

Interreg



Cofinancé par
l'Union Européenne
Medegefinancierd door
de Europese Unie

France – Wallonie – Vlaanderen



OBIWAN

Introduction to OBIWAN

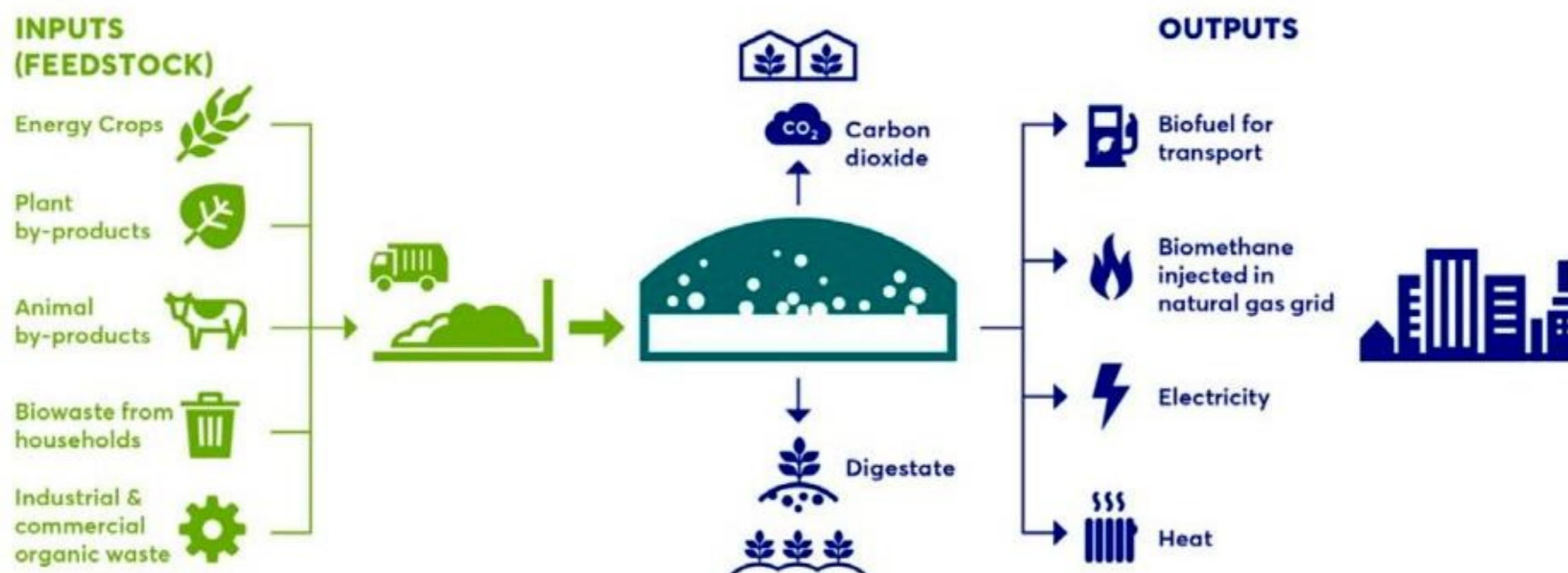
Joris Thybaut, 01/04/2025



biogas production

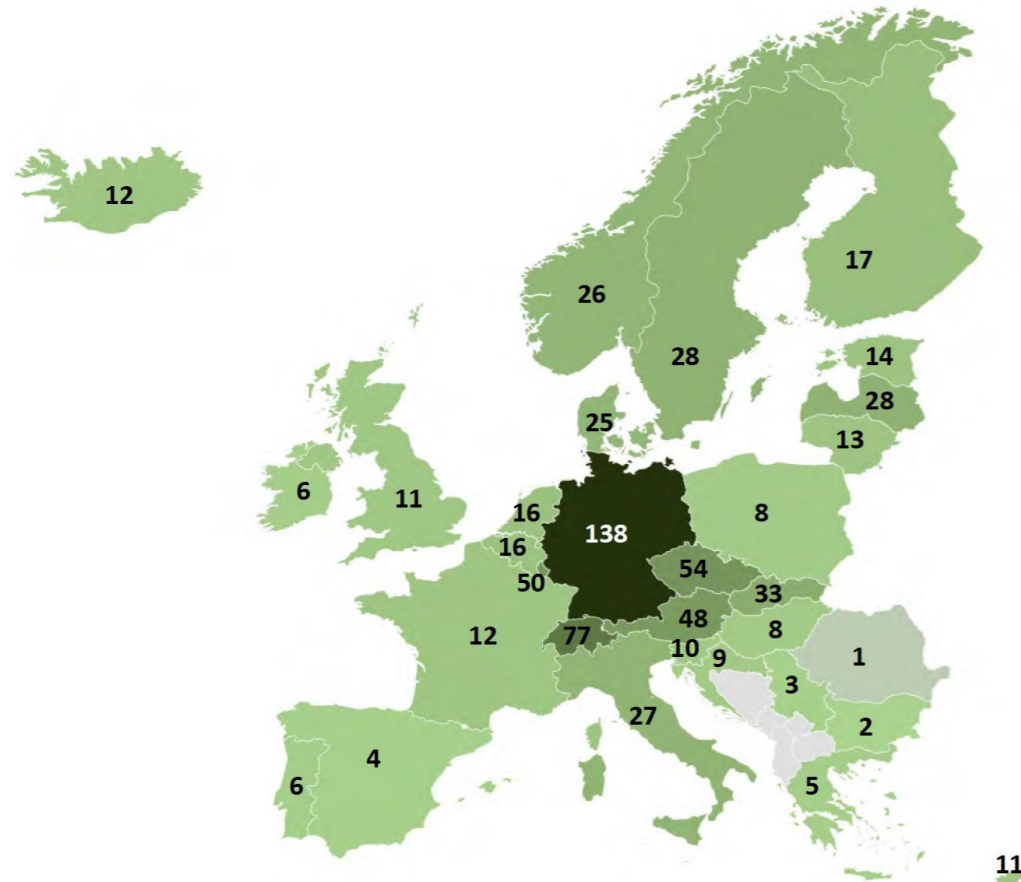
biogas = CH₄ (biomethane, ~50-70%) + **CO₂** (~24-45%)

feedstock (partly) produced by humans ~ high availability in densely populated areas

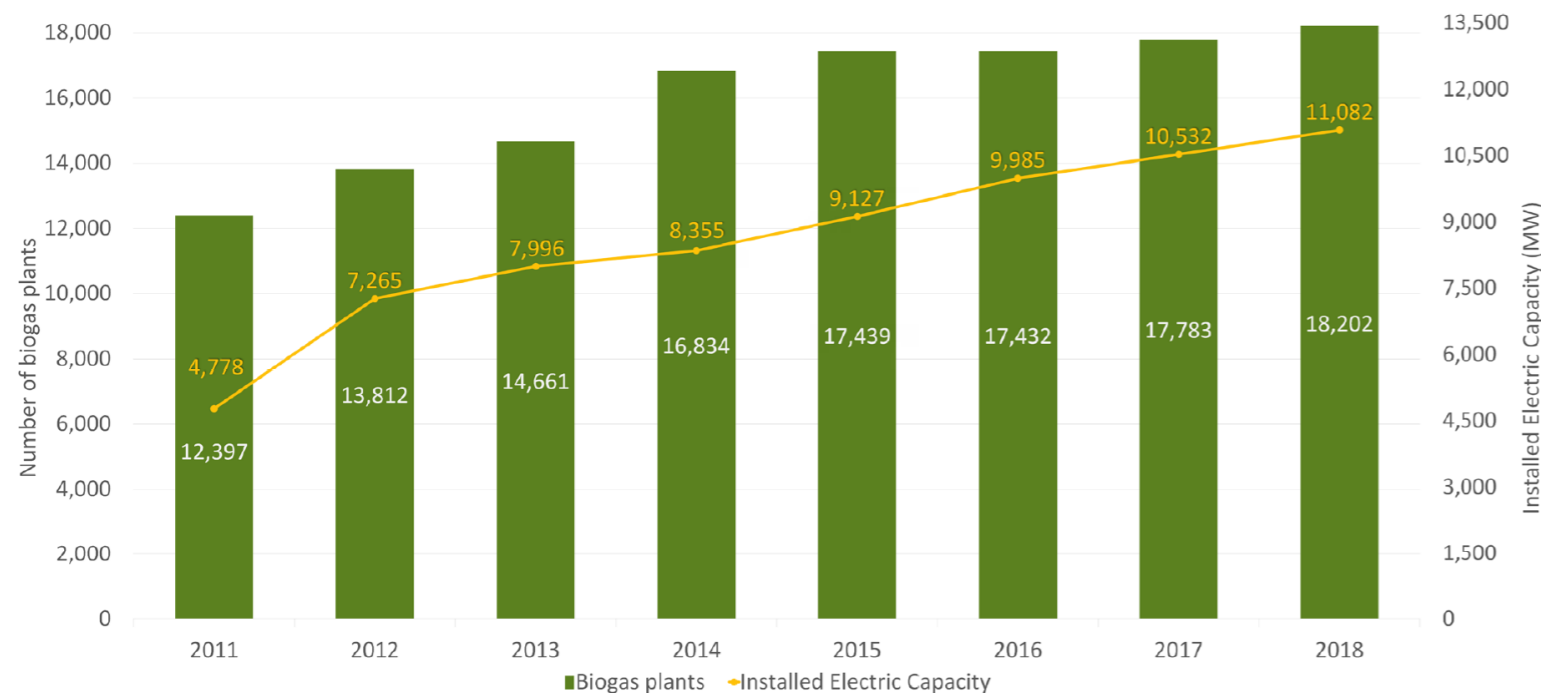


➤ about 200 biogas production units in the FWVL region

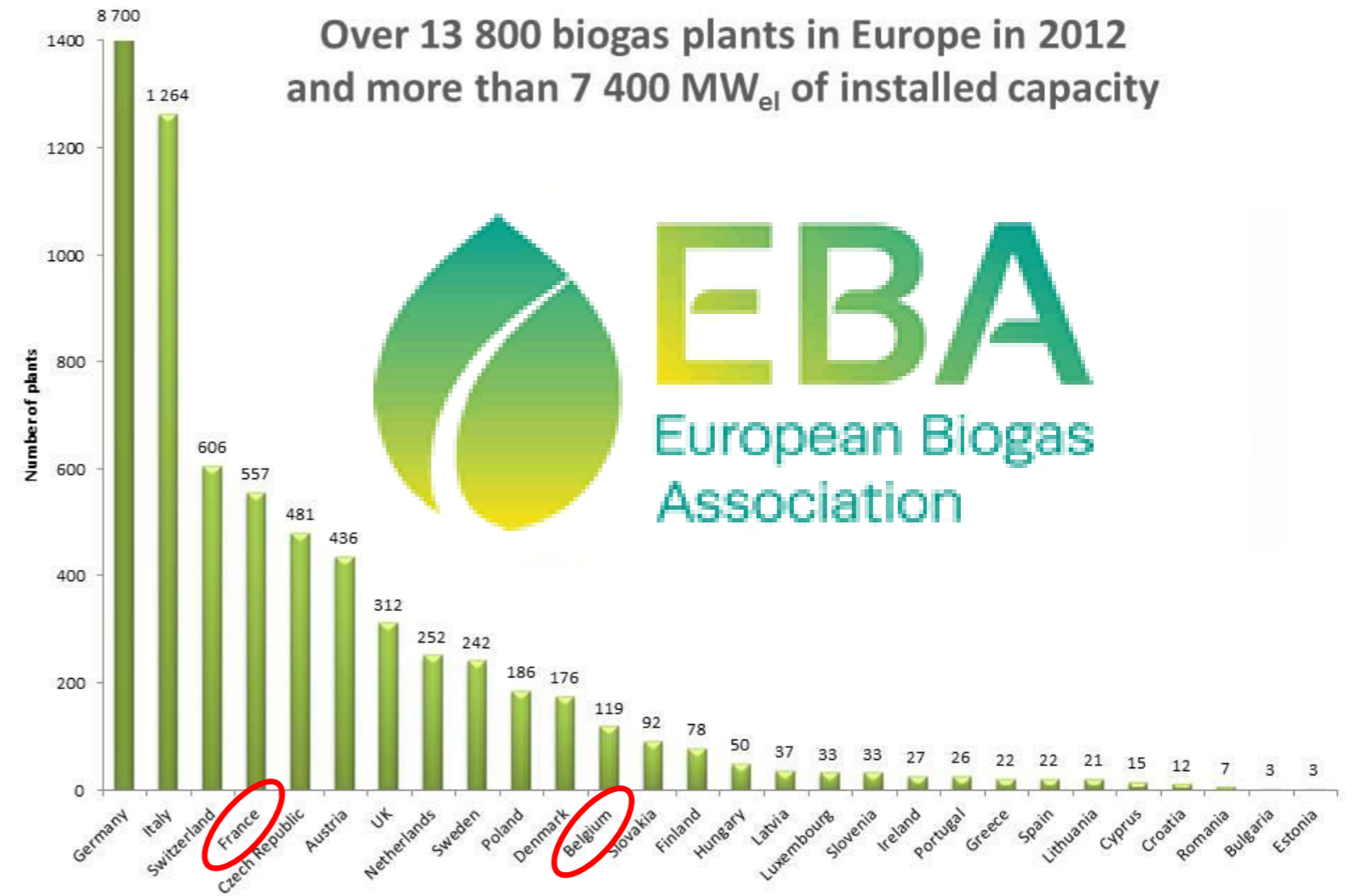
facts and figures: biogas plants in Europe



number of biogas plants per 1Mio capita (2018, source: UABIO)
total of over 18 000 units in 2018



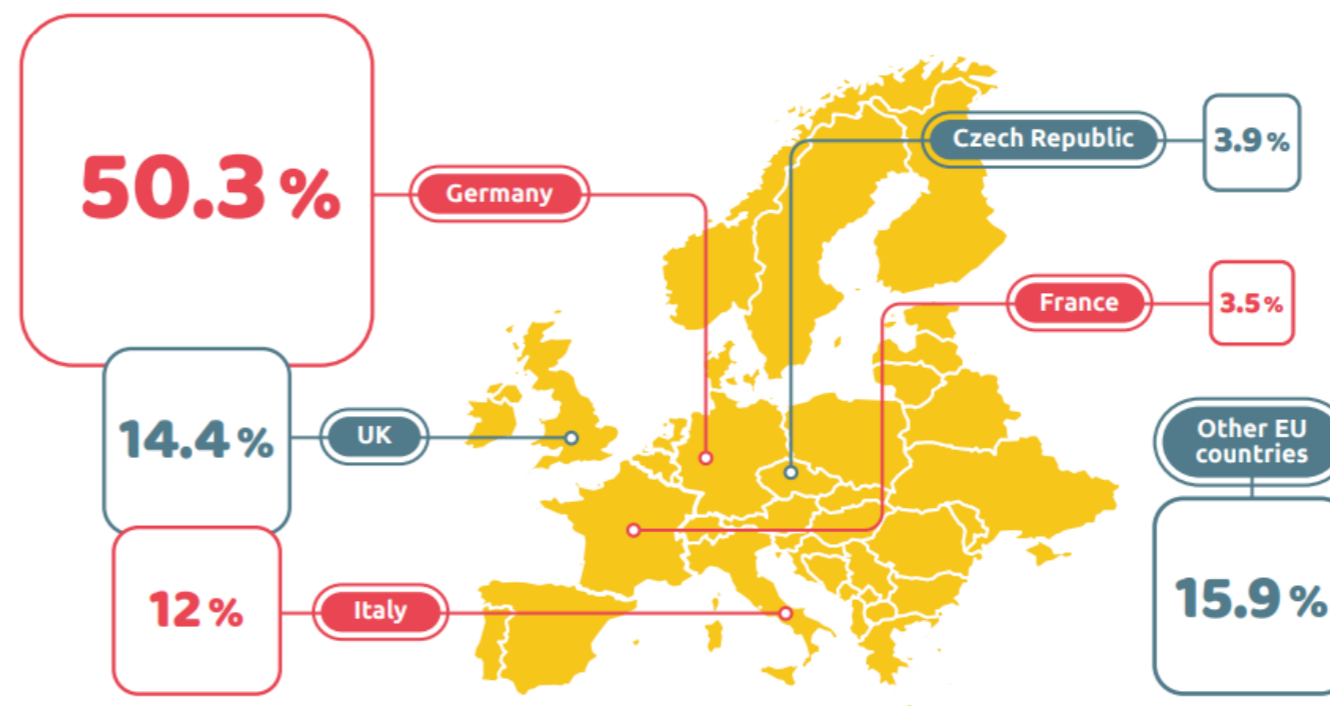
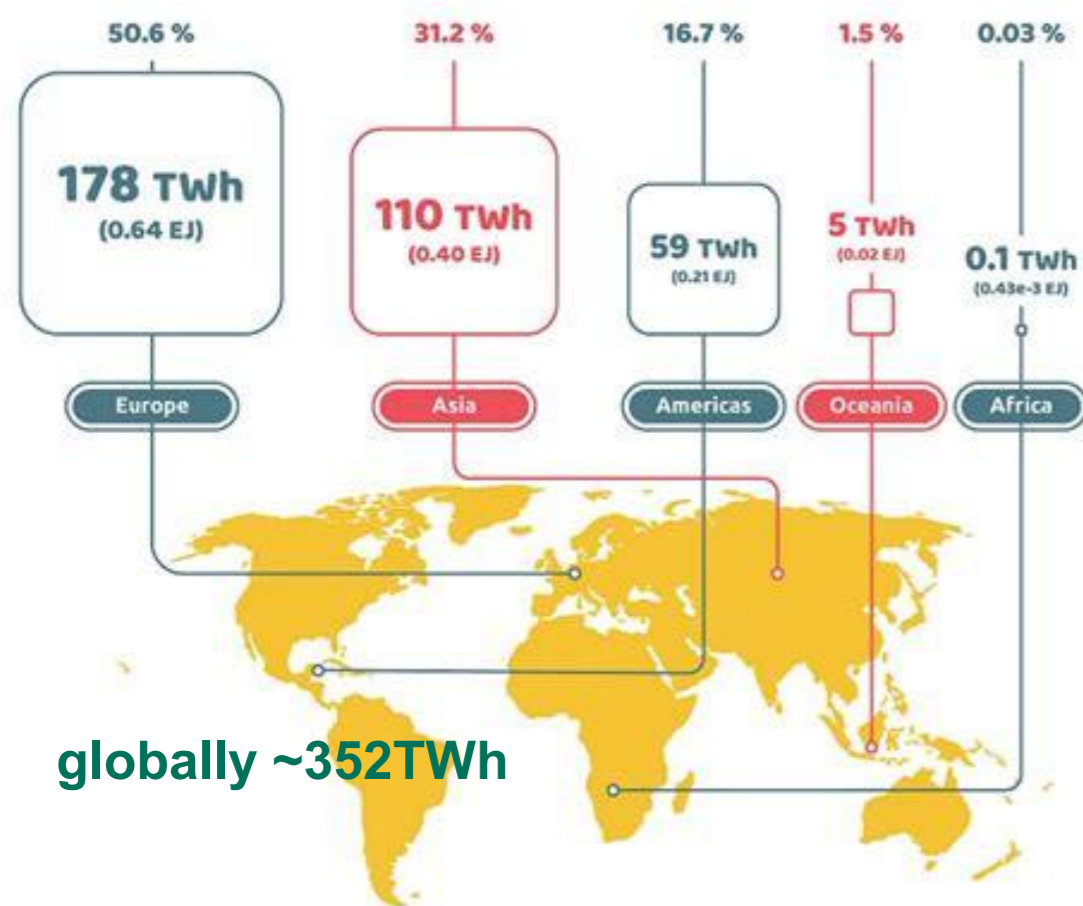
development of the total biogas IEC in Europe set against the total number of biogas plants (source: UABIO)



development of the total biogas IEC in Europe (source: UABIO)

facts and figures

Europe as frontrunner in biogas production



percentage contribution by countries to EU biogas production in 2015 (source: enea)

global and regional biogas production in 2014 (source: enea)

in 2023:

- global biogas production ~ 44.4 bcm/year ~ 271.1 TWh/year (bcm = billion cubic meters)
- European biogas production ~ 22 bcm/year ~ 134.2 TWh/year

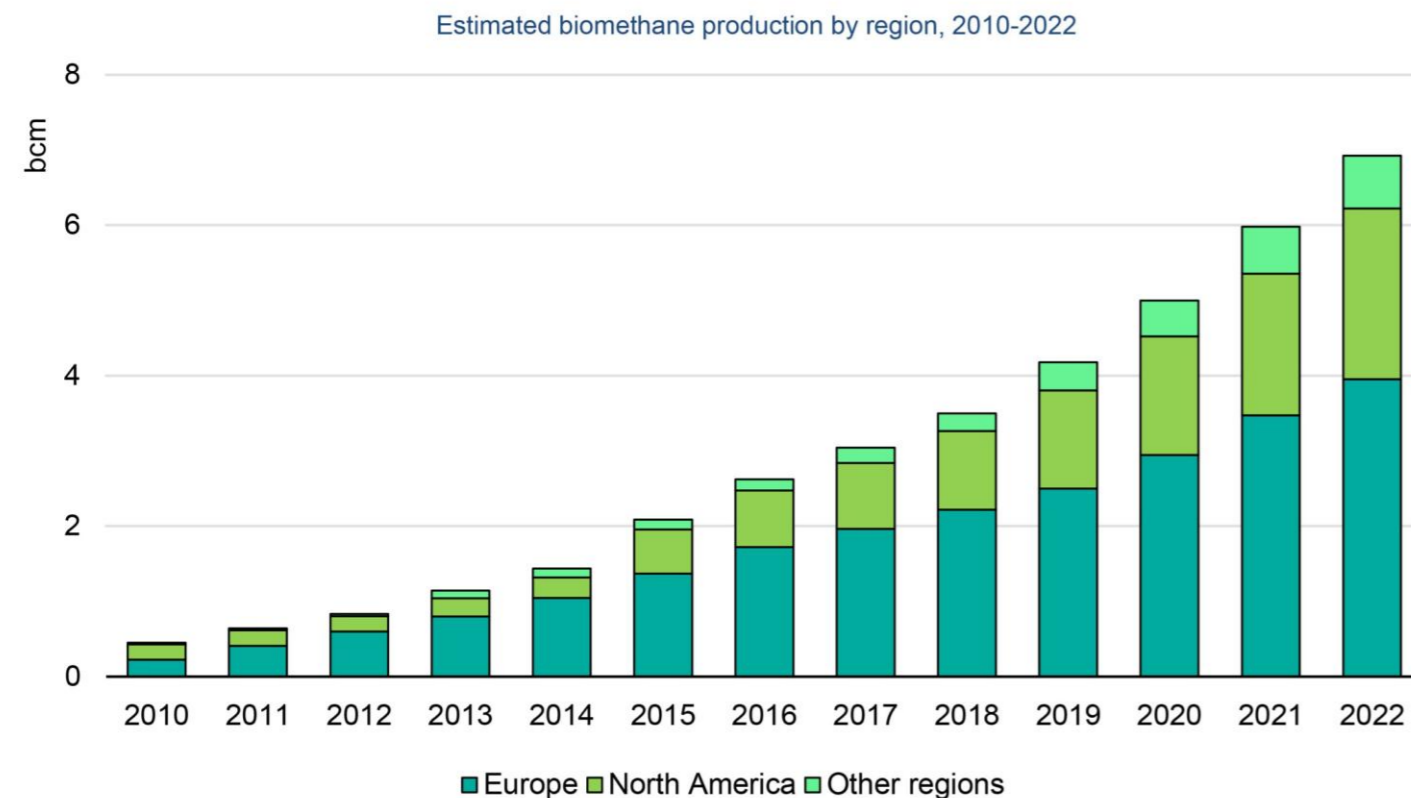
sources: <https://thundersaidenergy.com/downloads/global-biogas-production-by-country/>; <https://www.bioenergy-news.com/news/eba-europe-produced-22bcm-biogas-and-biomethane-last-year/>;

facts and figures

in Europe:

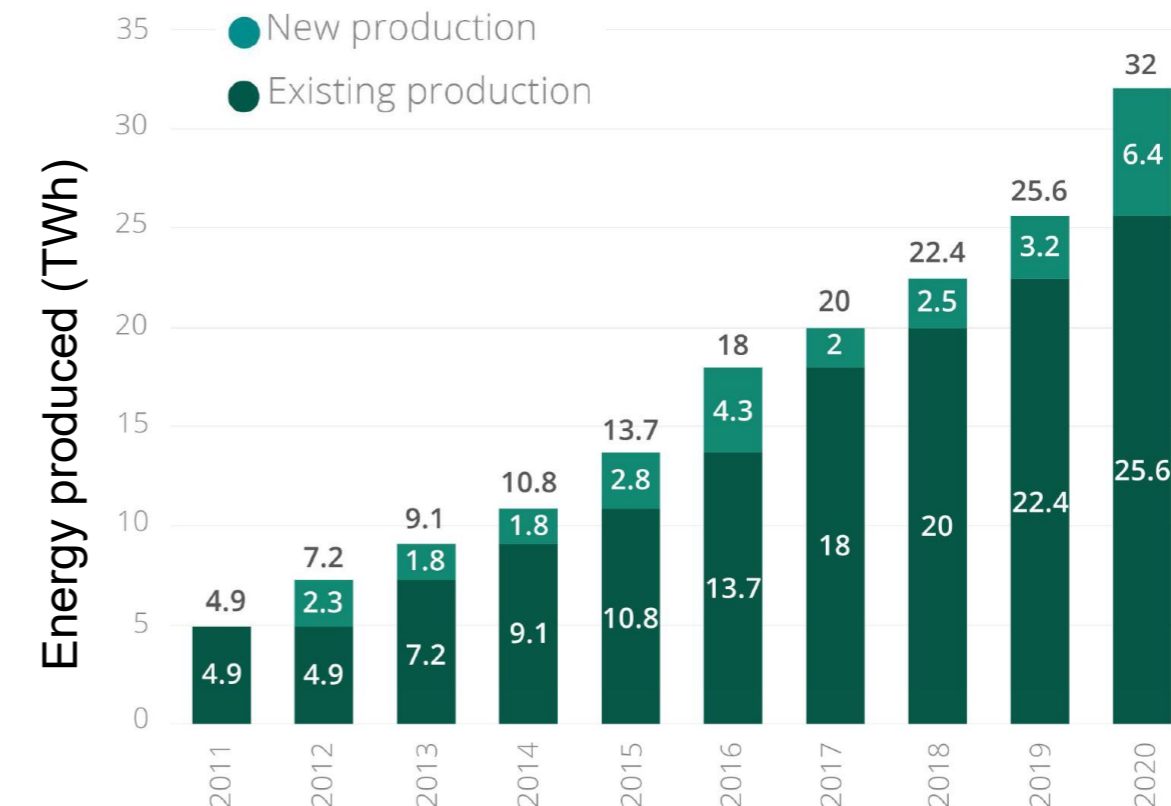
- 2023: biogas production ~ 22 bcm/year ~ 134.2 TWh/year
 - with biomethane production of ~ 4.9 bcm/year ~ 48.7 TWh/year
 - results in production of **29 Mt of biogenic CO₂** (which is currently not yet exploited)
- 2024: increase biogas production to 6.1 bcm/year by 2024 ~ 61.6 TWh/year

Global biomethane production reached close to 7 bcm in 2022



IEA. CC BY 4.0.

Sources: IEA analysis based on CBS (2022) [Open Data](#); Cedigaz (2021), Global Biomethane Database; Energinet (2022), [Energi Data Service](#); GRDF (2022), [Production annuelle de biométhane par site d'injection](#); RNG Coalition (2022).

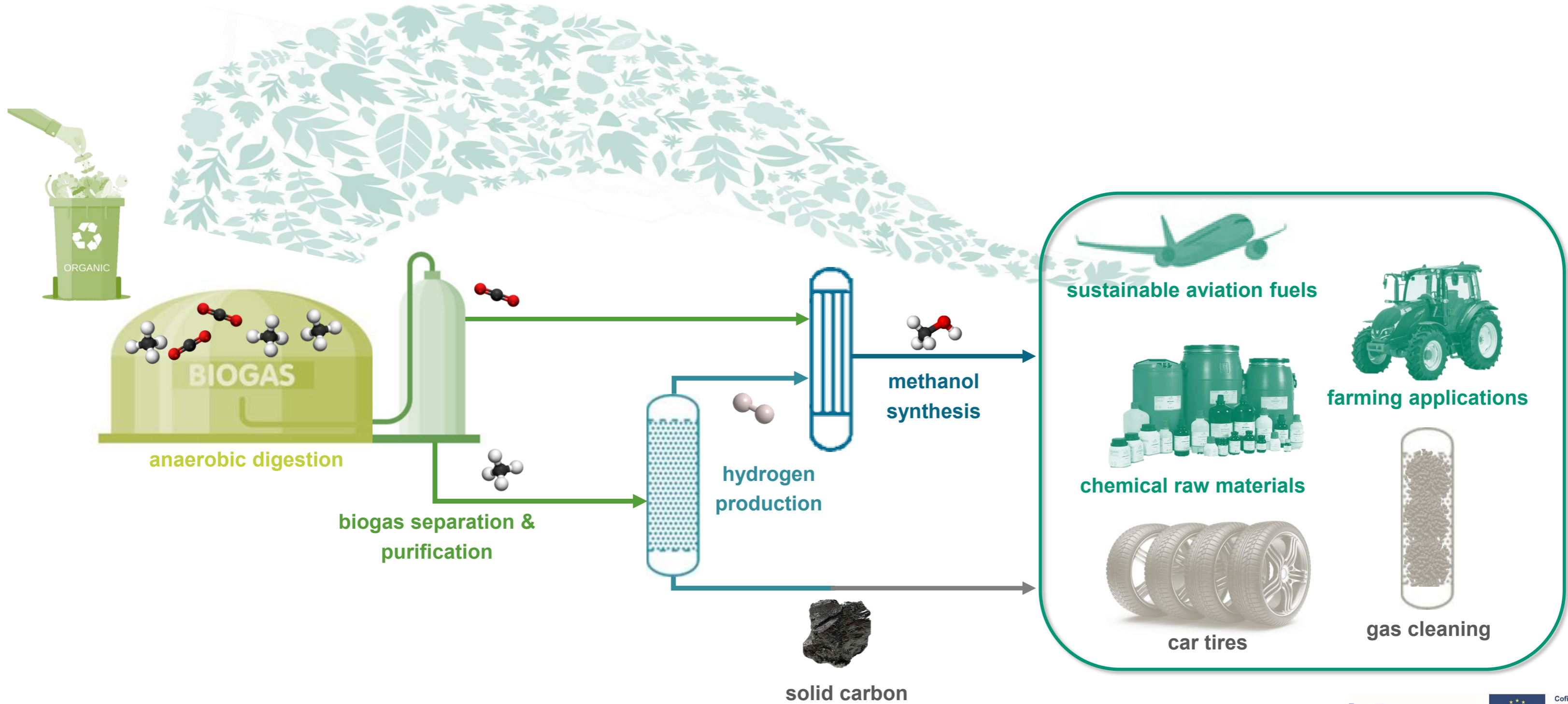


European biomethane (CH₄) production (source: UABIO)



sources: <https://thundersaidenergy.com/downloads/global-biogas-production-by-country/>; <https://www.bioenergy-news.com/news/eba-europe-produced-22bcm-biogas-and-biomethane-last-year/>;

OBIWAN concept



Interreg



Cofinancé par l'Union Européenne
Medegefinancierd door de Europese Unie

France - Wallonie - Vlaanderen

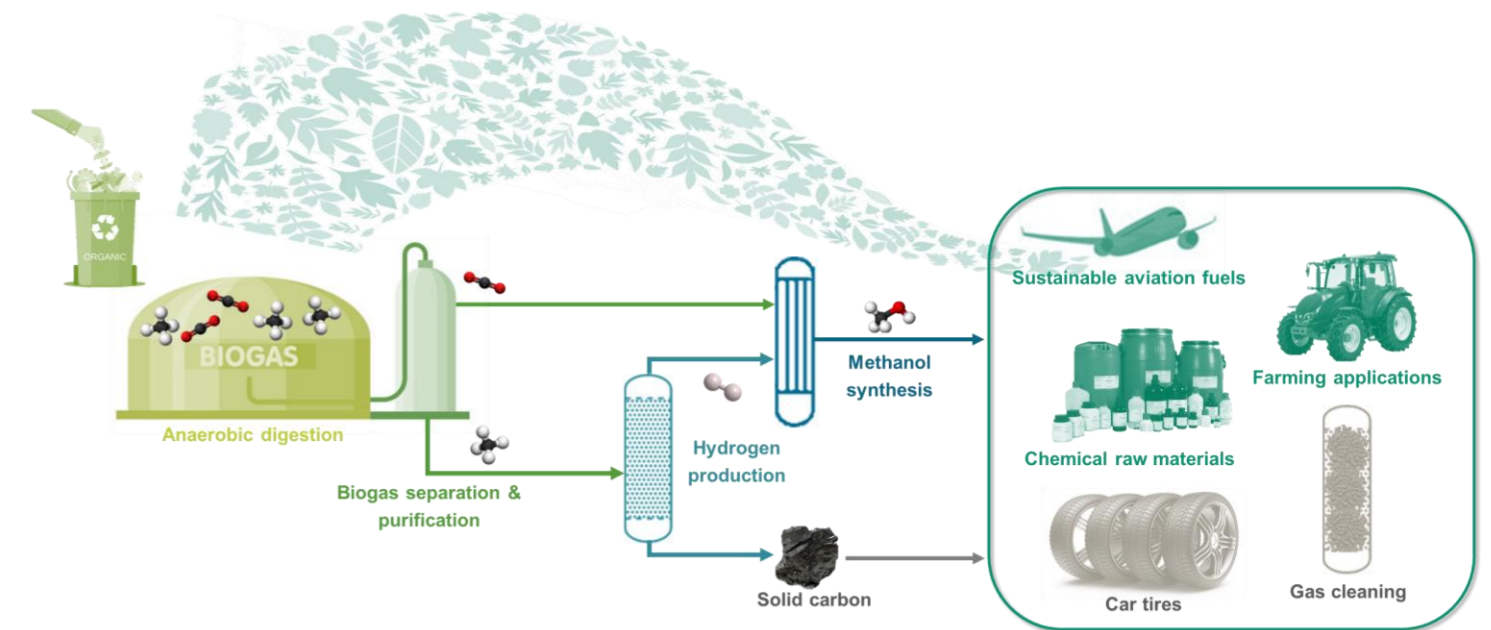


OBIWAN

OBIWAN objectives

reduction of greenhouse gas emissions:

- avoid emissions
- transformation of gases into valuable products



focus on Interreg Priorities:

- transition towards a circular economy
- development of innovative technologies to support adaptations to climate change
- decrease of pollution on land, in air and in water
- waste recycling

OBIWAN innovations

1) enabling stable biogas production:

- ideal biogas composition for transformation into chemicals is 60% CH₄ and 40% CO₂
- both seasonal and substrate-related variations
- development of innovative numerical tool to simulate the process
- regulation of reactors to enable stable biogas production, both in terms of production rate and gas composition

2) demonstration of hydrogen production at industrial relevant scale:

- catalytic methane decomposition into solid carbon and 'turquoise' H₂ is gaining popularity
- results in high quality of H₂ but suboptimal quality of solid carbon
- OBIWAN aims to produce both H₂ and solid carbon of high quality
- transition of production at lab scale to industrial scale with demonstration of proof of concept in an original Electrochemical Fluidized Bed Reactor (ETFB)

also: purification/separation of biogas
CO₂-hydrogenation towards methanol

project consortium



Joris Thybaut
Kevin Van Geem



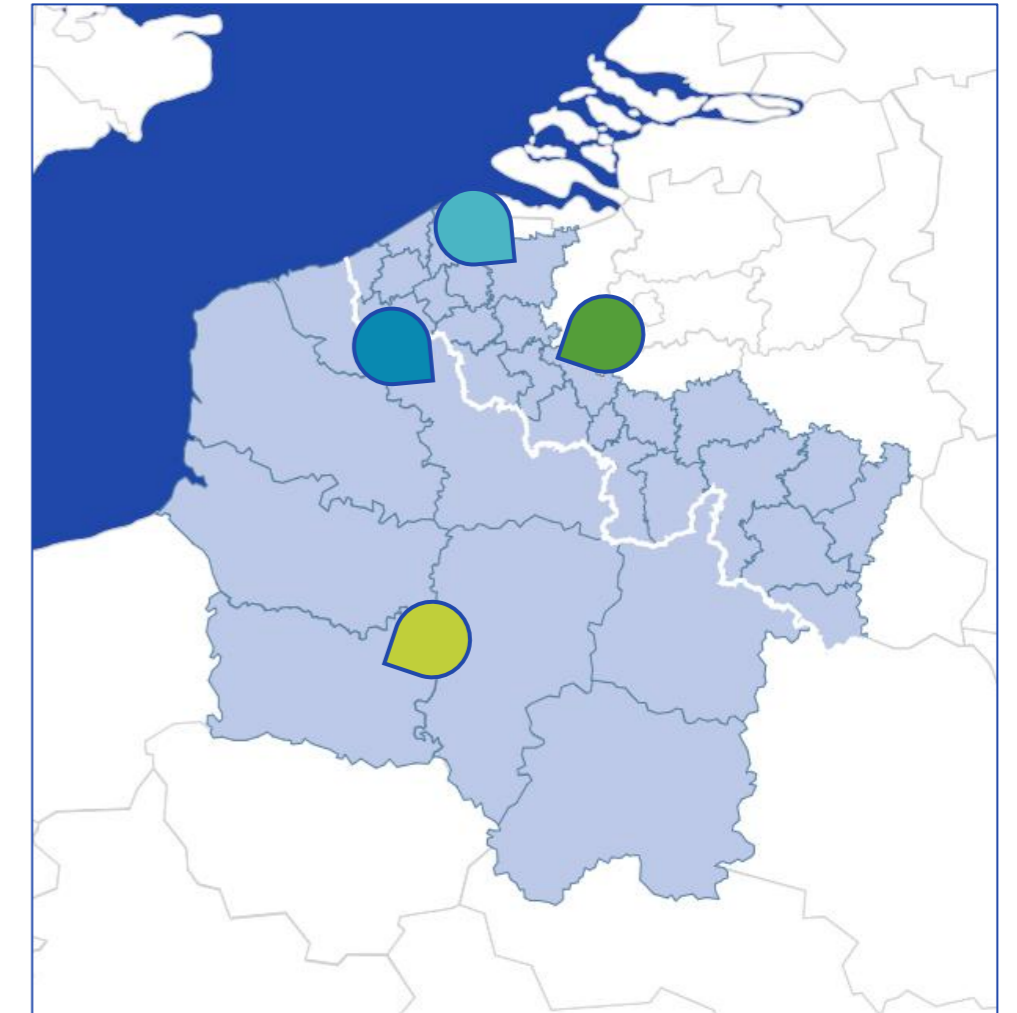
Xiaojun Liu
André Pauss
Thierry Ribeiro
Stéphane Mottelet



Julien Estager
Benoit Kartheuser



Andrei Khodakov
Vitaly Ordonsky



associated partners



France - Wallonie - Vlaanderen



OBIWAN Work Packages & Coordination

WP1
project management

lead:  **other involved partners:**   







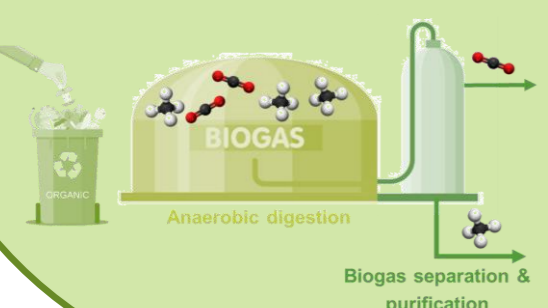
WP2
communication & training

lead:  **other involved partners:**   





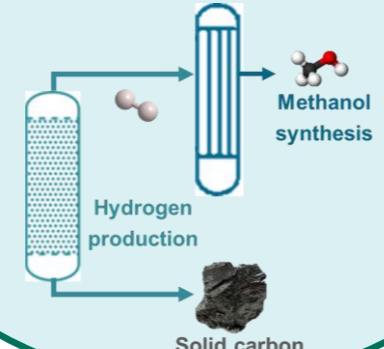
WP3
biogas production & separation/purification

lead:  **other involved partners:**   




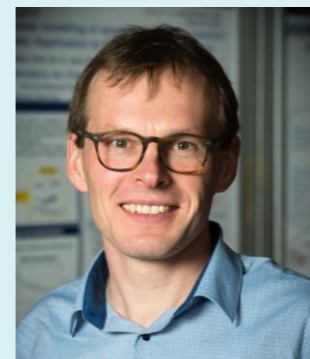

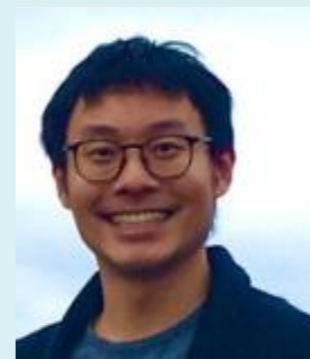


WP4
chemical processes


lead:  **other involved partners:** 



OBIWAN Steering Committee



 Joris Thybaut project coordinator	 Elisabeth Delbeke project manager
 Xiaojun Liu UTC	 Benoit Kartheuser Certechn
 Andrei Khodakov CNRS	



Acknowledgements

Interreg



Cofinancé par
l'Union Européenne
Medegefinancierd door
de Europese Unie

France - Wallonie - Vlaanderen



OBIWAN



Joris Thybaut

Laboratory for Chemical Technology (LCT)

LCT - UGENT

E joris.thybaut@ugent.be

T +32 9 331 17 52

M +32 478 44 75 38

www.lct.ugent.be

 Ghent University

 @ugent

 Ghent University

