Der Blick über den Tellerrand – Erfahrungen mit Biomethan in Italien und Europa

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Vice President, European Biogas Association (EBA) | Board Member, CIB

Representing the full European value chain

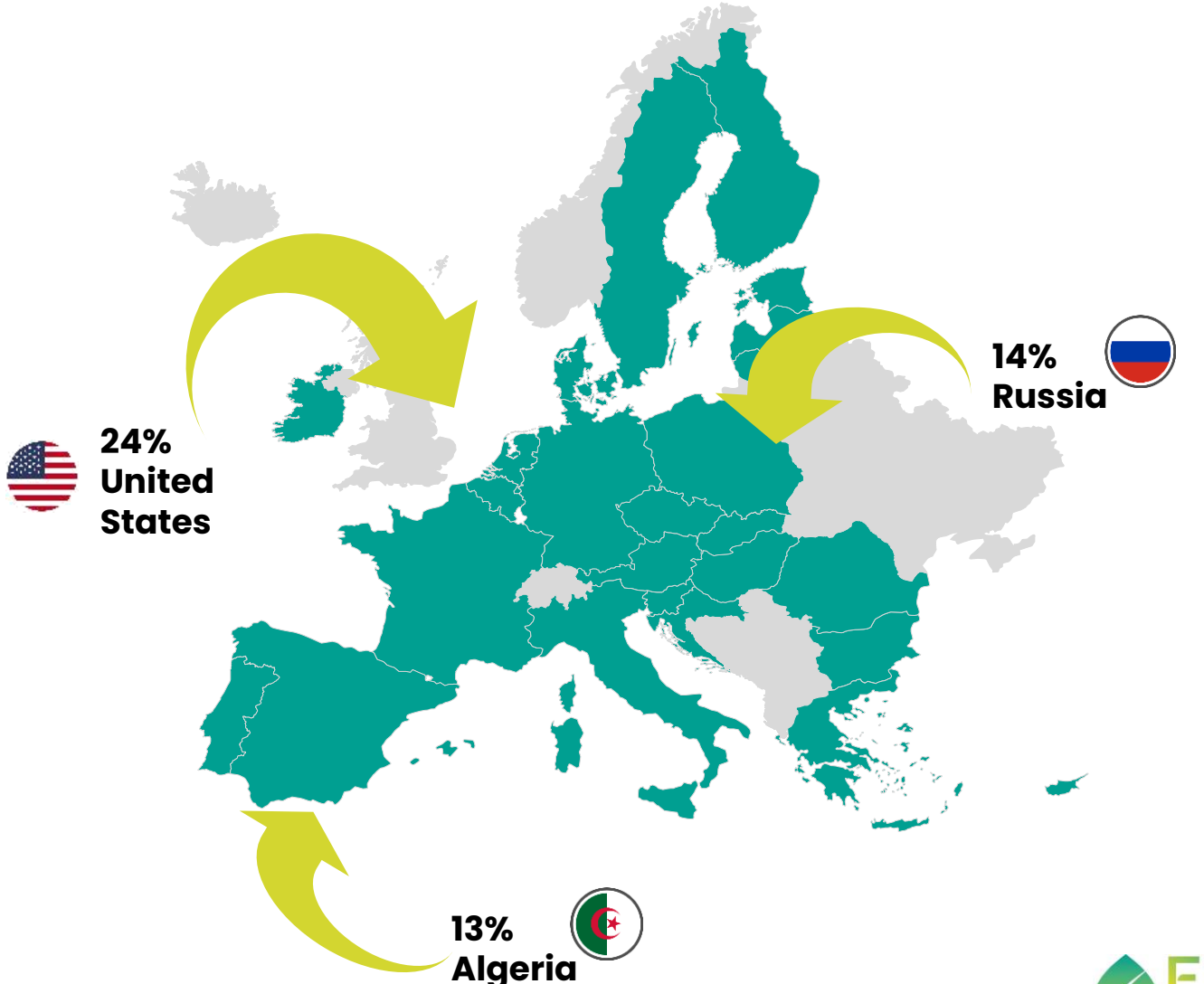
The EU imported 90% of its gas in 2024

46%
EU's primary energy production comes from renewables.

12%
Share of renewable energy in total energy consumption.

57%
Share of U.S. LNG in EU's LNG imports in 2025

46%
Year-on-year increase in EU imports of U.S. LNG



22 bcm of biogases are produced today in Europe

Combined biomethane and biogas production

22 bcm in Europe

=

Gas consumption of Belgium, Denmark and Ireland combined

19 bcm in the EU-27

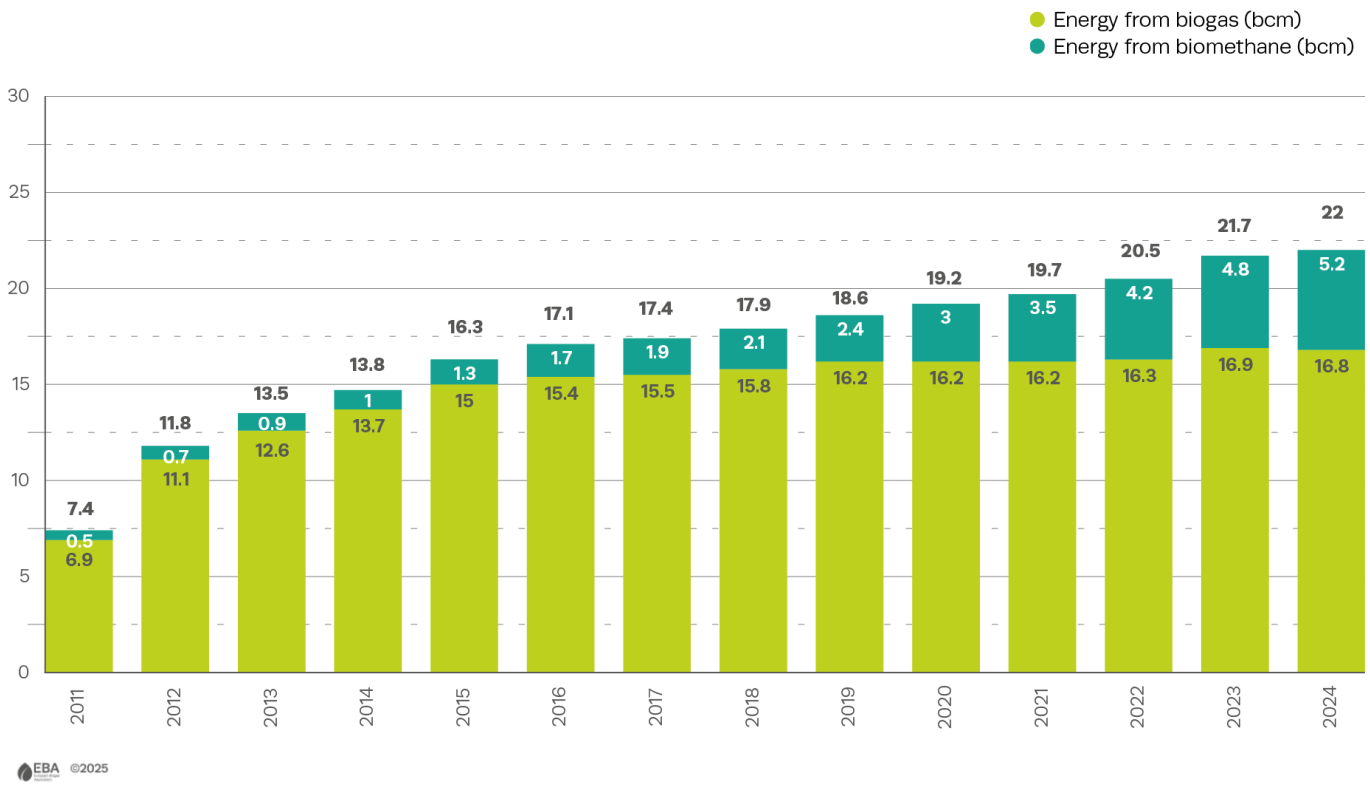
=

6% of EU natural gas consumption in 2024

Biogas and biomethane plants

+21,000 plants in Europe

Combined biomethane and biogas production in Europe (bcm)



EBA European Biogas Association

25 biomethane-producing countries in Europe

Biomethane production in 2024

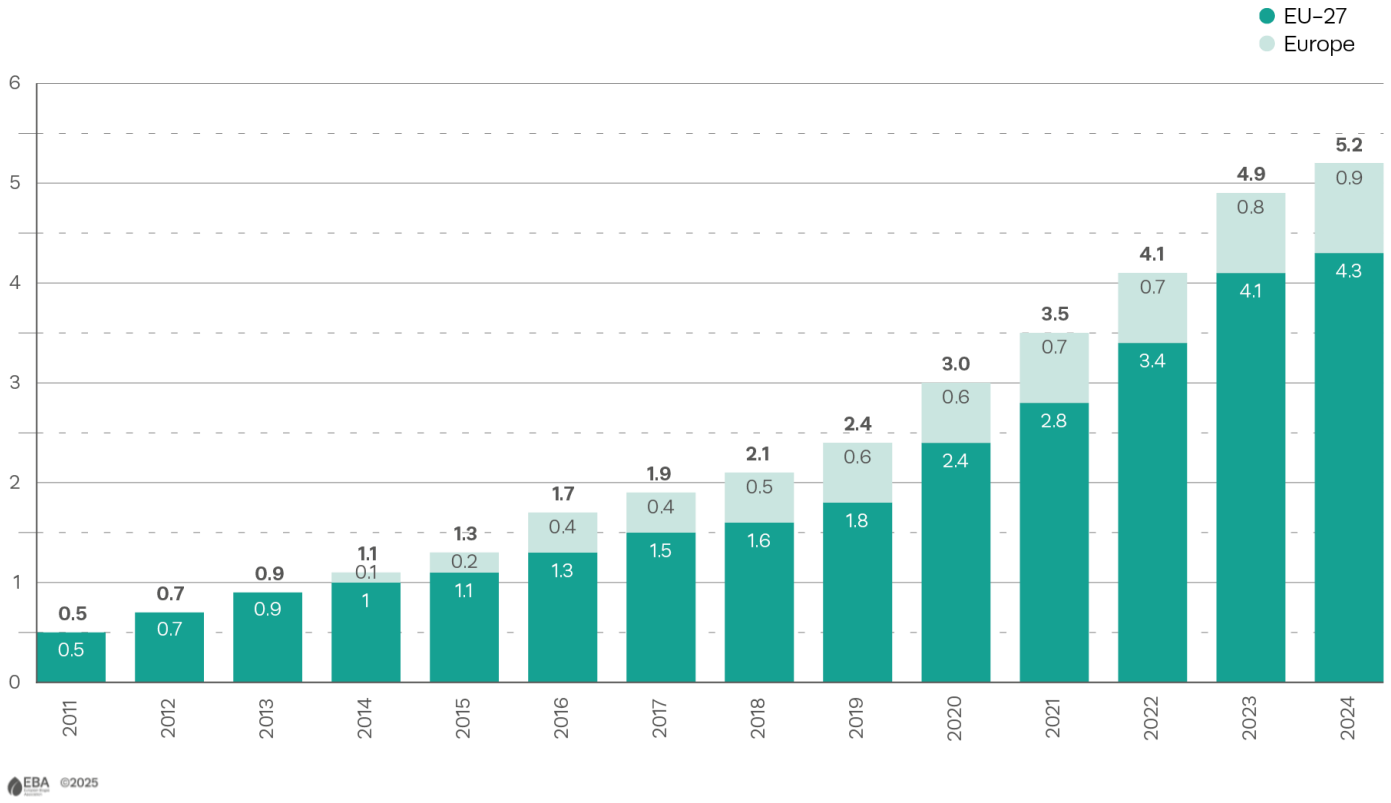
5.2 bcm
produced in Europe

4.3 bcm
produced in the EU-27

7 bcm/year
biomethane installed capacity in Europe (Q1 2025)

France, Germany, Italy, Denmark, and the UK are leading the production and scale-up of biomethane

Biomethane production in the EU-27 and Europe (bcm)

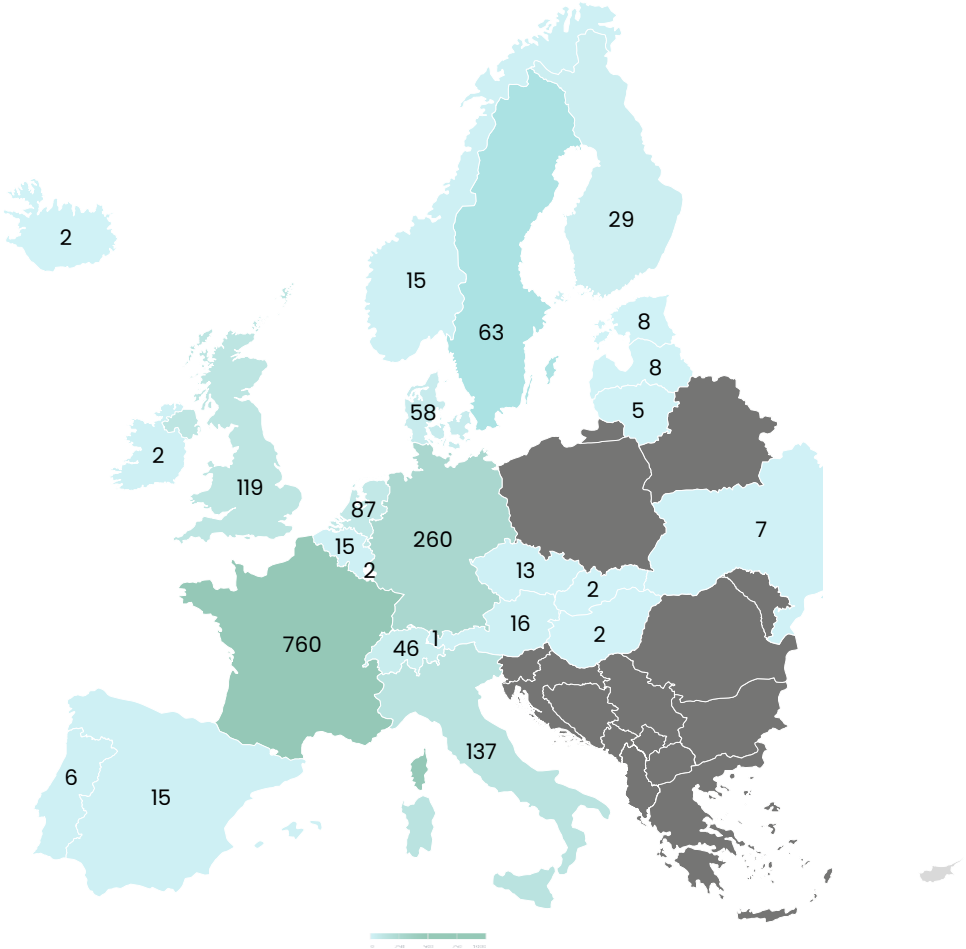


Biomethane plants in Europe and EU-27

Number of biomethane plants per country in 2024

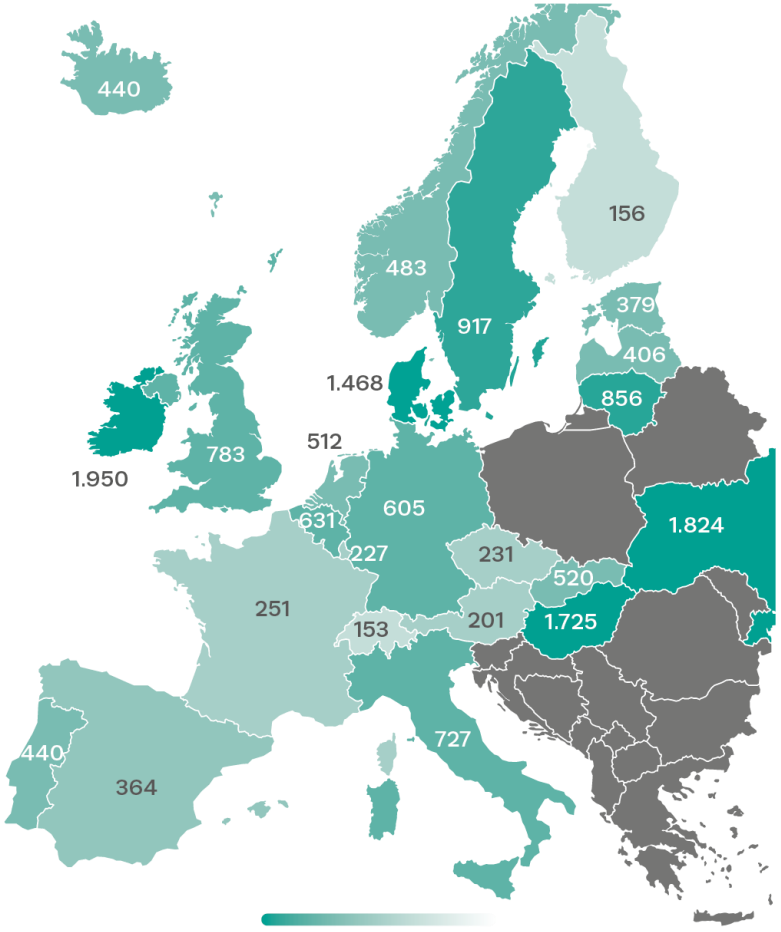
1,620
biomethane plants
in Europe

1,433
biomethane plants
in the EU-27



Average biomethane plant size per country in 2024 (m³/h)

483 m³/h
average size of biomethane plant
in Europe



EBA
European Biogas Association

Biomethane investments by 2030

€ 28
billion

earmarked to be invested in biomethane by 2030

7.3
bcm/year

of added biomethane capacity in Europe by 2030

900
Biomethane plants

Planned to enter operation in the next 5 years.

Top countries for planned investments 2025

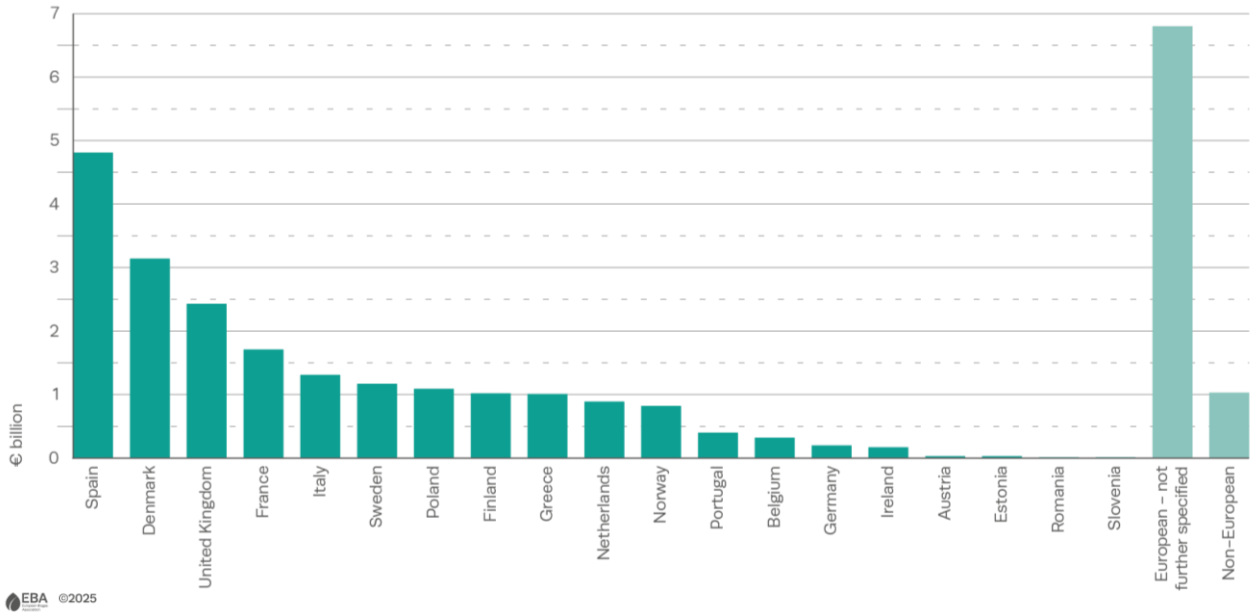
Top countries

Spain	€ 4.8 billion
Denmark	€ 3.1 billion
United Kingdom	€ 2.4 billion
France	€ 1.7 billion
Italy	€ 1.3 billion

Other investment destinations

European (yet to be specified)	€ 6.8 billion
Non-European	€ 1.02 billion

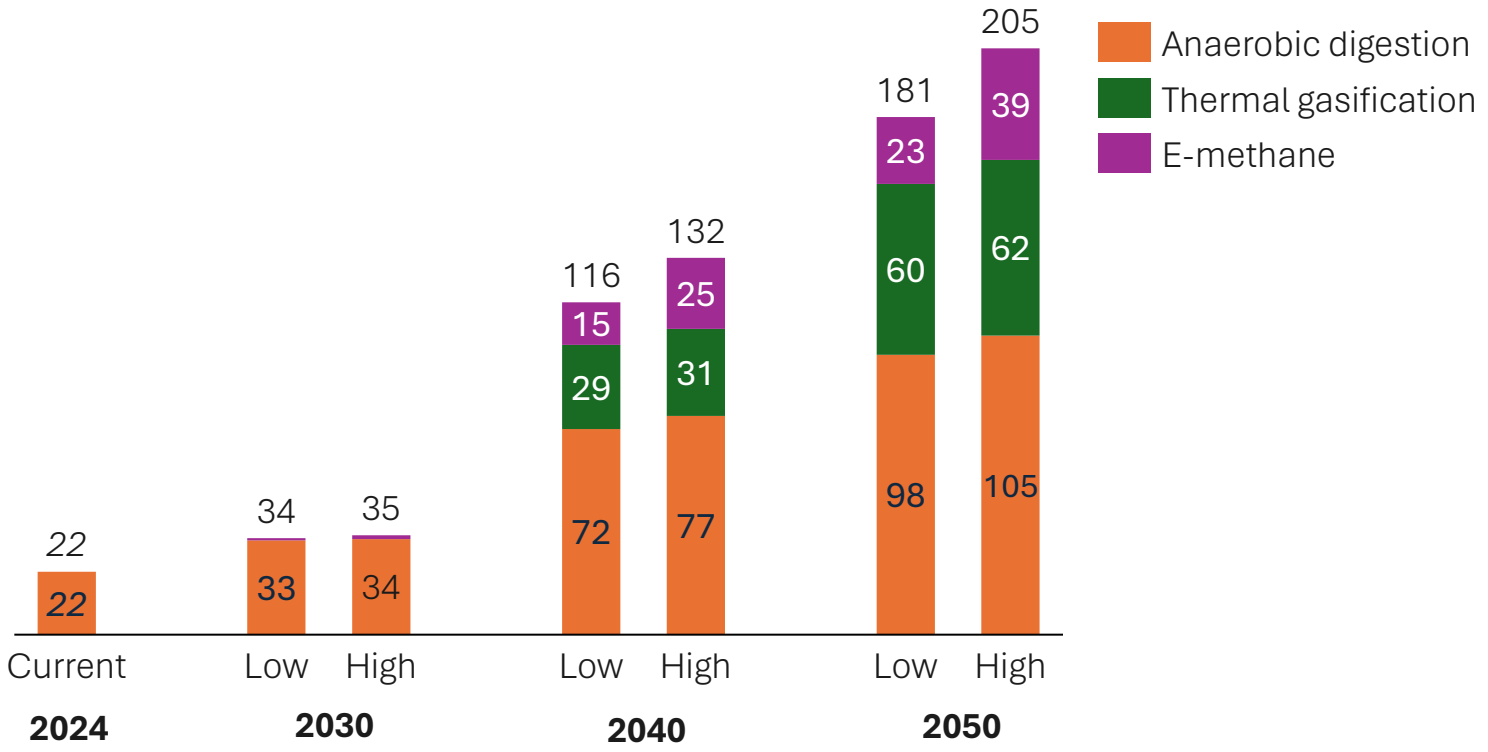
Geographical distribution of investment volumes



Production potential from today to 2050

There is a significant opportunity to scale-up

Production potentials in 2030, 2040 and 2050 (EU-27+3)



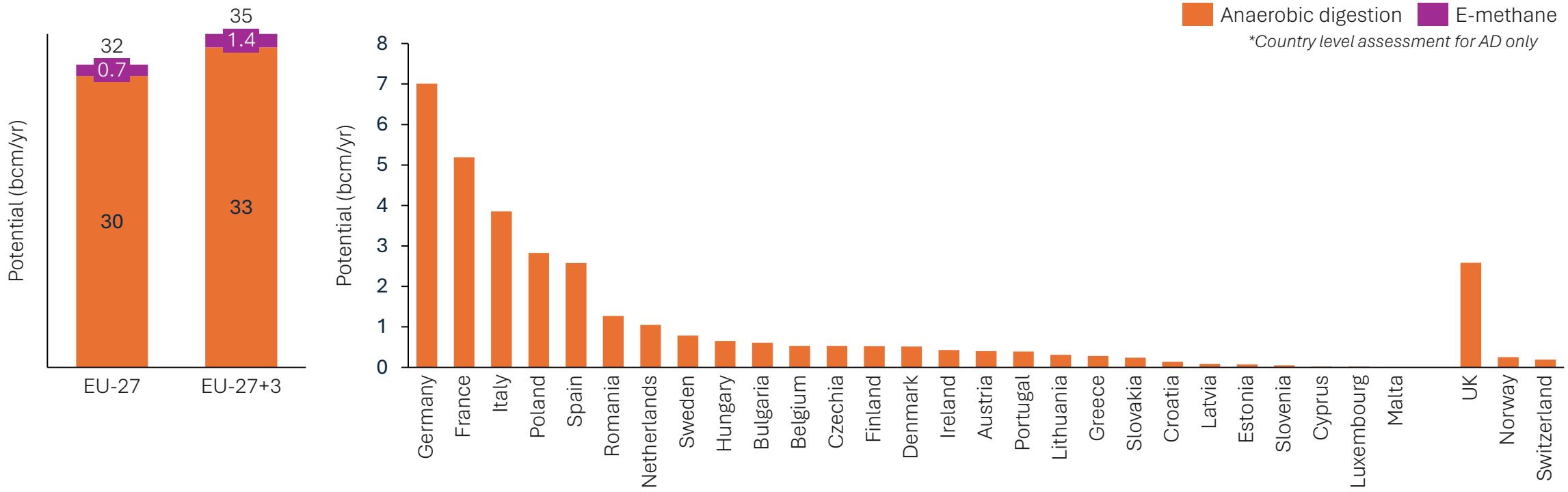
Key insights

- Up to 2030 almost exclusively based on anaerobic digestion
- 2030 potential lower than previously assessed due to lack of timely action to scale up production and mobilise sustainable feedstocks
- Steep increase towards 2050 – all production technologies play an important role
- Thermal gasification and e-methane become relevant by 2040 as these technologies commercialise
- EU-27 potential 31-32 bcm in 2030, increasing to 163-184 bcm by 2050

2030 production potential in Europe is 35 bcm/yr

Almost exclusively from anaerobic digestion

Total production potential by country and technology (bcm/yr)

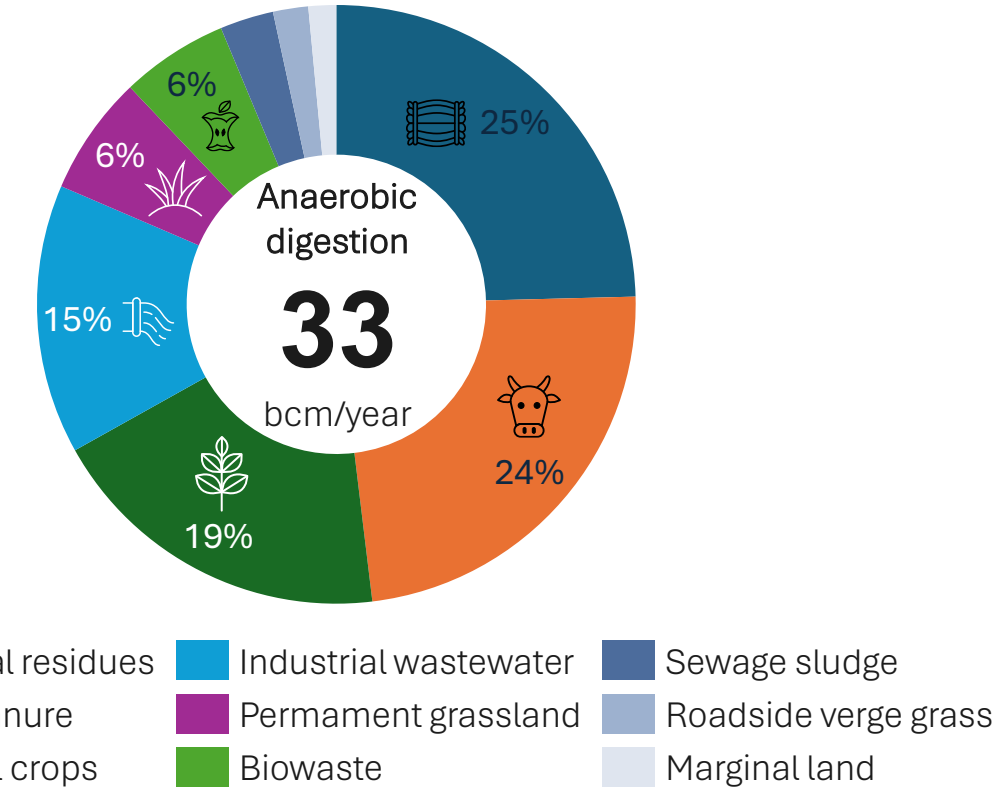


Note: Estimates may deviate from nationally specific studies assessing feedstock availability for sustainable biomethane production.

2030 Anaerobic digestion feedstock mix

Feedstock mix led by agricultural residues and animal manure

2030 anaerobic digestion feedstock mix



Key insights

- Potential of 33 bcm/yr estimated for Europe (down ~8 bcm/yr compared to 2024 study)
- Top 5 countries: Germany, France, Italy, Poland, United Kingdom (64% of total)
- Animal manure and agricultural residues make up 49% collectively
- Sequential crops (19%) and Industrial wastewater (15%) both provide a material contribution
- Newly added marginal land makes up 1.5%

Italy: Biogas & Biomethane until now

- 2nd EUROPEAN MARKET AFTER GERMANY
- 1,803 biogas plants built (agriculture + sewage + waste + industrial) dedicated to renewable electricity production
- 1,066 MW installed electrical power
- 115 biomethane plants in operation with the Biomethane Decree DM2018:
- RAPID GROWTH EXPECTED IN THE NEXT YEARS

ACTIVE BIOMETHANE PLANTS: DM 2018

OFMSW	57
Manure and Sludge	29
Industrial waste*	24
Other	6

TOTAL PRODUCTION CAPACITY
90,110 Sm³/h

** Biomass fraction of industrial waste not intended for feed use.*

PLANT TYPE AND DESTINATION

71	44
new	revamped

~ 789 MILLION Sm³/year

GAS GRID INJECTION	86
Liquefaction	23
NO GRID INJECTION	6

Source: GSE Nov. 2025

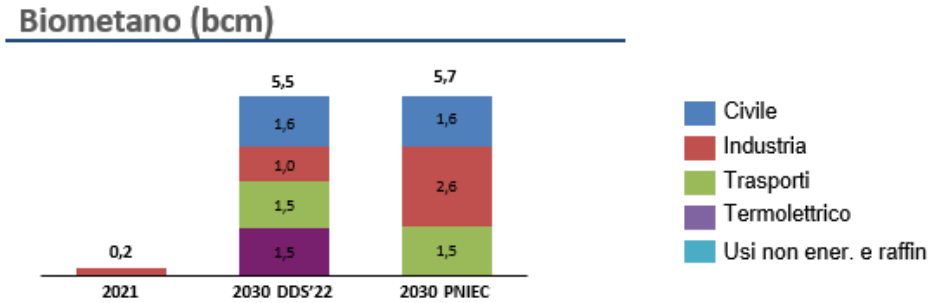
Italy: New Biomethane Decree DM 2022

BIOMETHANE REGULATORY REFERENCES | DM 2022

- **Objective:** to promote the production of sustainable biomethane from agricultural plants or OFMSW.
- **Budget:** €1.73 billion for new plants and conversions
- **Incentives: non-repayable grant** up to **40%** + **incentive tariff for 15 years and access via GSE competitive tenders**
- **Environmental requirements:**
  GHG reduction ≥65% (transport), **≥80%** (other uses).
- **Also allowed:** signing of **BPAs** with **hard-to-abate** industries (from 2024).

NATIONAL TARGET (PNIEC):

5.7 billion m³/year of biomethane injected into the grid by 2030
= 16,3% of the European objective



PNRR TRAJECTORY 2026

2.3 billion Sm³/year

Development of plants with the objective of producing at least 2.3 billion Sm³ by 2026.

Italy: New Biomethane Decree DM 2022

PLANTS RANKED IN DM 2022

551

TARGET PNRR M2C2-4

90%

of the annual production capacity required to reach the target of 2.3 billion m³ by 30/06/2026 has been achieved.

➡ **4.9% already in operation**

ANALYSIS OF QUOTA UTILIZATION AND CAPACITY

Capacity quota allocated: 92.2%

236,886 Sm³/h Awarded | Target: 257,000 Sm³/h

Plants in Operation: 5.0%

12,929.92 Sm³/h operational as of today

Total Volume
2.08 billion
Sm³/year awarded

In Operation
0.113 billion
Sm³/year effective

TECHNOLOGY MIX

Revamped Agricultural Plants	317
New Agricultural Plants	207
New Organic Waste Plants	26
Revamped Organic Waste Plants	2

280
Plants: construction start notified

25
Plants: already in operation

~1 billion Sm³/year
production capacity from plants with construction started and completed

Company Overview

Cambium Srl/GmbH - **Holding**

TerraX a new era Srl/GmbH is dedicated to project development and plant operation (**Operation**)

BIHCON Srl/GmbH focuses on technical design, construction, EPC, and technical maintenance of the plants (**Maintenance**).

OceanX Srl/GmbH a newly established company, will focus on innovative projects in the **Power2X** sector, specifically in **biological methanation**.

AS OF TODAY, THE GROUP HOLDS:

31 REGISTERED TRADEMARKS ACROSS **EUROPE, JAPAN, AND THE USA**

31 **TOTAL PATENTS** 7 GRANTED AND 24 PENDING APPROVAL

31 **PATENT FILINGS WITH EUROPEAN, U.S., AND ASIAN PATENT OFFICES**

Cambium Holding company with strategic stakes in renewable energy businesses.

VALUE CHAIN (Full Integration)

Development → Construction → Maintenance & Operation

KEY COMPANIES

TerraX a new era → Project Development

BIHCON → Implementation & Plant Management

BUSINESS MODEL

Projects → **Sold to investors** *or* **Managed directly** → Long-term value creation

THE GROUP IS SEEKING AN INVESTMENT OF OVER €1 BILLION TO ACCELERATE ITS INDUSTRIAL PLAN, STRENGTHEN INTERNAL CAPABILITIES, AND CO-FINANCE STRATEGIC ASSETS IN EUROPE AND GLOBALLY.

About the Founder

Cambium TerraX a new era BIHCON OceanX

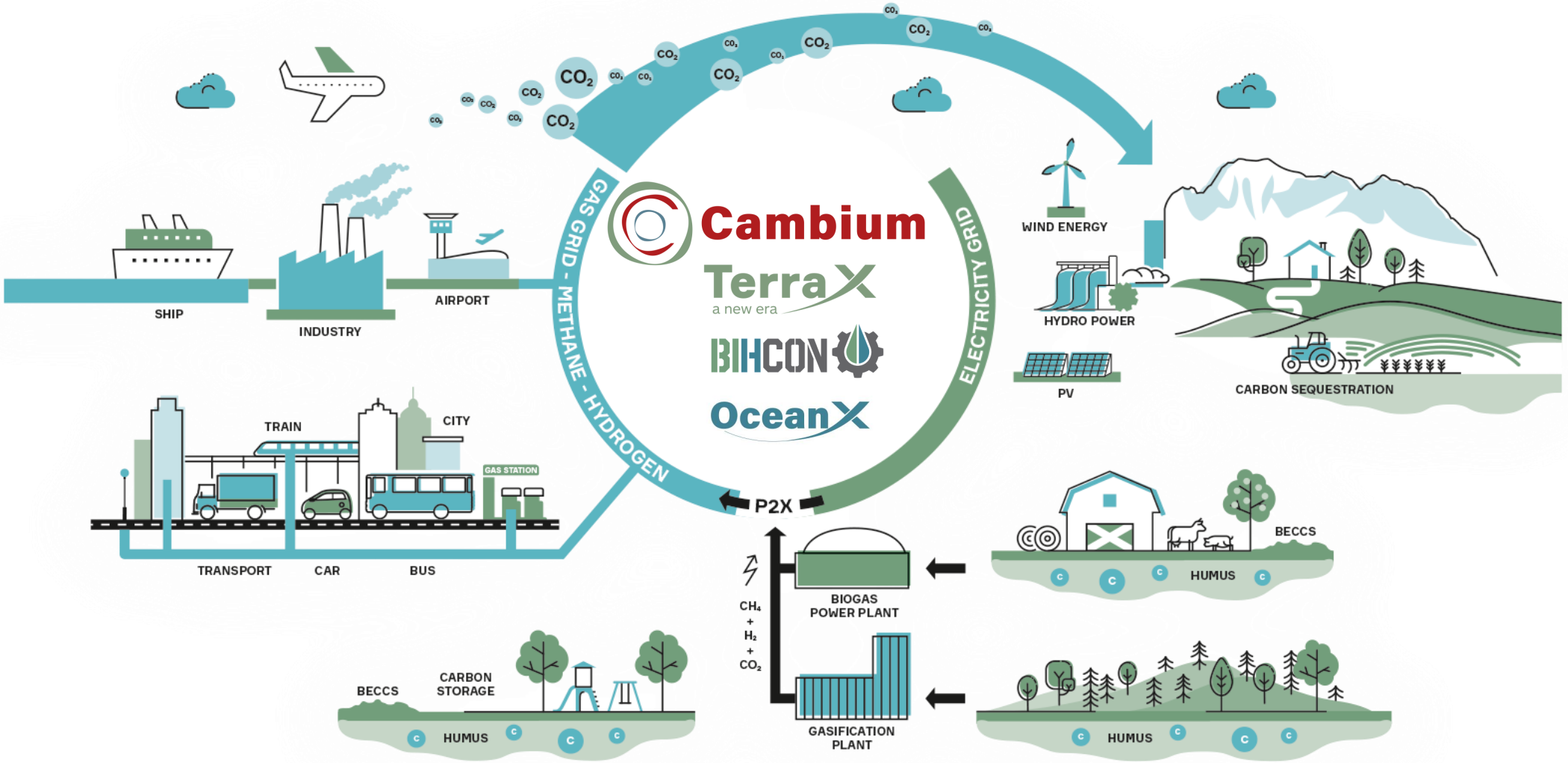
Experience & Innovation
- ✓ 25+ years in bioenergy, 30+ patents
- ✓ Creator of the first **biogas consortium plant** in South Tyrol (2001)
- ✓ Founder of a company with **225 plants in 14 countries**

Technological Leadership
- ✓ Biomethane from agricultural biomass & OFMSW
- ✓ Biohydrogen from anaerobic digestion
- ✓ Biofertilizers (pellets) from digestate
- ✓ Carbon neutrality systems by **2050**

Current Role & Vision
- ✓ Leads **TerraX** (biomethane, biohydrogen) & **Bihcon** (engineering)
- ✓ With **Cambium**, builds an integrated **renewable gas supply chain**
- ✓ Driven by **innovation** and **sustainability**

"I saw my first anaerobic digestion plant at the age of 13.
Since then, I've nurtured the idea of turning manure into energy."

Vision and Mission



Services we provide

Design Solutions

We are experts in the elaboration of **design solutions**, related to biomethane and biohydrogen production plants, high rated and certified by an international advisor.

Projects Development

We are in charge of **developing** highly customized biomethane and biohydrogen production projects, investing in new technologies and pursuing the so-called circular economy.

Financing

With our team of experts, we are able to develop specific projects that meet the **requirements of investors**.

Construction

We are in charge of **building** highly customized biomethane projects, investing in pre-treatment, flexibility and redundancy and pursuing the **circular economy** by considering each project as a **bionergy hub**

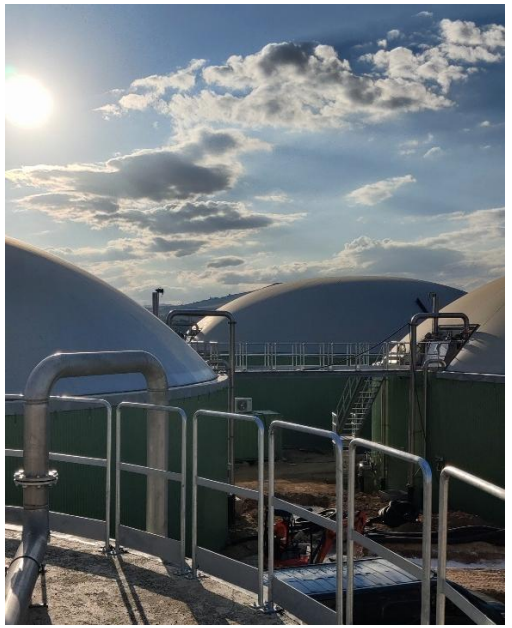
Operation & Maintenance (O&M)

We provide full Operation & Maintenance (O&M) **services for biogas, biomethane and biohydrogen plants**. With extensive technical expertise and field experience, the company ensures optimal plant performance, efficiency, and reliability through preventive maintenance, **real-time monitoring**, and tailored **technical support** throughout the entire lifecycle of the facility.

Biomethane Plant from Agricultural Residues

Greenfield 500 Sm^3/h of biomethane production for gas grid injection

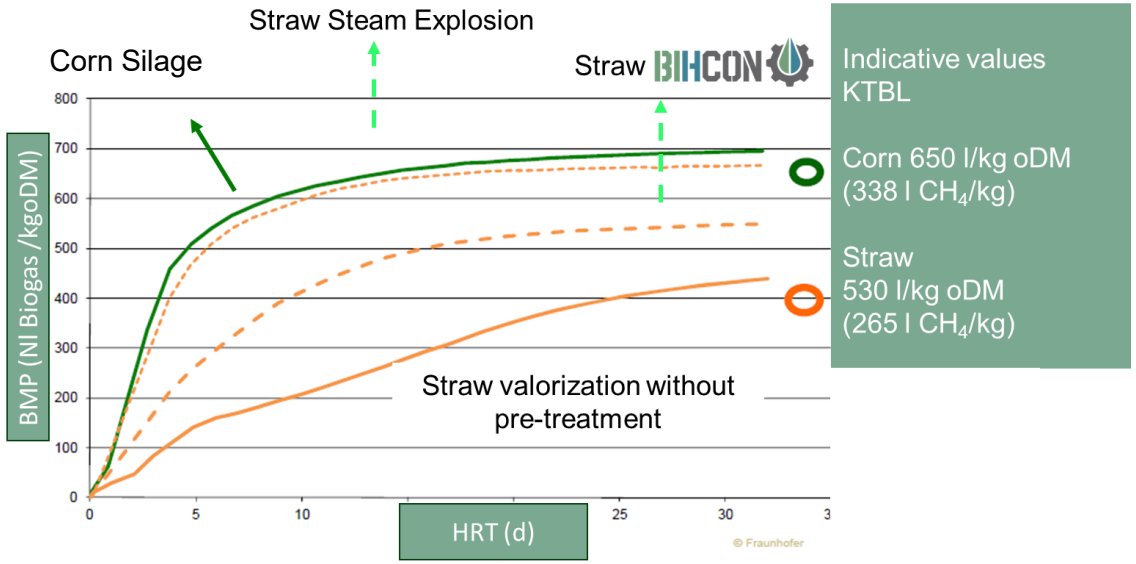
Grottole (MT), Basilicata, Italy



Straw Pre-Treatment

BiHcon mechanical pre-treatment

- High lignocellulosic parts => pre-treatment
- Destroy the protective structure
- BiHcon's solution comparable to straw extrusion



Indicative values KTBL

Corn 650 l/kg oDM (338 l CH_4/kg)

Straw 530 l/kg oDM (265 l CH_4/kg)

1. NON-TREATED STRAW
2. MILLED + MOISTENED
3. MILLED + MOISTENED + REACTOR

Source: Frauenhofer

Tool box

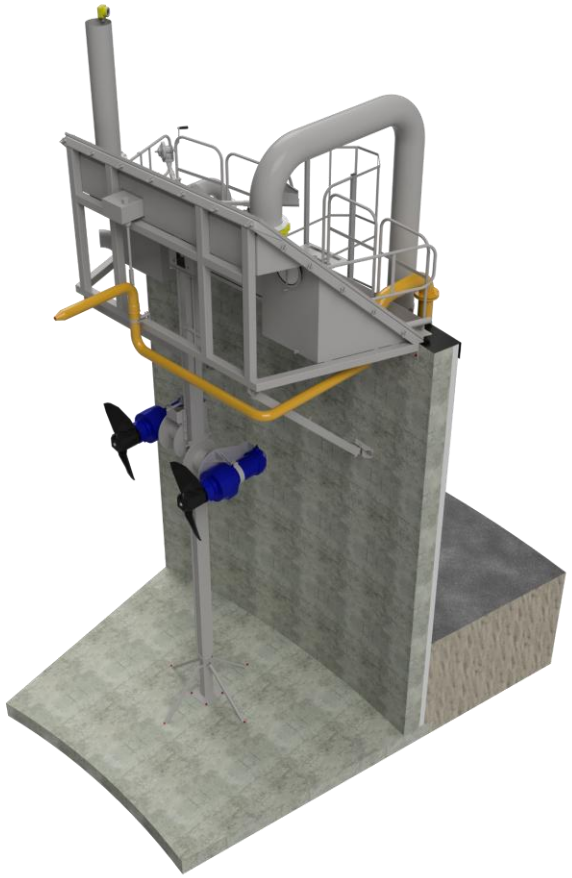
TOOL box

THE SOLUTION DEVELOPED BY BIHCON TO CENTRALIZE ALL CONTROL OPERATIONS OF EACH TANK IN A SINGLE LOCATION.

The Spritz mix

SPRITZ mix

BIHCON TECHNOLOGY FOR THE FORMATION OF SUPERNATANT AND CRUST



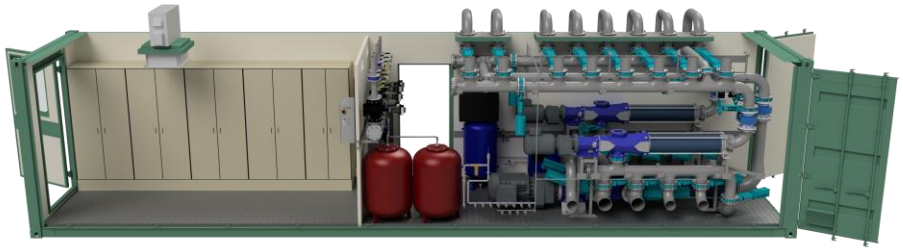
COMBINED SPRAYING AND AGITATION SYSTEM COMPOSED OF:

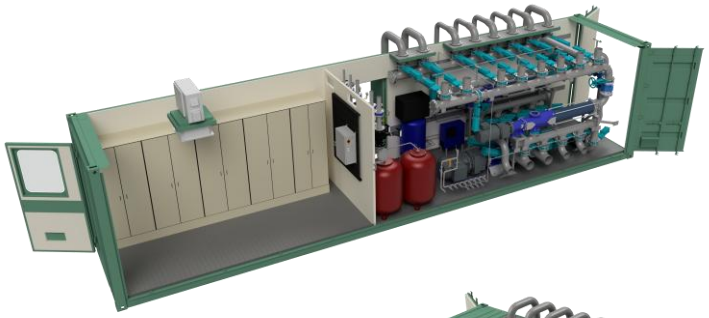
- **DIGESTATE PUMPING SYSTEM FROM THE PUMPING STATION**
- **MIXING AND NOZZLE**

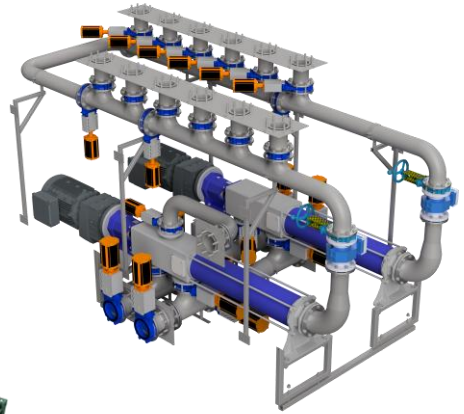
ADVANTAGES:

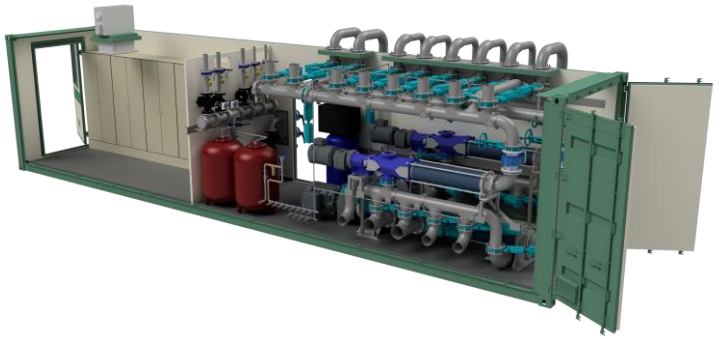
- PREVENTION AND REMOVAL OF CRUSTS AND FLOATING LAYERS
- LOWER ENERGY CONSUMPTION
- REDUCED INVESTMENT IN MIXING SYSTEMS
- HOMOGENEOUS SUBSTRATE

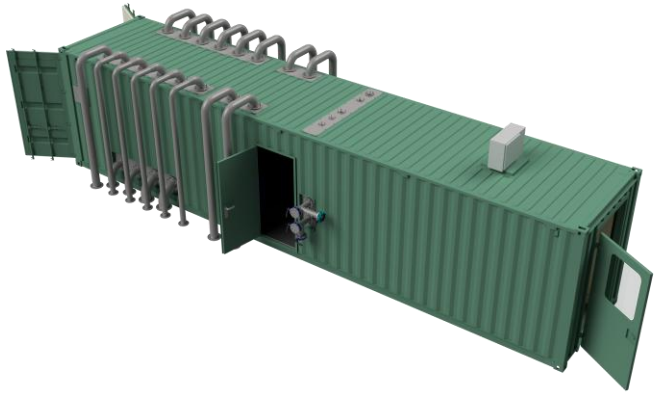
Pumping Station

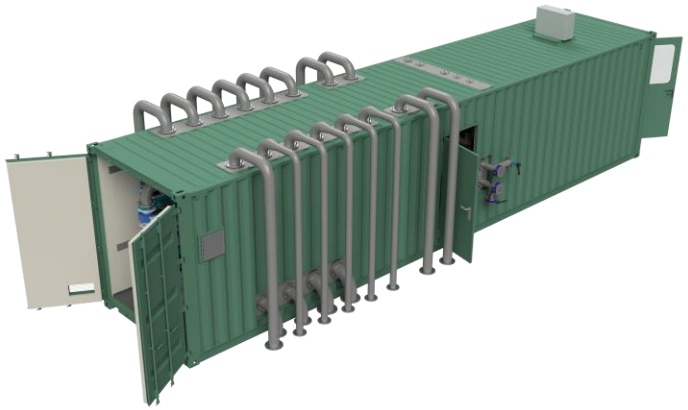












THE TECHNOLOGICAL CONTAINER IS THE HEART OF THE PLANT AND HOUSES THE PUMP ROOM AND THE CONTROL PANEL ROOM.

Umification Facility

Project Stercus, Sicily

- Innovative umification facility with 20.000 t/a humus production
- Optimized for cow slurry with low dry matter content
- Transform liquid digestate in a stable odor free solid biofertilizer
- Total reduction of output quantity of AD plants of app. 70%
- Increased nutrient concentration in the fertilizer (reducing water)
- Additional income of AD plants with the production of a premium biofertilizer enriched with NPKS as needed

Umification Facility

Project Stercus, Sicily

- Recovery of micro/macronutrients via zeolite/biochar addition
- Overall process improvement with reduced nutrient losses and reduction in nitrogen emissions
- Addition of magnesium salts during the stabilization process to enable struvite formation: $MgNH_4PO_4$
    - Increasing the N-content in the fertilizer
    - Reducing N-emissions
    - Estimated N-recovery up to 80%
    - Production of slow-release premium fertilizer

Struvite (MAP) crystals produced in a manure treatment plant:

Biopellet Production

Project Stercus, Sicily

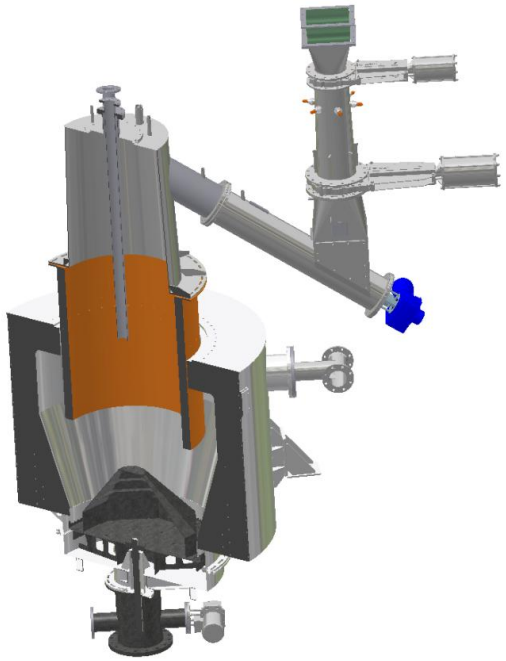
Experience: Greenergy in Molinella – Emilia-Romagna (built in 2012)

- Treatment of 100.000 t/a humus and/or solid digestate derived from the anaerobic digestion of zootechnical waste and agricultural biomass based on the drying and pelletization of the input material
- 65.000 t/a biofertilizer production as biopellets with ≥ 85% DM for sale in big-bags or 20 kg sacks
- Biochar from wood gasifier, utilized as additive in biofertilizer production, for AD process stabilization of the adjacent biomethane plant and/or its sale

Wood Gasification

Project Stercus, Sicily

Experience: Energiegen. Stans – CH (built in 2007/2011)

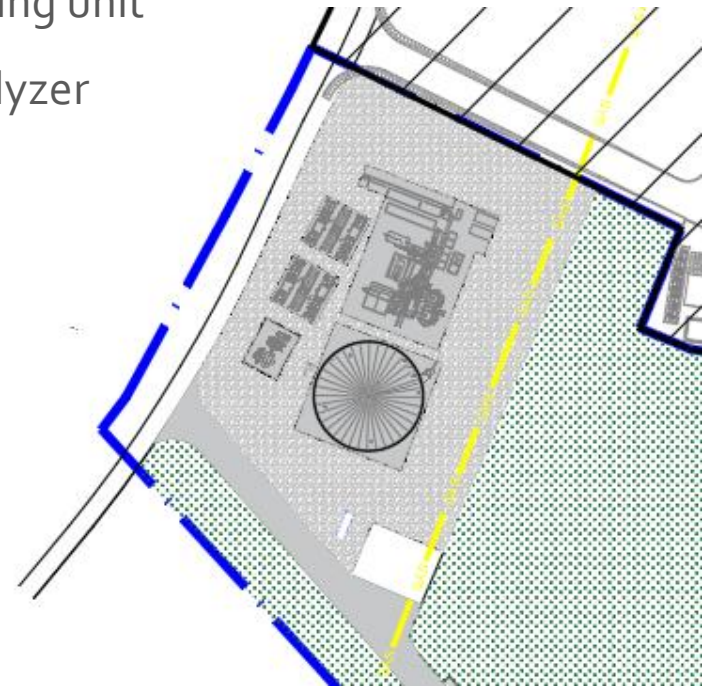


- Wood gasifier with cogeneration unit and two burners for heat/electricity self-consumption and biochar production as additive/stabilizer
- Adjacent to the biomethane and biopellet production facilities
- 1.000 t/a biochar production utilized as additive in biofertilizer production, for AD process stabilization of the adjacent biomethane plant and/or its sale
  - 3.600 kW fuel thermal input
  - 500 kW_{el} from cogeneration unit
  - 700 kW_{th} from cogeneration unit
  - 550 kW_{th} from gasification
  - 1.000 kW_{th} from syngas burner

Biogenic CO2 methanation

Project Stercus, Sicily

- Biomethanation Plant with a total installed capacity of 500 Sm³/h biomethane
- Adjacent to the biomethane and biopellet production facilities
- Utilizing electricity and heat from the wood gasifier
- Plant based on the biological methanation of 7.000 t/a bio-CO2 from the upgrading unit of the adjacent biomethane plant using green H2 produced by a 10 MW_{el} electrolyzer
- Daily hydrogen storage for optimized energy management



Source: Electrochaea

DiBiMeth - Direct Biogas Methanation

Biomethanation Lentini

- DEVELOPMENT OF **INNOVATIVE POWER-TO-X PRODUCTION PROJECTS**
- FOCUS ON DIRECT METHANATION OF BIOGAS WITH GREEN H_2 FOR BIOMETHANE PRODUCTION
- **PROPRIETARY PROCESS DEVELOPED**
- PLANT ENGINEERED
- PATENT FILING IN PROGRESS
- NEXT STEPS: PROJECT DEVELOPMENT AND PERMITTING FOR INDUSTRIAL-SCALE IMPLEMENTATION

KEY PARAMETERS:

500 Sm^3/h Biomethane
275 Sm^3/h from Biogas
225 Sm^3/h from DiBiMeth
10 MW_{el} Electrolyzer
for 3.500 h/a
BESS for parasitic load

Bio-H2 Production via Direct Biogas Reforming

"Bio-H2 Terenten" in Terenten – South Tyrol

- Biogas AD plant revamping
- incl. 300 bar bio-H2 Trailer Filling Station
- incl. CHP for autoconsumption

→ 200 $kW_{el.eq.}$

→ 200 kg/d bio-H2 system

→ 80 t/a bio-H2

→ 10 buses

→ 1.400 GLU

Feed-in tariff expired

No possibility to gas grid connection

Cambium

TerraX
a new era

Headquarters
Piazza Gilm/Gilmplatz, 2
I-39031 Brunico/Bruneck (BZ)
South Tyrol- Alto Adige

Office of Operations:
Zona Artigianale/
Handwerkerzone, 14
I-39040 Varna/Vahrn (BZ)
South Tyrol- Alto Adige

BIHCON
Biogas | Hydrogen | Construction

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