



Centro Studi di Economia e Tecnica  
dell'Energia  
Giorgio LEVI CASES  
Centro interdipartimentale di ricerca

1222-2022  
**800**  
ANNI



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA



Consiglio Nazionale  
delle Ricerche

# ***Biometano in Italia ed Europa, stato di fatto e sfide future***

*Dott. Andrea Zamboni*

***Biometano sinonimo di sostenibilità. La ripartenza del settore dopo  
il nuovo DM 15 settembre 2022***

Agripolis- Aula Magna PENTAGONO Viale dell'Università, 16 35020 Legnaro, Padova  
10 marzo 2023

# GLOBAL CRISIS

- Climate Change (fit-for-55 package)

**luglio 2021**

- Crisi economica post-pandemica (PNRR)

**luglio 2021**

- Guerra in Ucraina (REPowerEU)

**maggio 2022**

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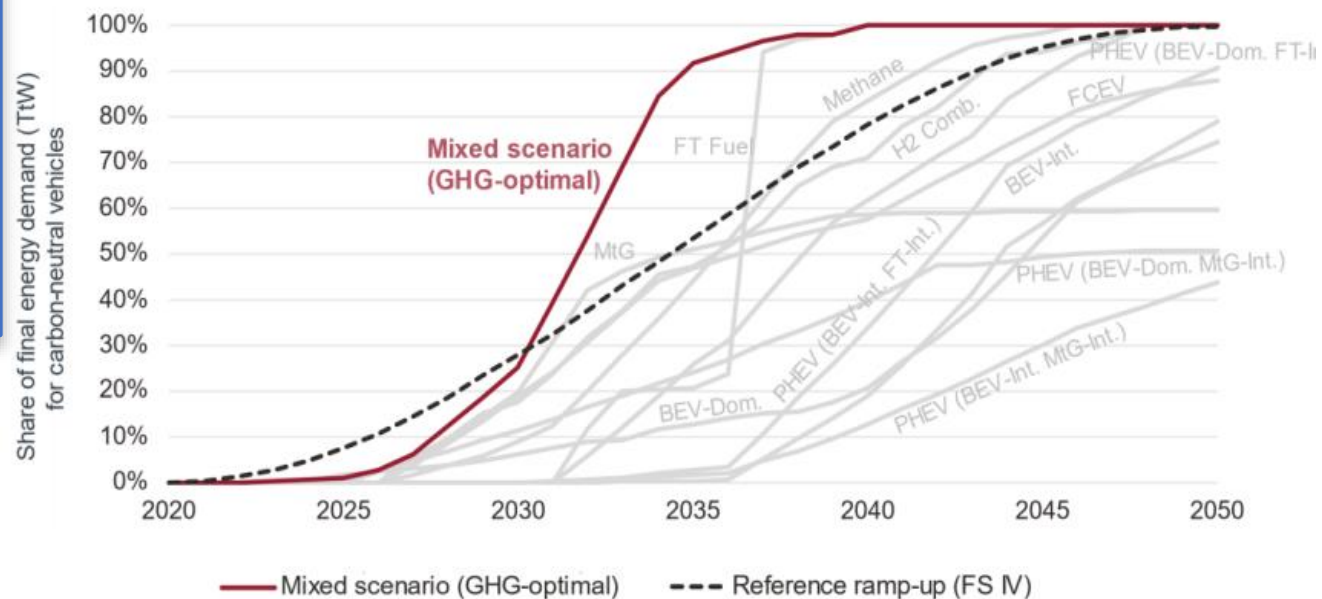
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***No silver bullet solutions!***

Source: Future Fuels: FVV Fuels Study Ivb 2022

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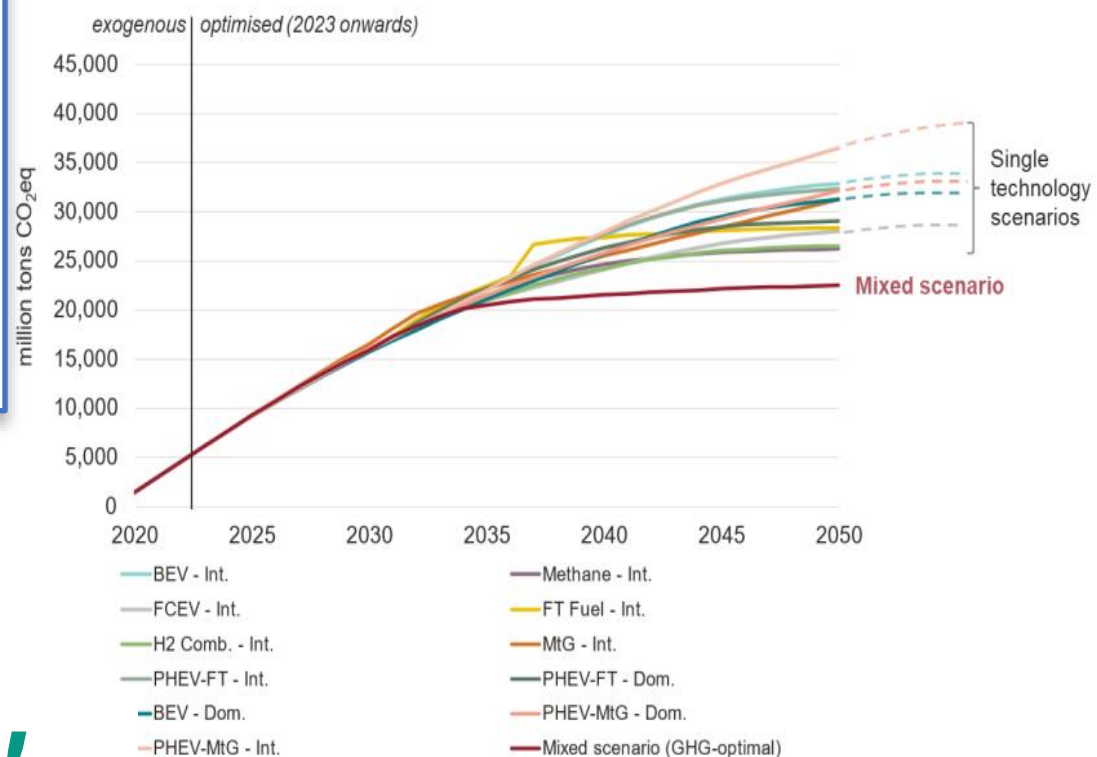
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# BIOMETHANE ...WHY?

1

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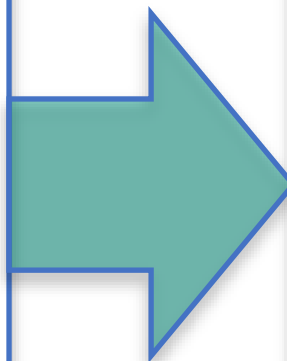
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maggio 2022



- Sostenibilità
- Salute del suolo
- Versatilità
- Maturità tecnologica
- Sicurezza energetica
- Competitività

*SOURCE: Guidehouse Report 2023, Beyond energy – monetising biomethane's whole-system benefits*

# BIOMETHANE...WHY?

# 2

- Climate Change (fit-for-55 package)

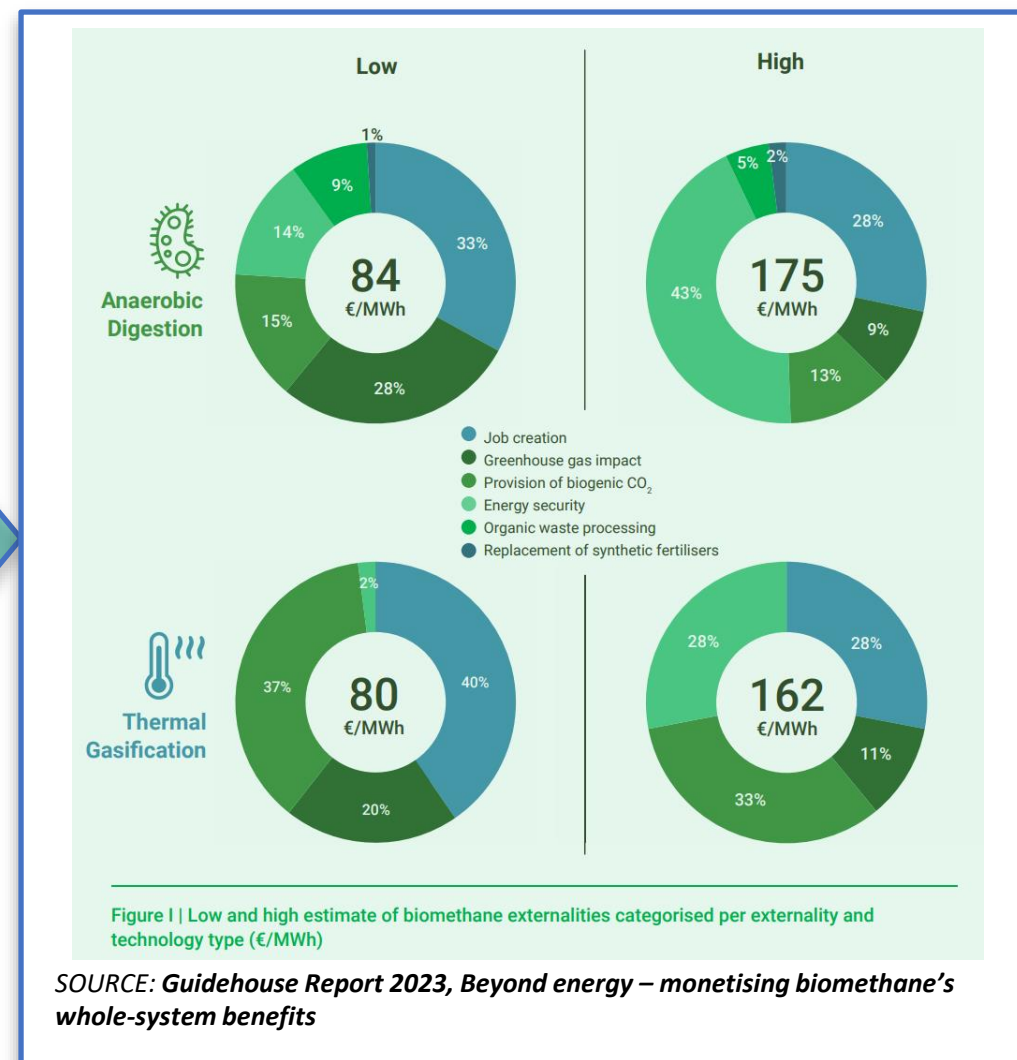
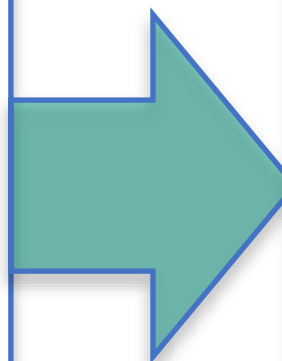
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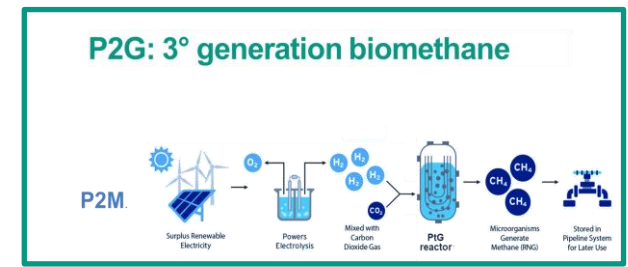
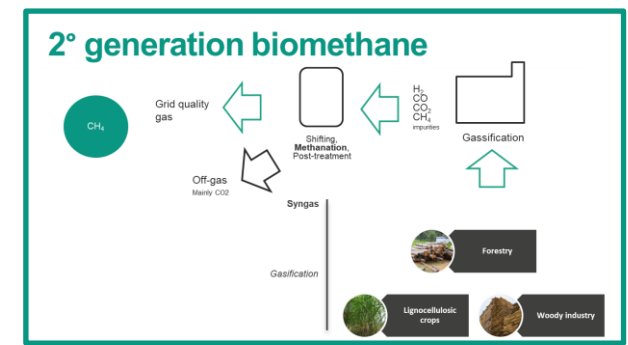
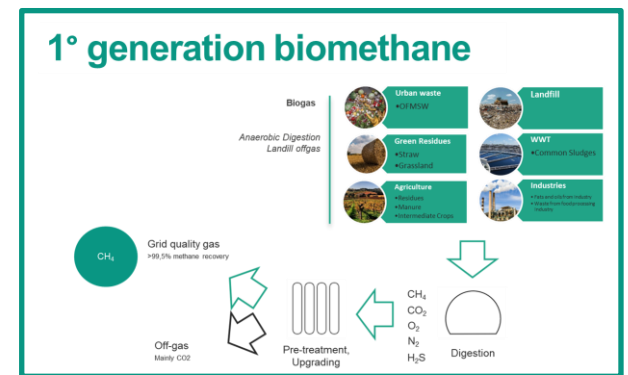
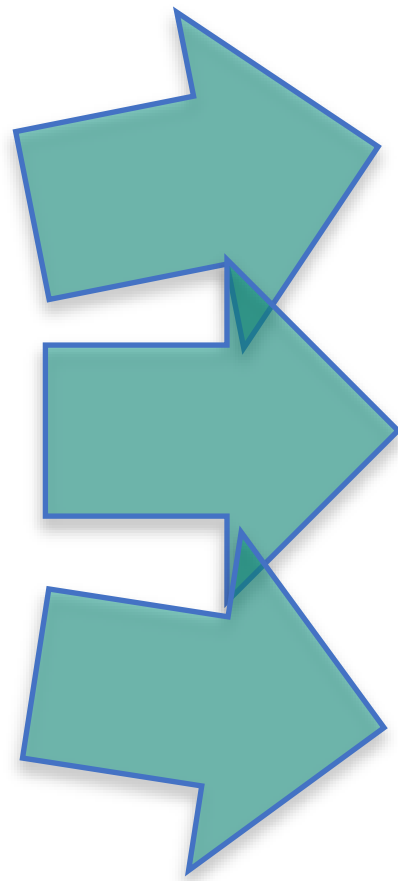
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# Biomethanes

- 1G Biomethane
- 2G Biomethane
- 3G Biomethane





**1**

## **Biogas and 1G Biomethane**

Anaerobic Digestion



# 1° generation biomethane

Biogas

Anaerobic Digestion  
Landfill offgas



**Urban waste**  
•OFMSW



**Landfill**



**Green Residues**  
•Straw  
•Grassland



**WWT**  
•Common Sludges



**Agriculture**  
•Residues  
•Manure  
•Intermediate Crops

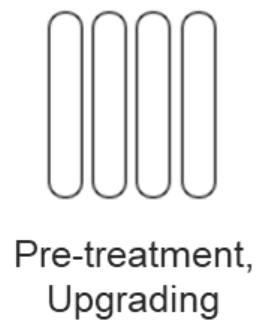


**Industries**  
• Fats and oils from Industry  
• Waste from food processing Industry

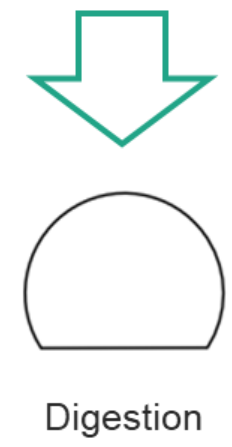


Grid quality gas  
>99,5% methane recovery

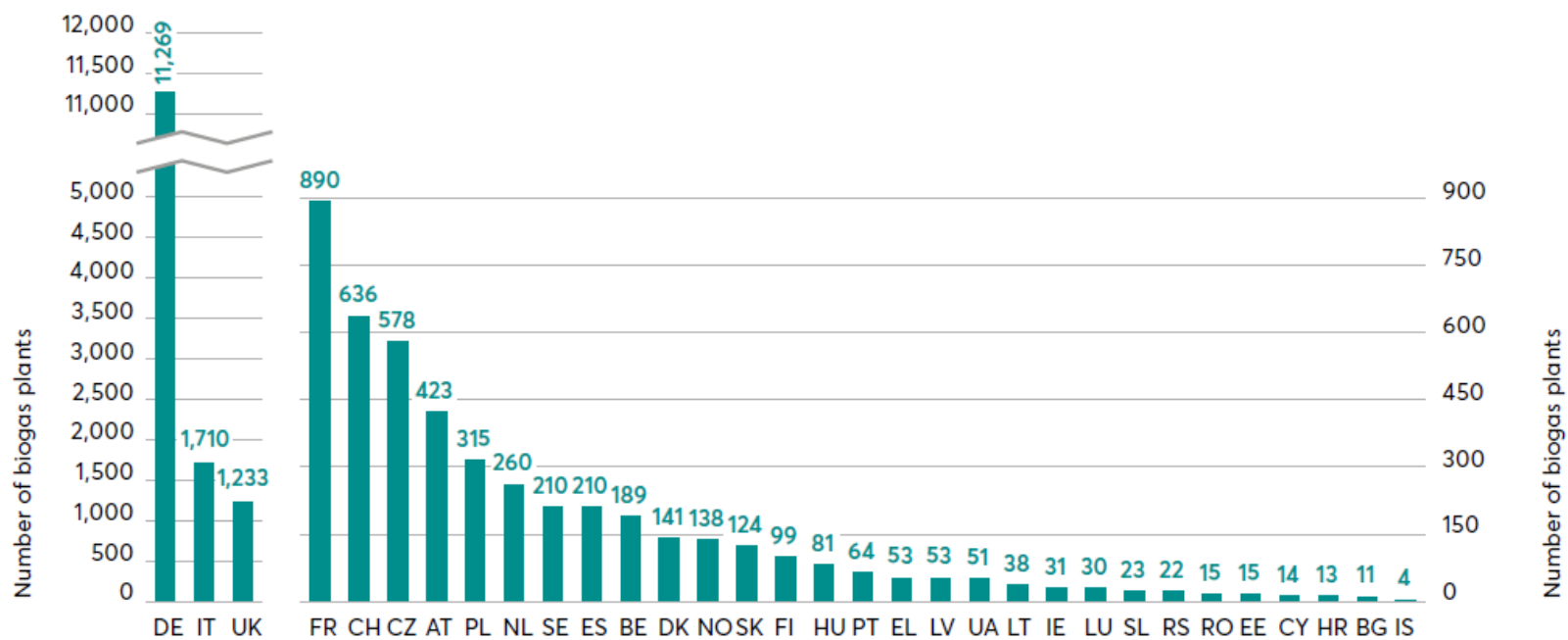
Off-gas  
Mainly CO2



CH<sub>4</sub>  
CO<sub>2</sub>  
O<sub>2</sub>  
N<sub>2</sub>  
H<sub>2</sub>S



# Biomethane in Europe

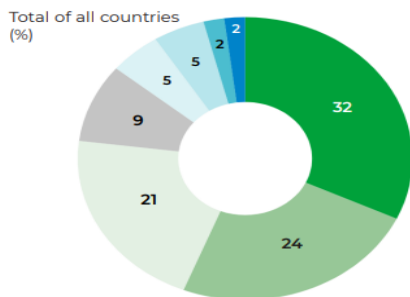
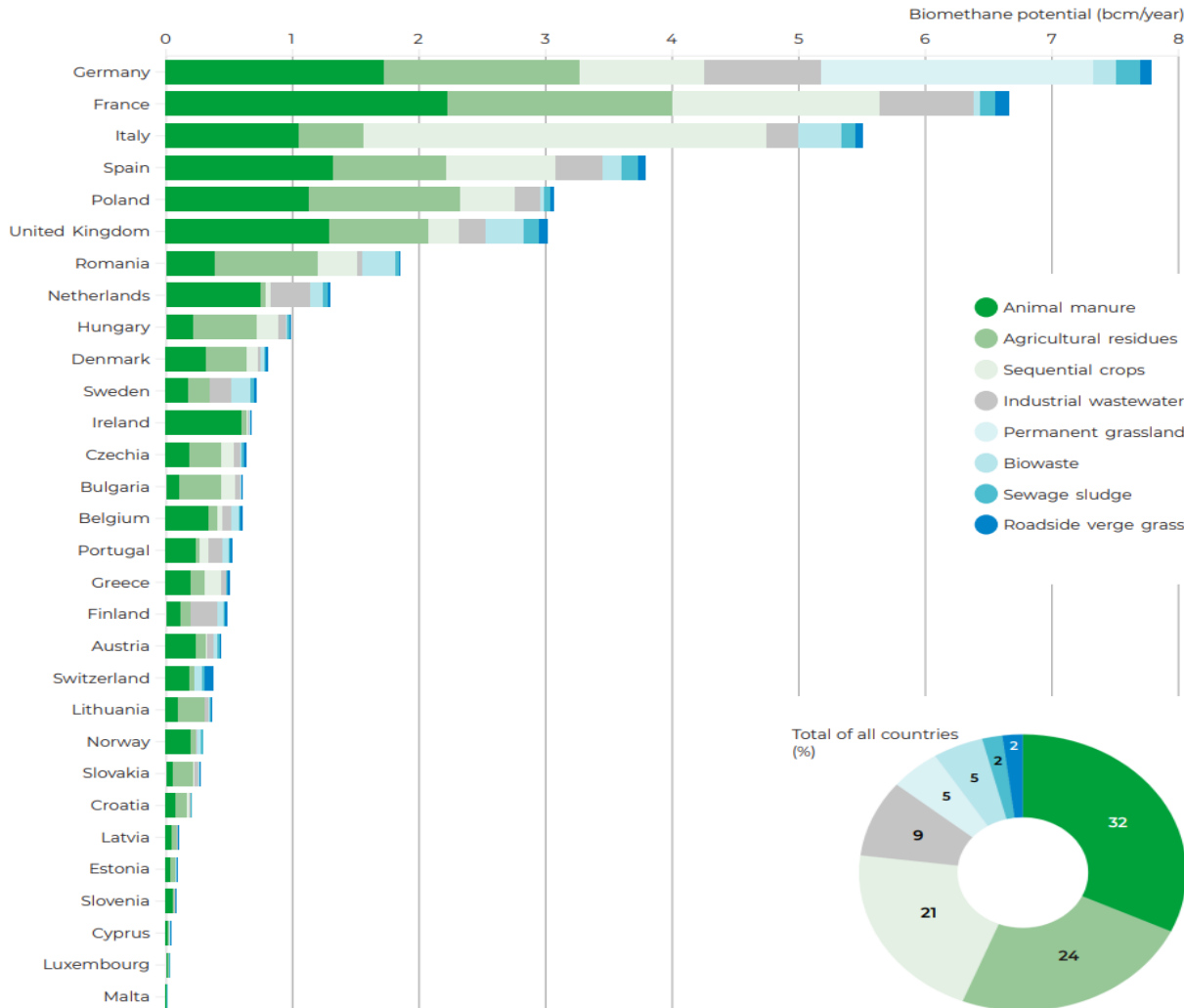


Source: EBA



# Biogas in Europe

Figure 5. Anaerobic digestion potential in 2030 per feedstock and country



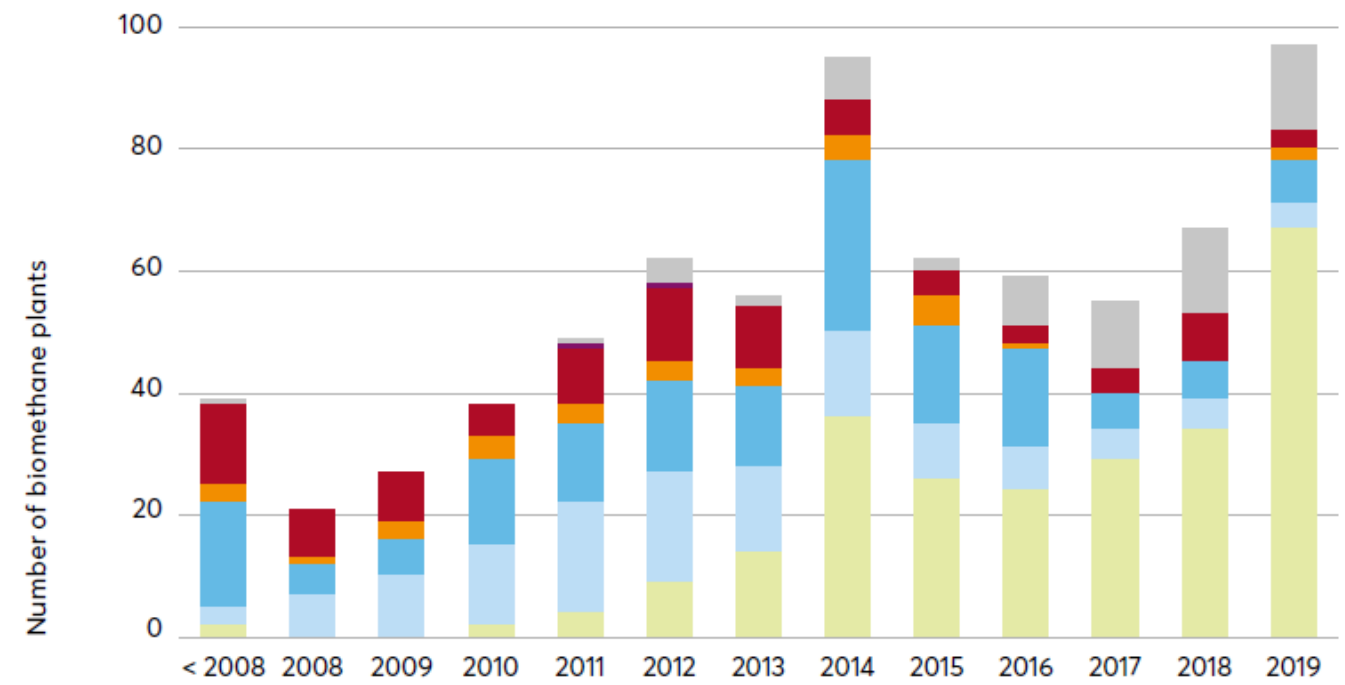
Source: Gas for Climate report 2022

# Upgrading technologies

**FIGURE 3.19**

Total number of newly installed biomethane plants each year, overall and per upgrading technology, 2008-2019

- Membrane Separation
- Chemical Scrubbing
- Water Scrubbing
- Physical Scrubbing
- Pressure Swing Adsorption
- Cryogenic Separation
- Unknown



Source: EBA

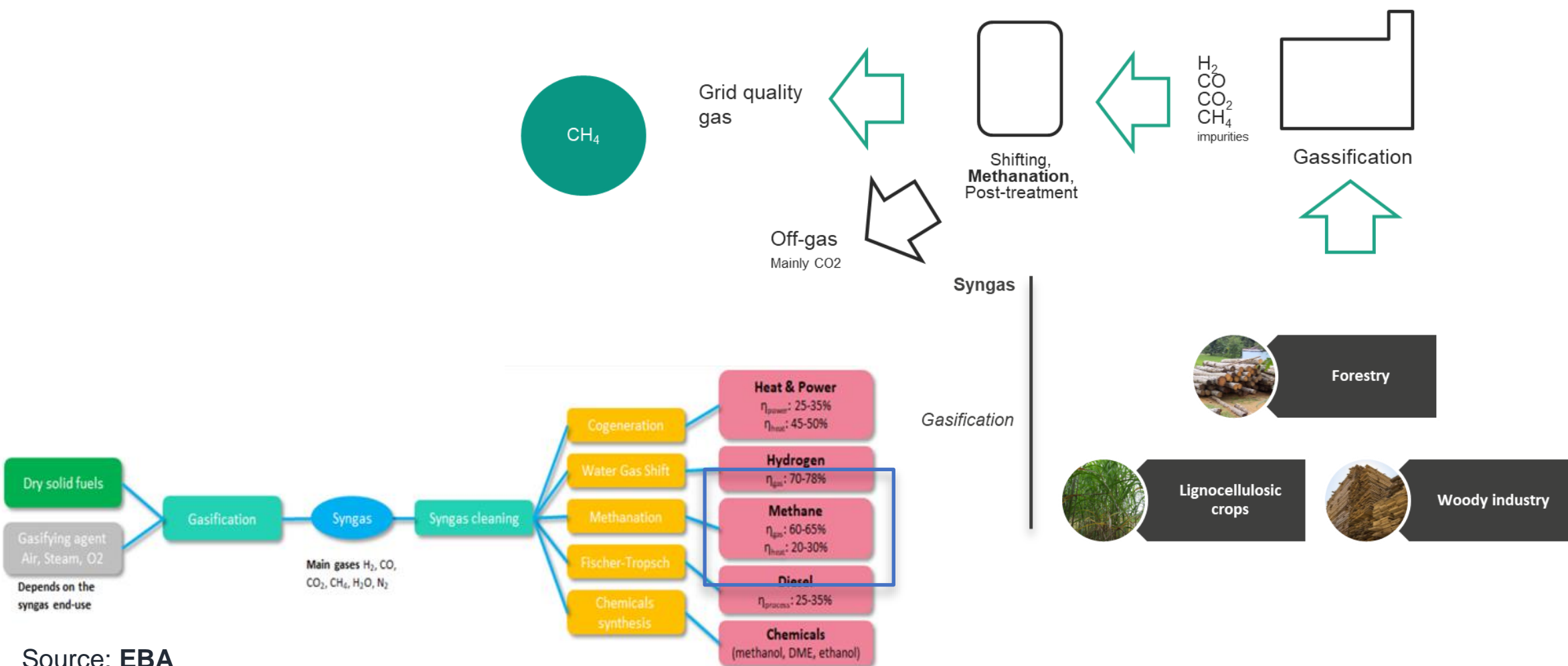


**2**

**2G Biomethane**

Gassification

# 2° generation biomethane



Source: EBA



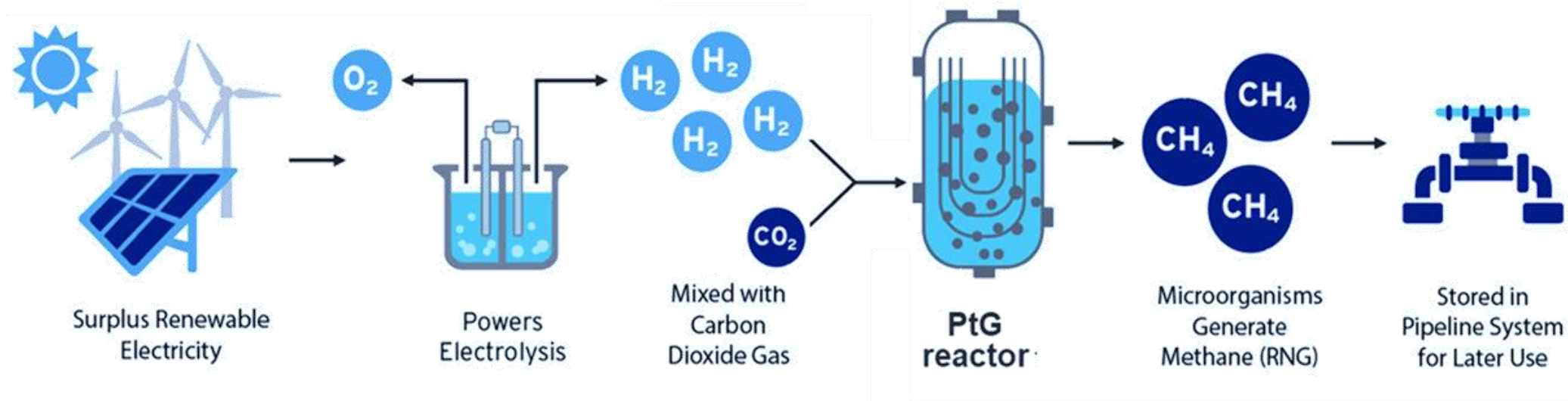
**3**

**3G Biomethane**

Power-to-Methane

# P2G: 3<sup>o</sup> generation biomethane

P2M.



Source Image: SoCargas



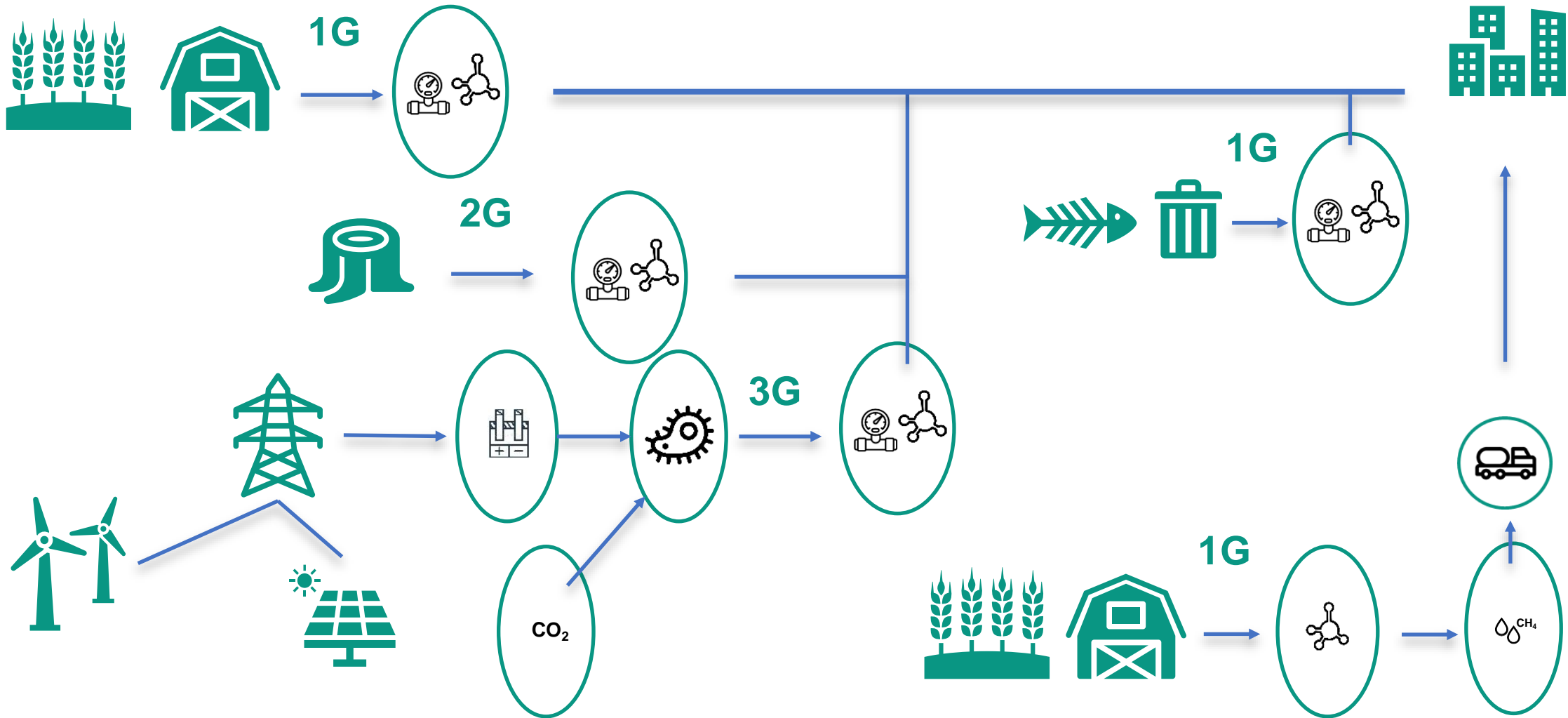


4

## Gas Infrastructure

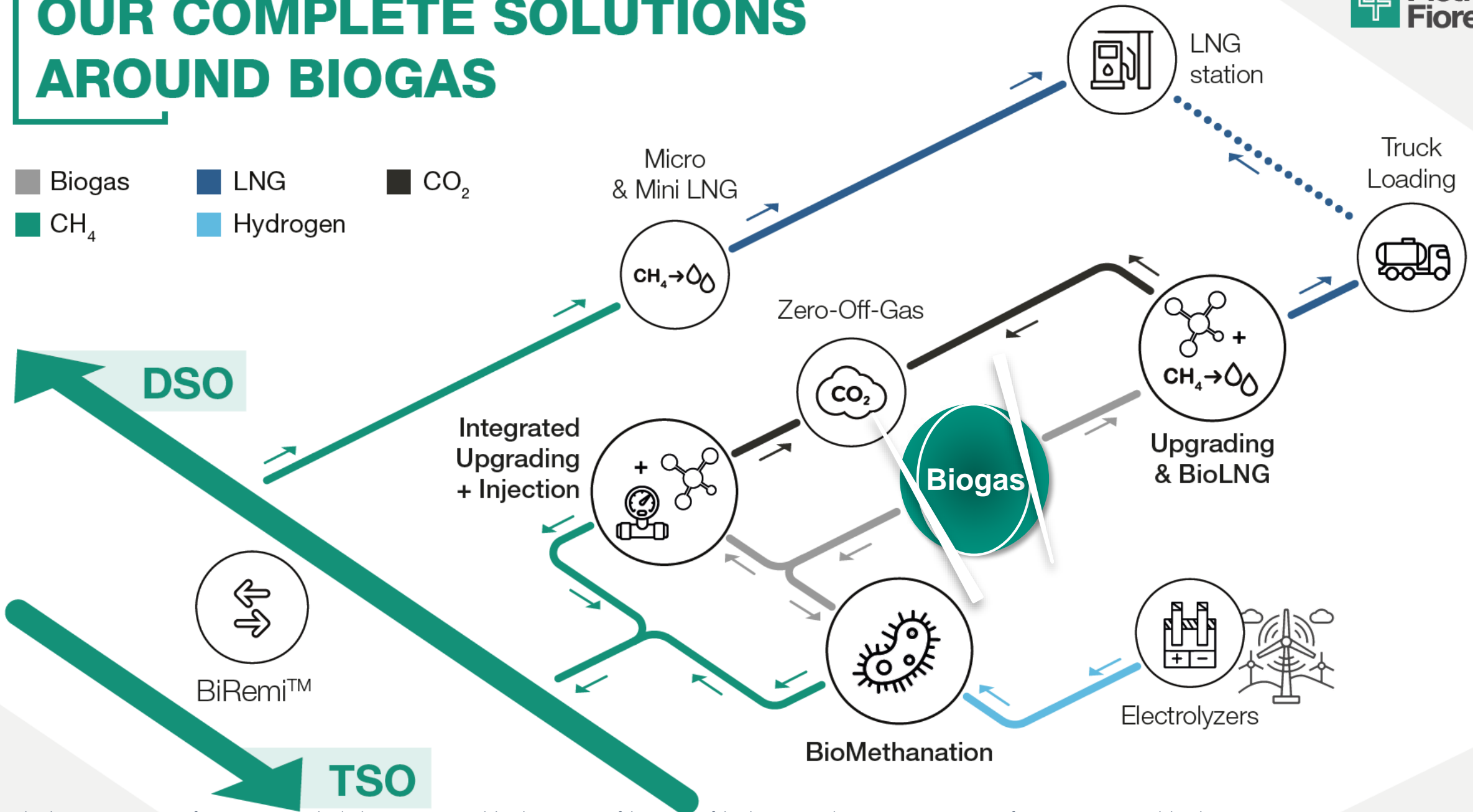
TSO, DSO, Liquefaction

# Biomethane: distributed production



# OUR COMPLETE SOLUTIONS AROUND BIOGAS

- Biogas
- CH<sub>4</sub>
- LNG
- Hydrogen
- CO<sub>2</sub>



# CHALLENGEs

- Disponibilità di biomassa (competizione/LUC)
- Supply chain design
- Capacità produttiva dei player industriali
- Infrastrutture (Reverse flow cabinet)
- Forza lavoro
- Red taping degli investimenti
- Iter autorizzativi
- Demand-driven market
- R&D e scale up 2G/3G

# Analisi, misura e iniezione in rete

## Fiogrid

Manufactured  
in PF with PF  
components

Integrated  
plant



Sulphur &  
VOC removal

Compression

**Fiograde<sup>+</sup>**  
Upgrading

Dehydration

Chillers



**1.800 Nm<sup>3</sup>/h**  
Portata biogas totale



**12 barg**  
Pressione iniezione

**Biogas**

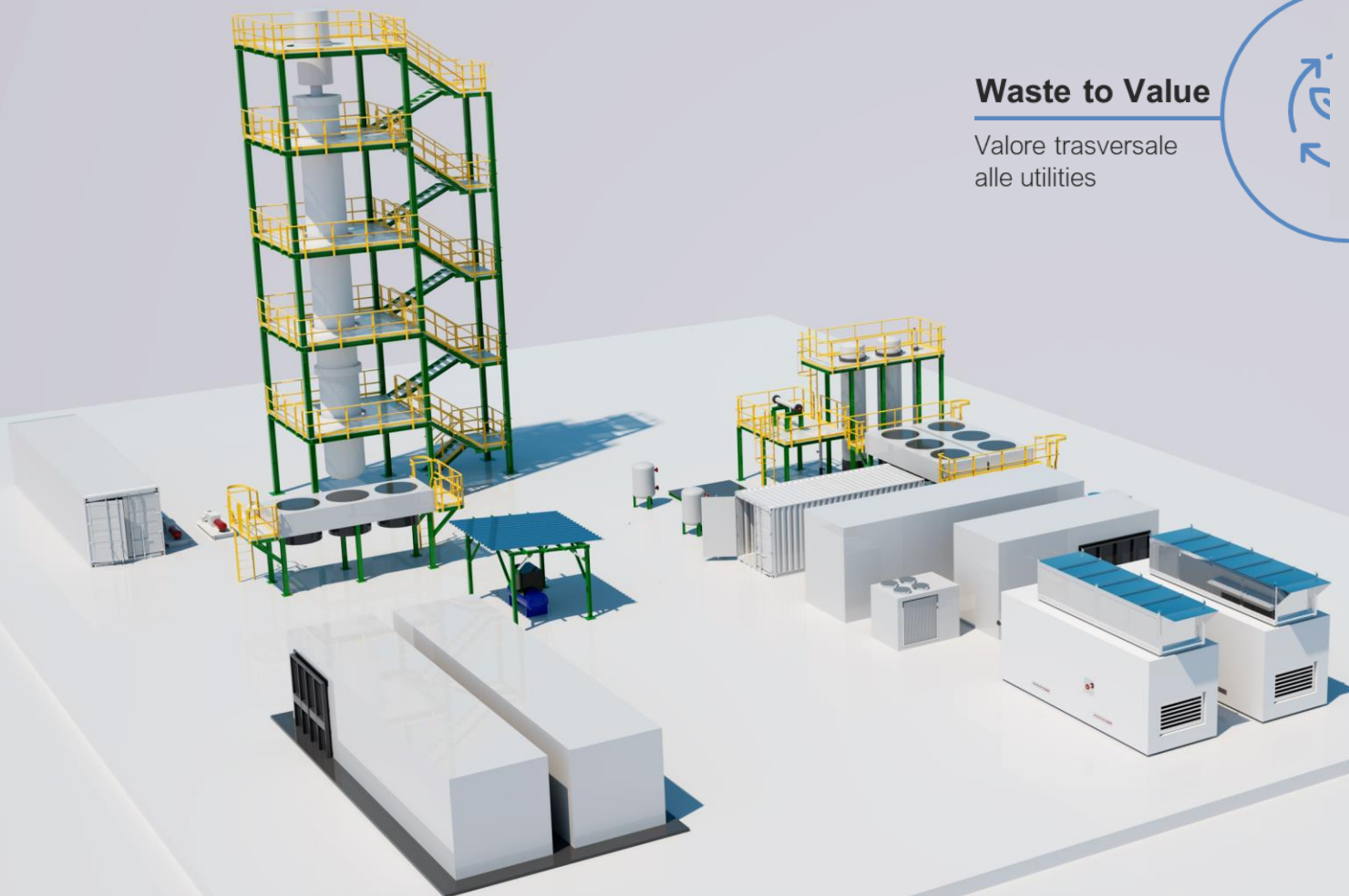
CH<sub>4</sub> = 63%  
CO<sub>2</sub> = 37%  
H<sub>2</sub>S = 100 ppm  
VOC < 0,3 mg/Nm<sup>3</sup>

**Fiogrid<sup>+</sup>**

Analisi, misura e  
iniezione in rete

# SynBioS, simbiosi tra acqua, gas ed elettroni

Impianto industriale di Power2Methane, presso il depuratore di Corticella (BO) del Gruppo HERA



## Waste to Value

Valore trasversale alle utilities



## Carbon negative

Riutilizzo del carbonio verde del biogas



SynBioS

## Sector Coupling

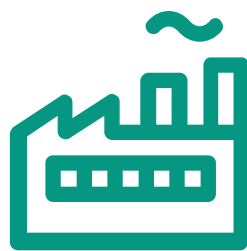
A disposizione del sistema elettrico con la flessibilità del gas



# I numeri del gruppo



Più di  
**2.400 persone**  
nel mondo



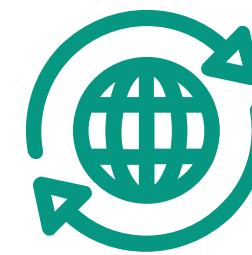
**18** impianti di  
produzione:  
**9** in Italia e  
**9** all'estero



Fatturato di  
**~500 M€**  
nel 2022



Uffici in **Europa**,  
**America**,  
**Africa** e **Asia**



Oltre  
**100 paesi**  
serviti





**Thanks**

*Padova 10.03.2023*

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**Pietro  
Fiorentini**

