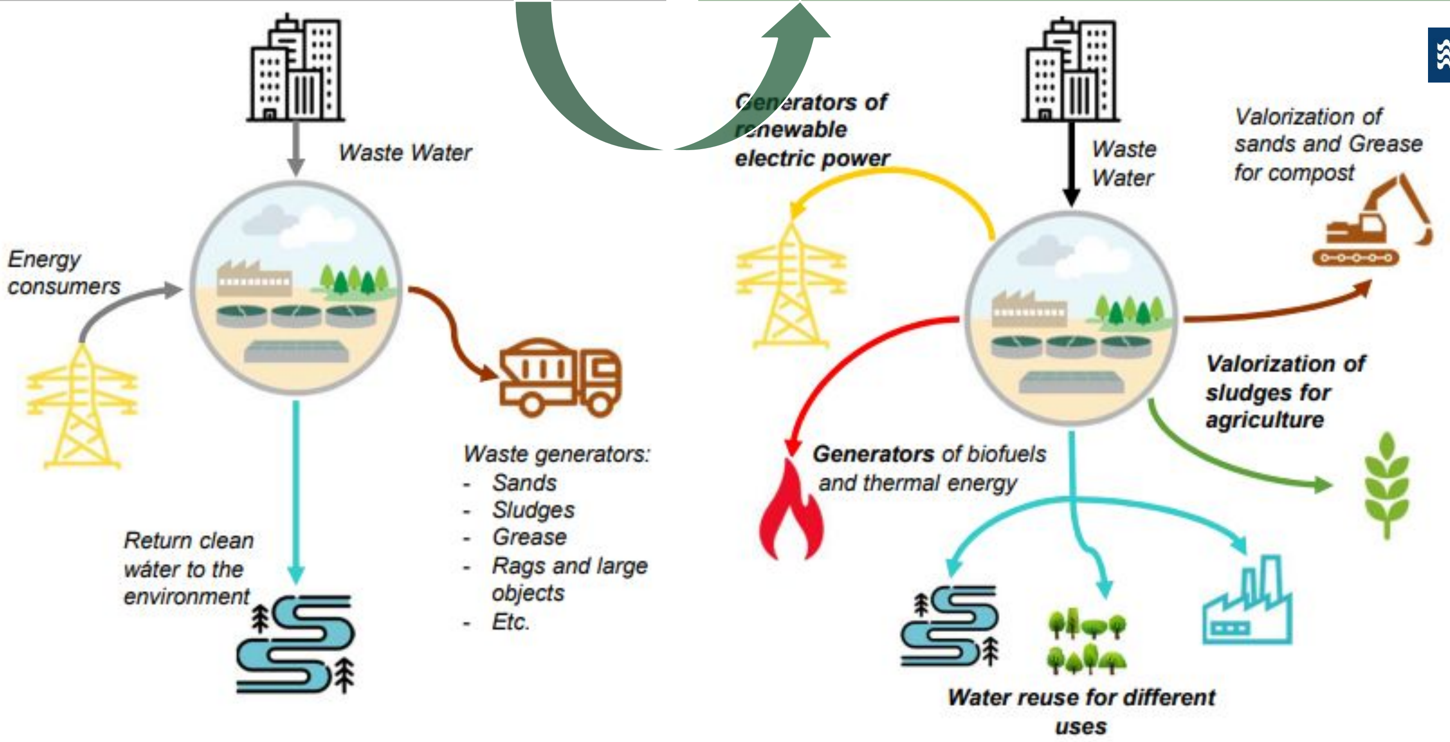
CETAQUA WATER TECHNOLOGY CENTRE · Aigües de Barcelona · UAB Universitat Autònoma de Barcelona · TMB

Project Site: WWTP

Old Paradigm: Sewage Treatment Plant

New Paradigm: Biofactory

Aigües de Barcelona



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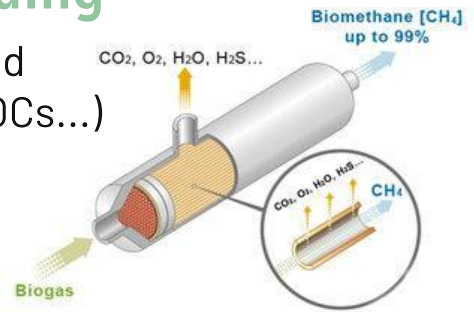
Metanation vs Upgrading

Conventional upgrading

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

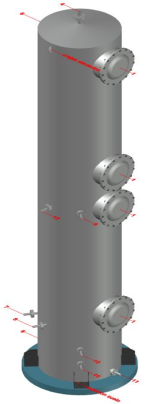


	Biogás EDAR [vol.%]	Biometano inyección [vol.%]	Biometano transporte [vol.%]
CO_2 [vol.%]	30-40%	<2%	<5%*
CH_4 [vol.%]	60-70%	>90%	>90%*
H_2 [vol.%]	0%	<5%	<2%
H_2S [ppm]	5000-300	<3	<3

*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/Sm3, LHV min. 44 MJ/kg

Methanation

Adding H_2 to biogas to make CO_2 react to CH_4 through methanogens.



NIMBUS

- 4 Nm^3/h de CH_4
- Mesophilic (~35ºC)
- 3-4 barg
- Electrolyzer

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- 14 Nm^3/h de CH_4
- Thermophilic(~55ºC)
- 10-12 barg
- PEMEL

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Biomethanation

Energy

Renewable energy supply surplus electricity.

Electrolysis

Hydrogen is produced from excess power.

Biogas

Clean biogas without impurities such as H2S, VOCs and siloxanes.

Biomethanation

Microorganism and CO_2, act on the hydrogen, converting it into Biomethane.

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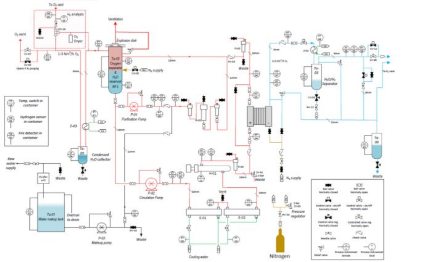
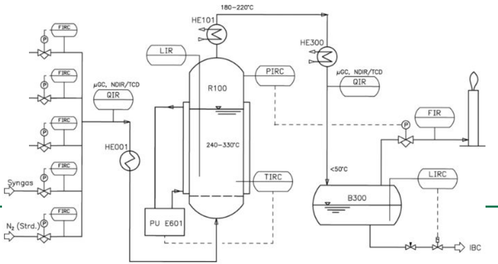
Biomethanation Demoplant

Life Nimbus

Sempre-Bio





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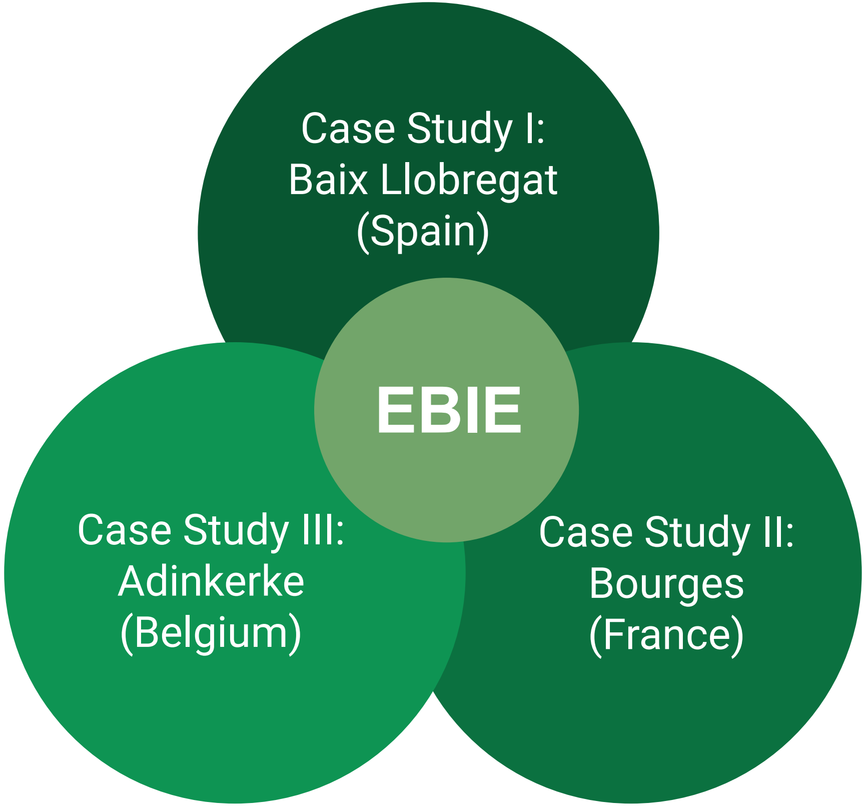

European Biomethane Innovation Ecosystem

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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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Case Study 2: Bourges (France)

Feedstock

Green waste from the city of Bourges

Technology

Pyrolysis

CO Methanation

Site

Case Study 2: Bourges (FR)

Final use of biomethane

Grid injection

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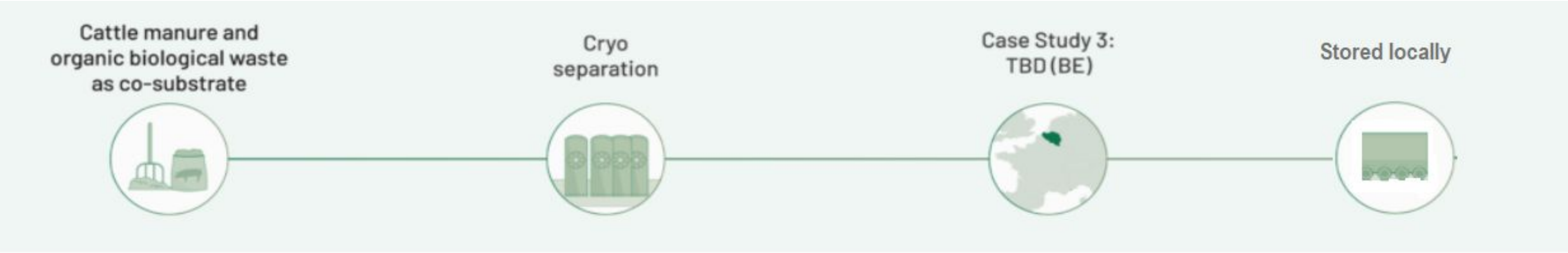
Case Study 3: Adinkerke (Belgium)

Feedstock

Technology

Site

Final use of biomethane



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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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Expected impacts

- Biomethane as a substitute for imported LNG.
- Biomethane as a fuel substitute in transportation.
- Reduction of CO_2 by 213 million tons/year by 2050.
- Diversify energy sources and new routes.
- Reduce the need for strategic reserves.
- Smaller extension of critical infrastructure to protect.

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¡Thank you for your attention!

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