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France – Wallonie – Vlaanderen



OBIWAN

Introduction to OBIWAN

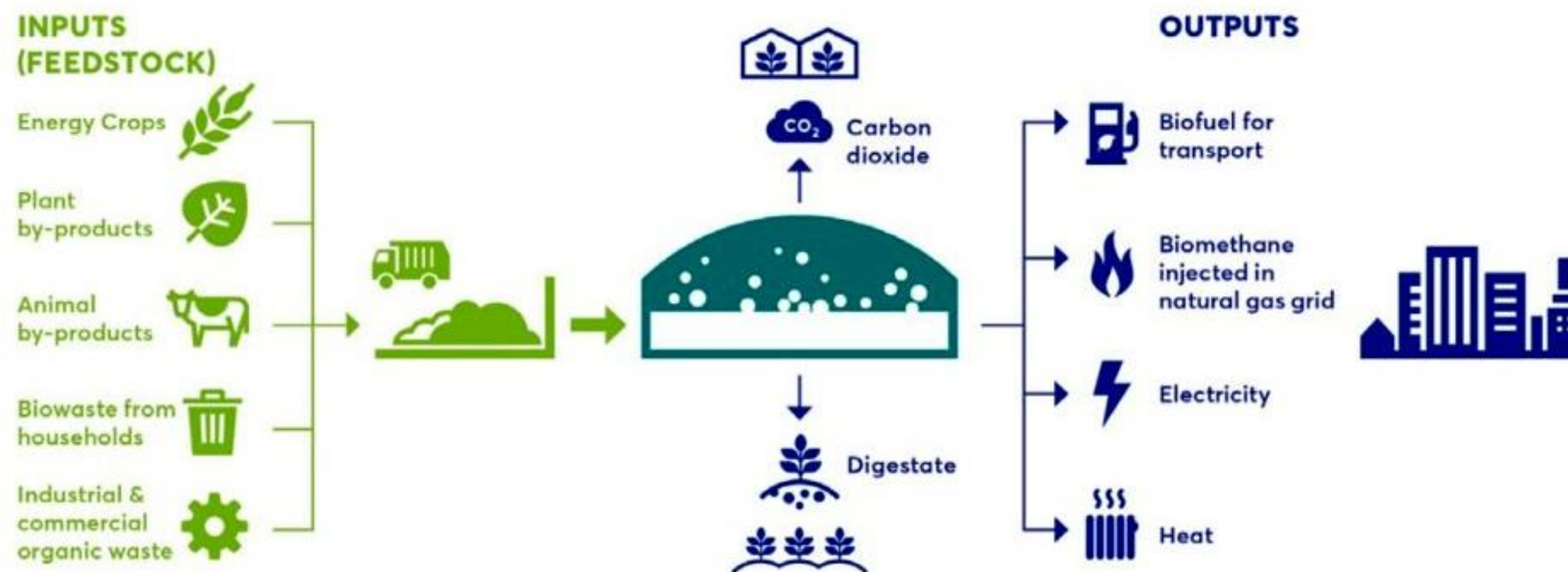
Joris Thybaut, 30/04/2026



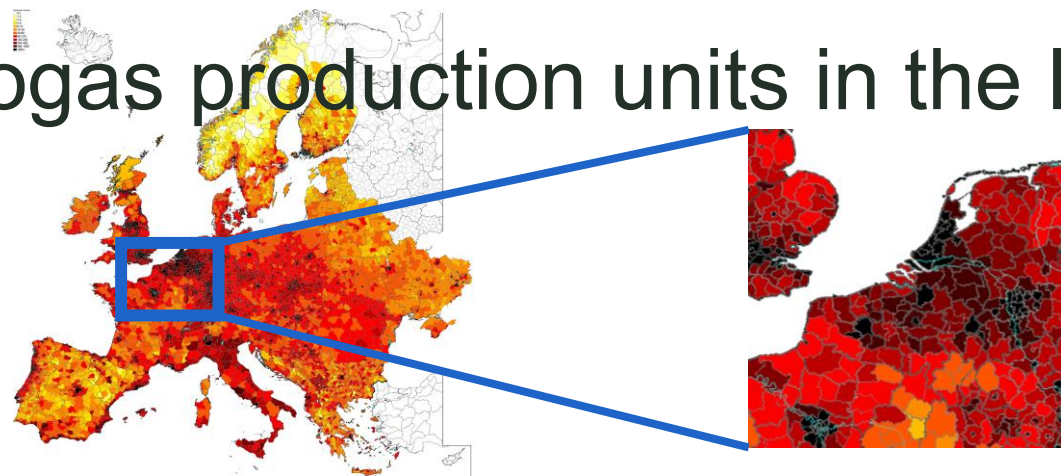
biogas production

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

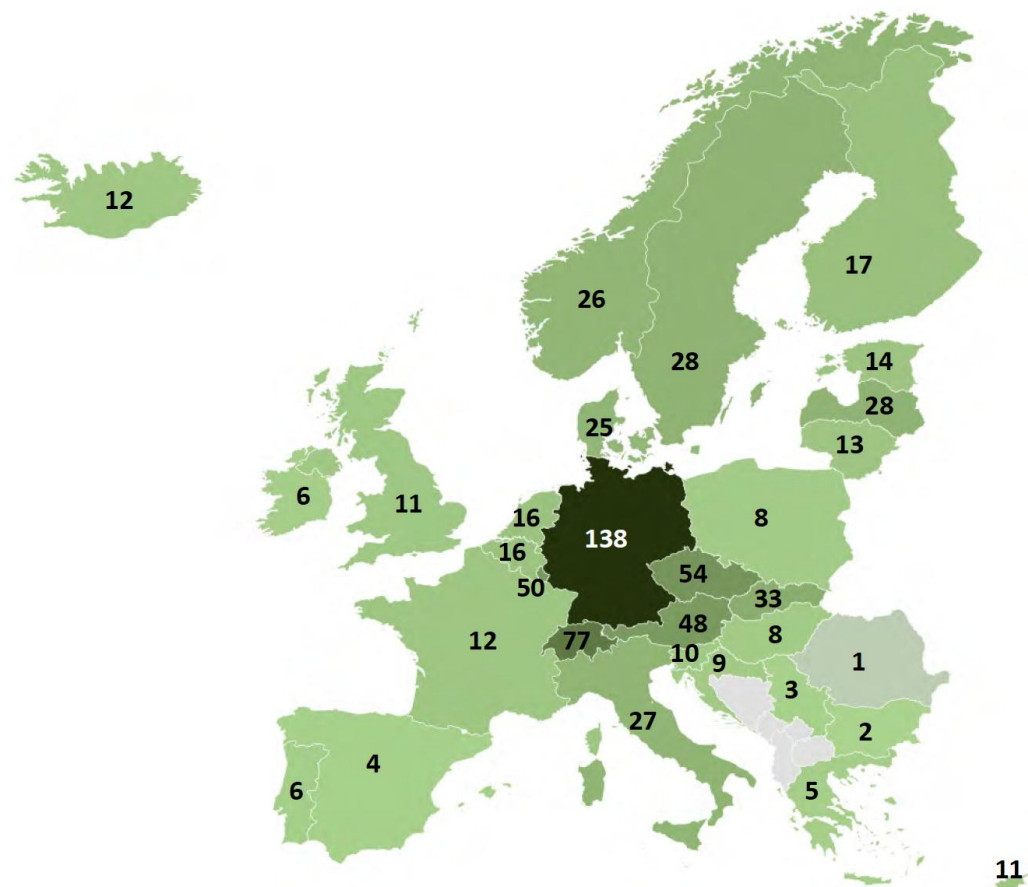
feedstock (partly) produced by humans ~ high availability in densely populated areas



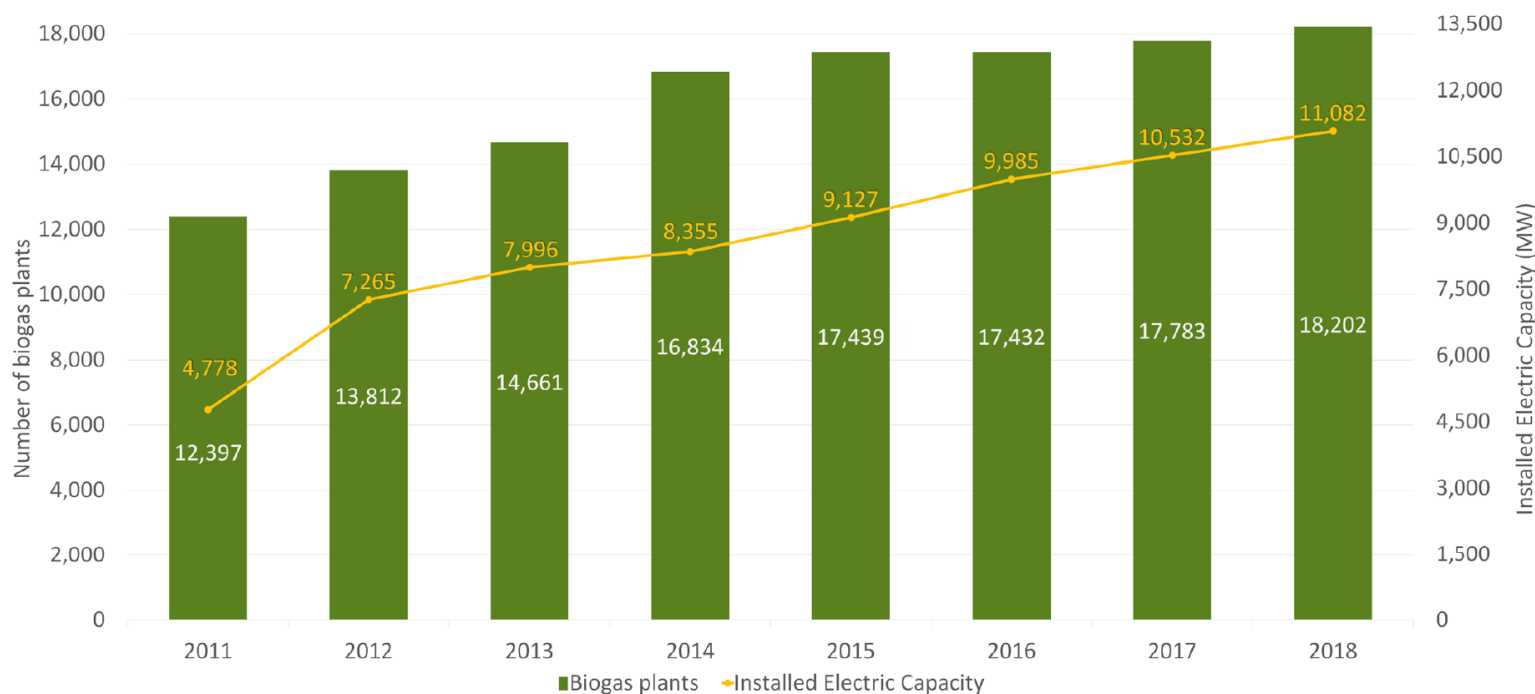
➤ about 200 biogas production units in the FWVL region



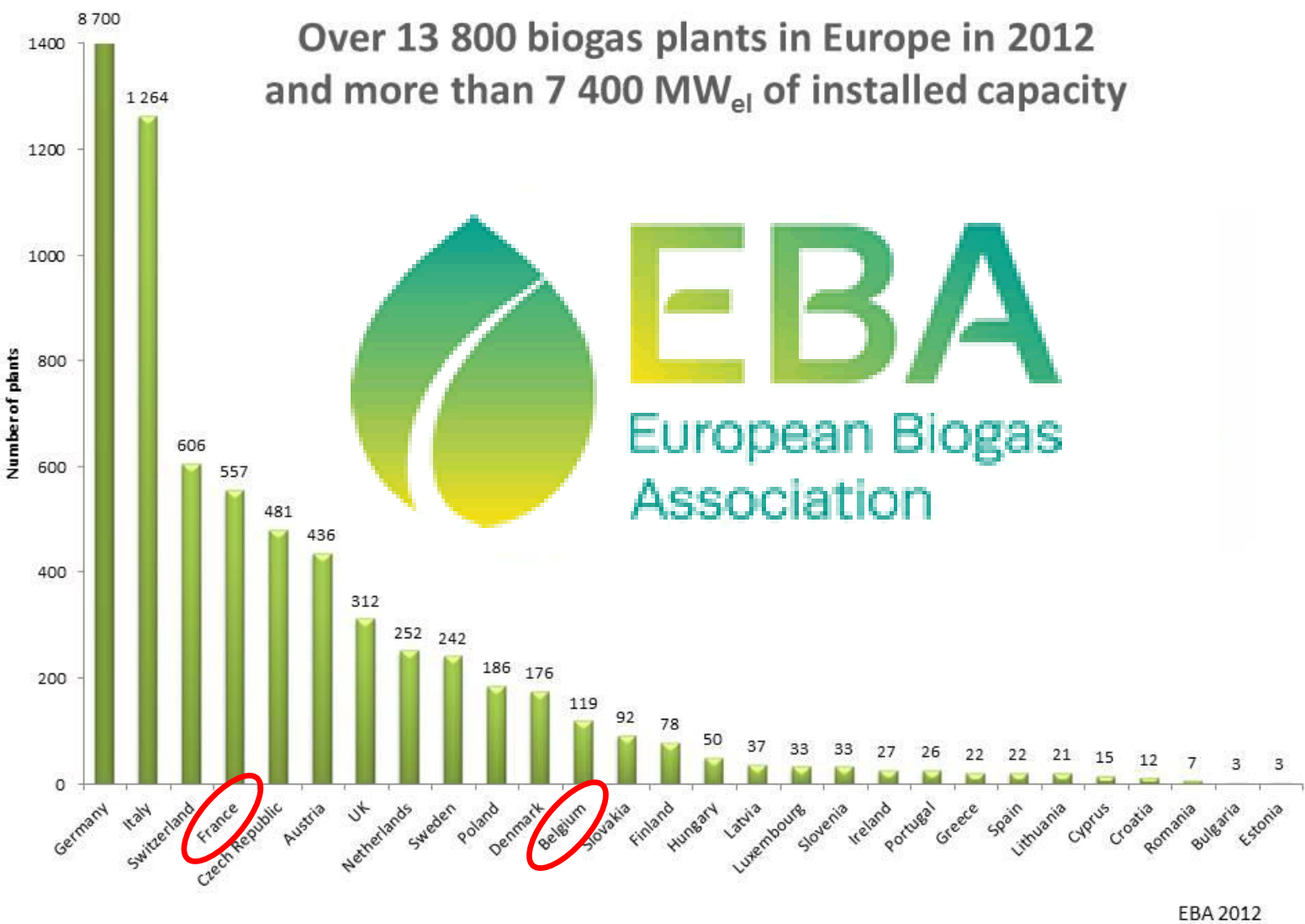
facts and figures: biogas plants in Europe



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



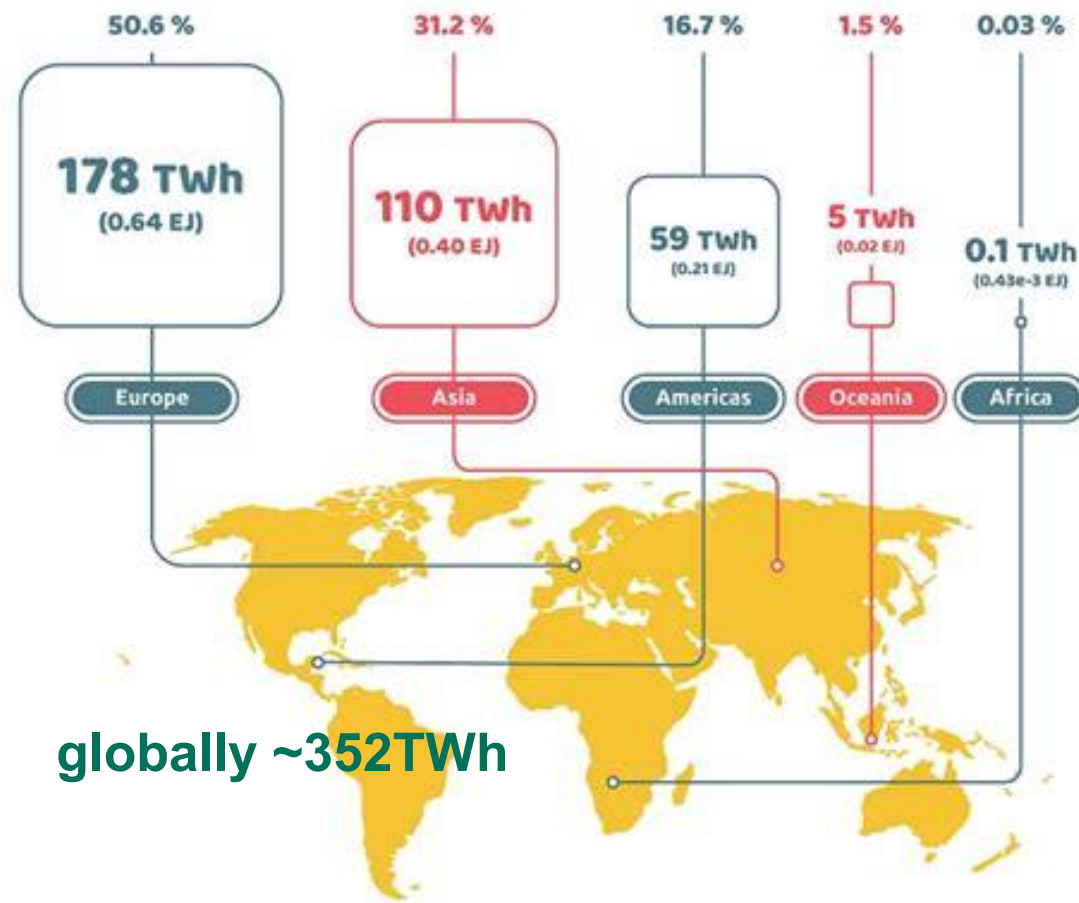
development of the total biogas IEC in Europe set against the total number of biogas plants (source: UABIO)



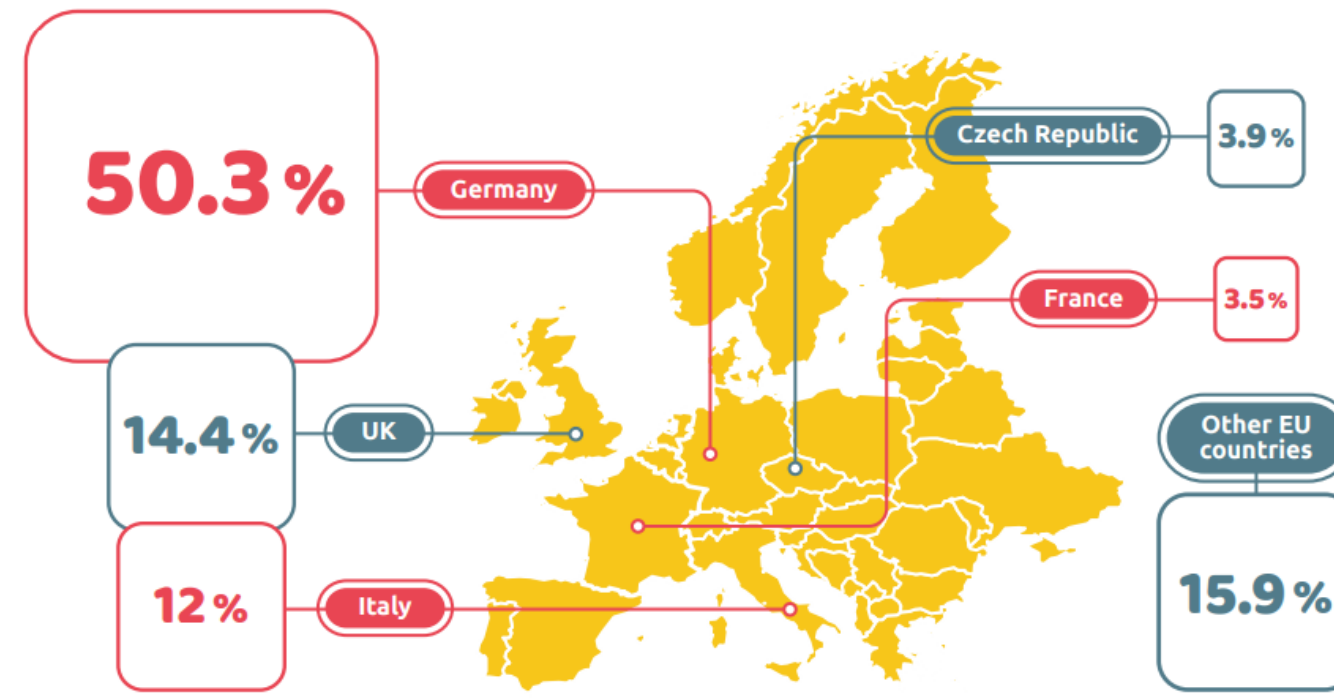
development of the total biogas IEC in Europe (source: UABIO)

facts and figures

Europe as frontrunner in biogas production



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



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

in 2023:

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

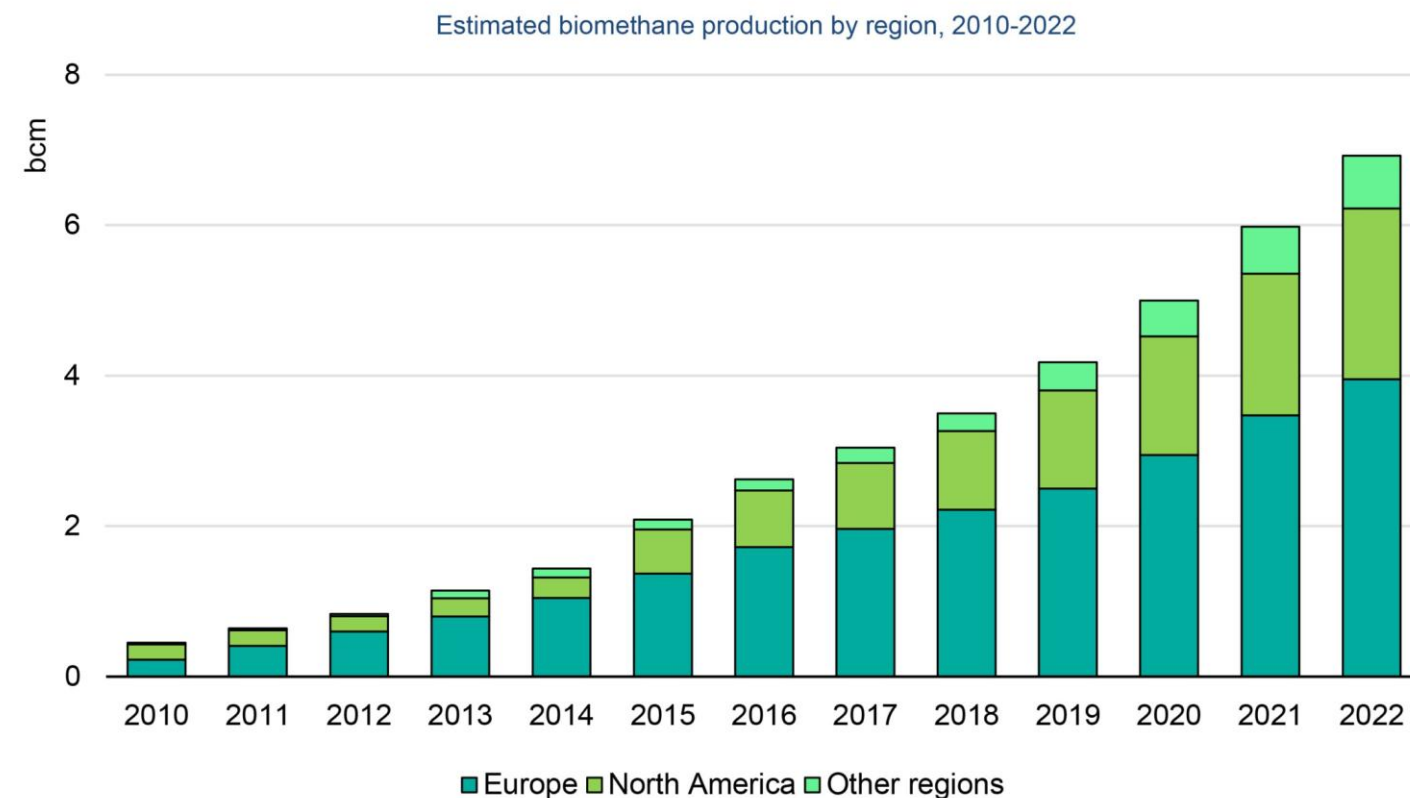
sources: <https://thundersaidenergy.com/downloads/global-biogas-production-by-country/>; <https://www.bioenergy-news.com/news/eba-europe-produced-22bcm-biogas-and-biomethane-last-year/>;

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

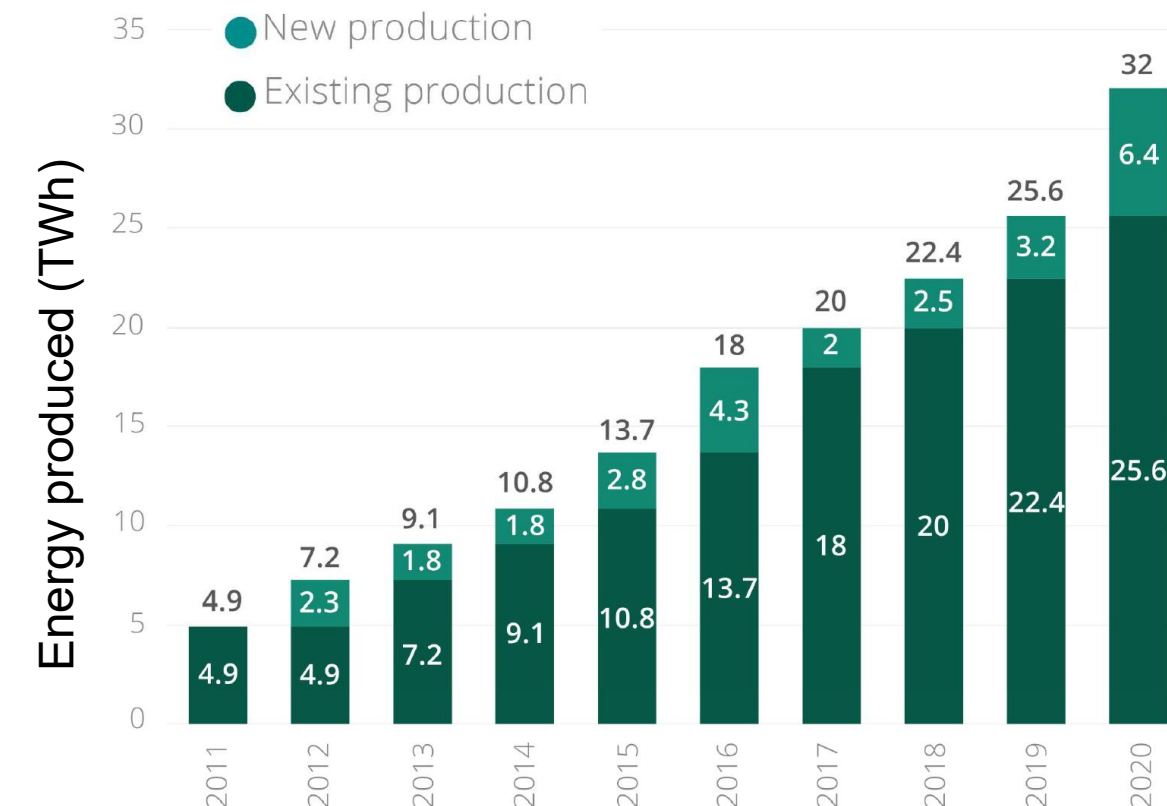
Global biomethane production reached close to 7 bcm in 2022



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)

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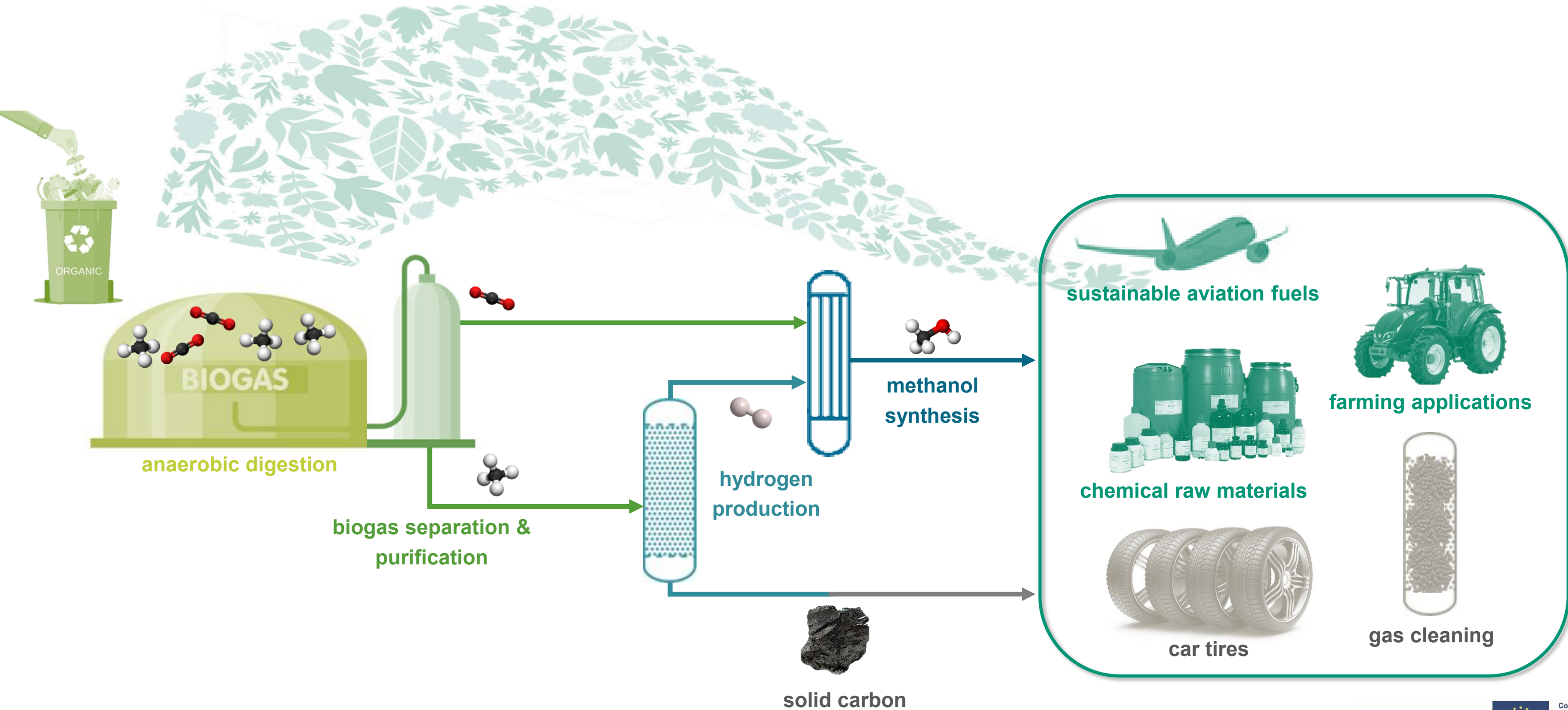
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sources: <https://thundersaidenergy.com/downloads/global-biogas-production-by-country/>; <https://www.bioenergy-news.com/news/eba-europe-produced-22bcm-biogas-and-biomethane-last-year/>;

OBIWAN concept



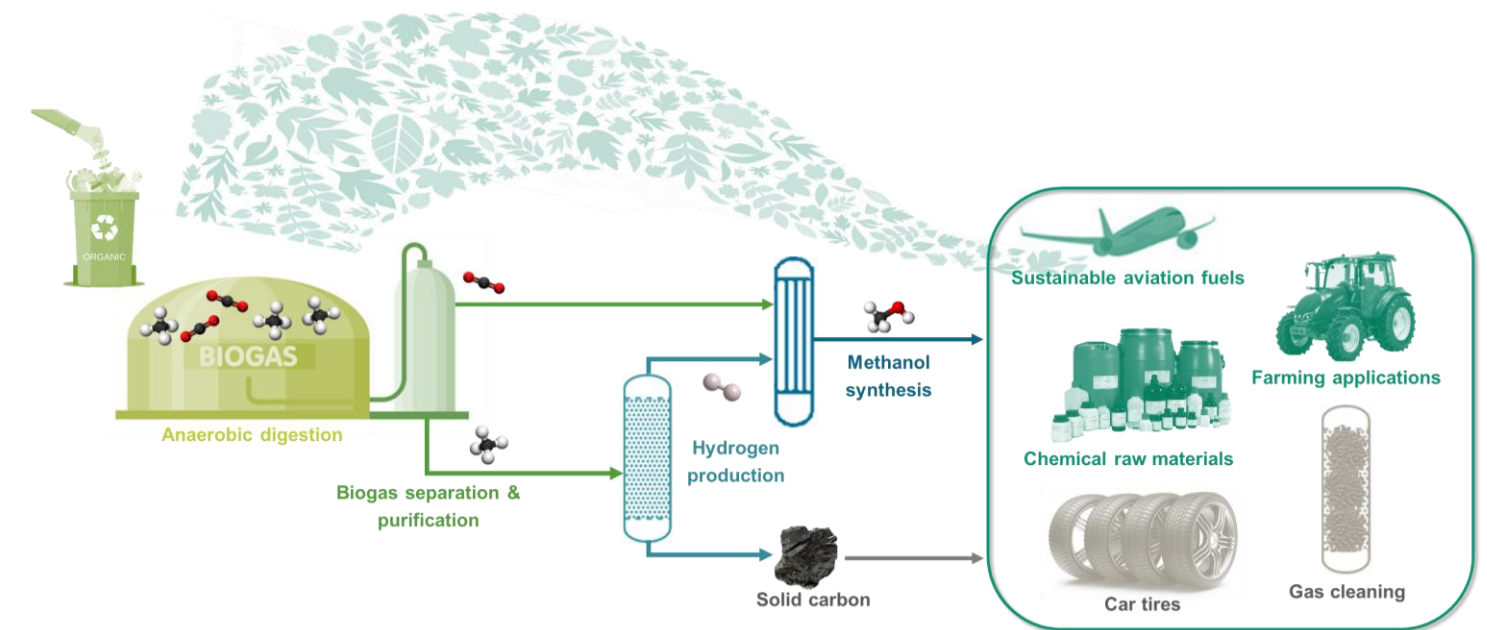
OBIWAN objectives

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



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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



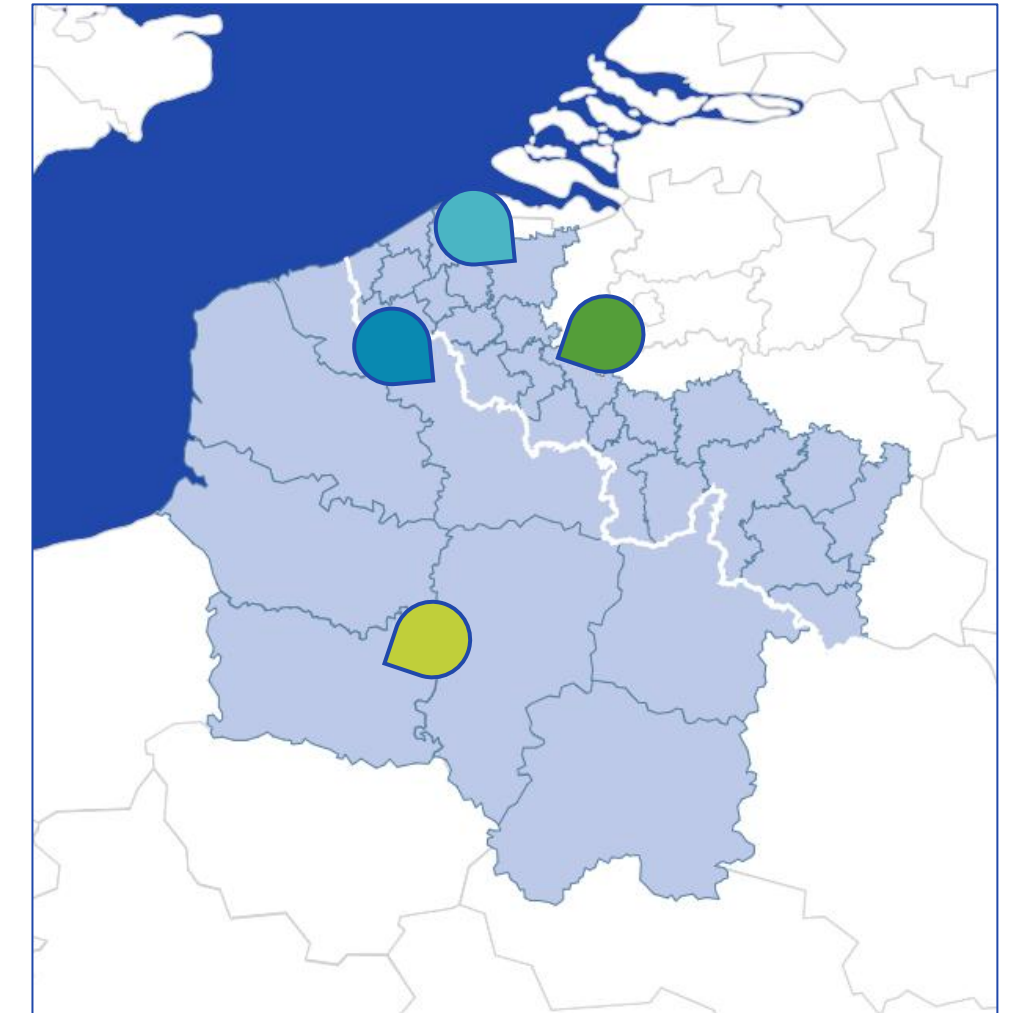
Xiaojun Liu
André Pauss
Thierry Ribeiro
Stéphane Mottelet



Julien Estager
Benoit Kartheuser



Andrei Khodakov
Vitaly Ordonsky



associated partners



OBIWAN Work Packages & Coordination

WP1

project management

lead: other involved partners:



WP2

communication & training

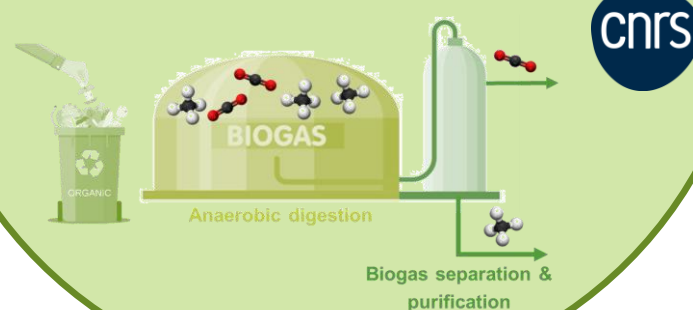
lead: other involved partners:



WP3

biogas production & separation/purification

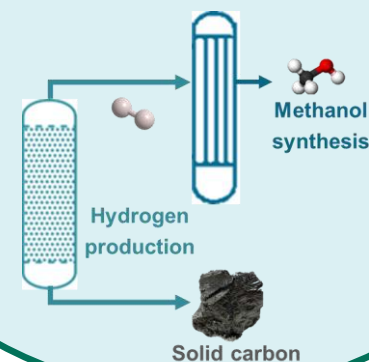
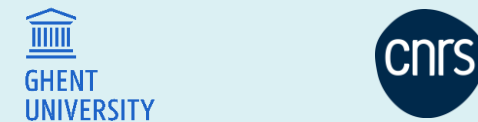
lead: other involved partners:



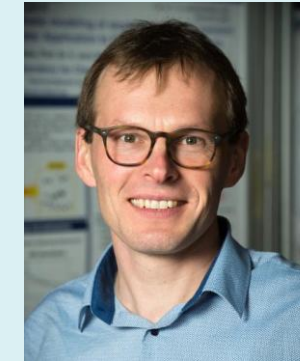
WP4

chemical processes

lead: other involved partners:



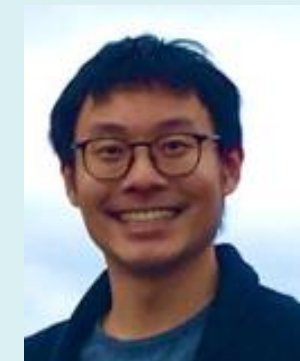
OBIWAN Steering Committee



Joris Thybaut
project coordinator



Elisabeth Delbeke
project manager



Xiaojun Liu
UTC



Benoit Kartheuser
Certech



Andrei Khodakov
CNRS



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Acknowledgements



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