DECODING **BIOGASES**

Made in Europe, Sustainable, and Affordable

EBA
European Biogas Association

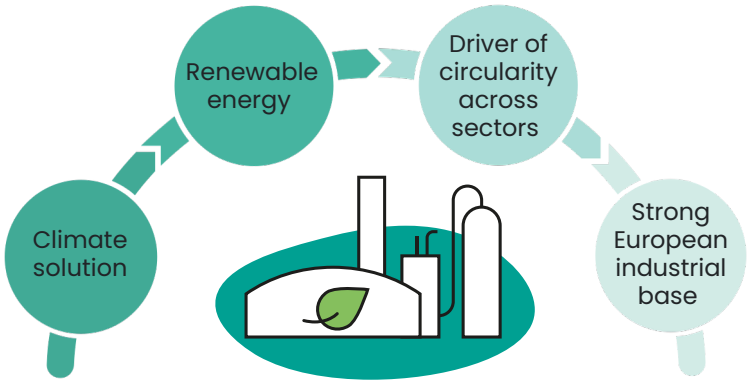
Biogases: key players in the future energy mix

Biogas is produced by converting biomass in an anaerobic digester, where microorganisms break down organic matter, producing a blend of gases.

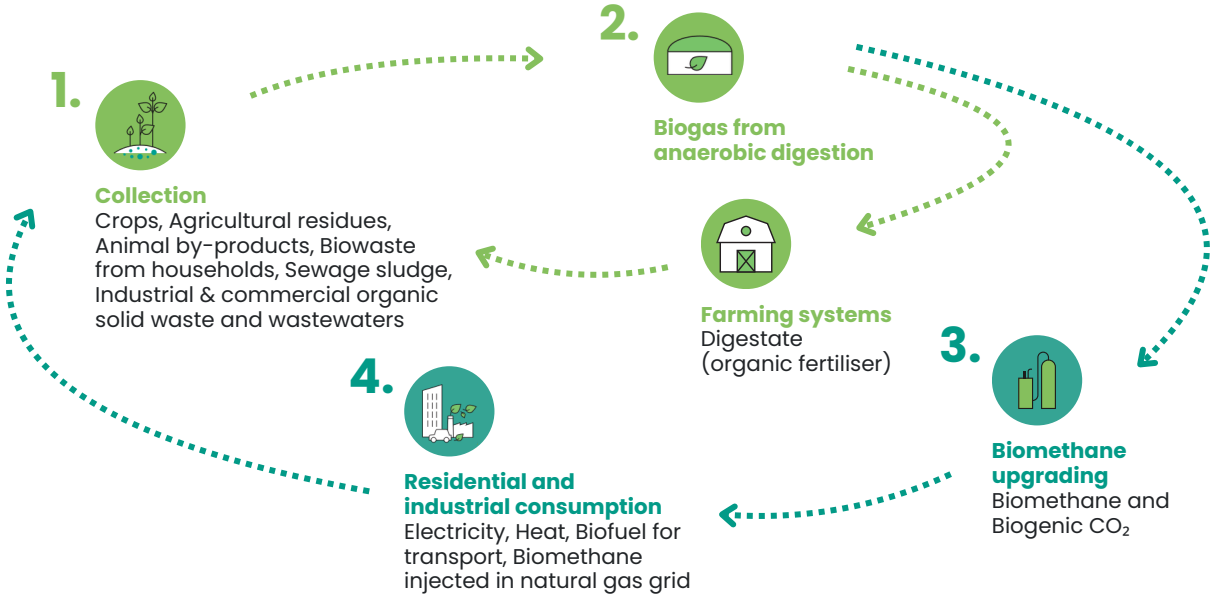
The output of this process is a raw **renewable gas that can be used for various applications**. By upgrading biogas to biomethane, which is chemically identical to natural gas, we can benefit from the existing distribution and transportation networks, replacing natural gas in all its end-uses.

The impact of biogases goes far beyond energy production, as they provide solutions to significant societal challenges. They support grid stability, provide affordable and sustainable energy, and offer effective waste management solutions.

The offsetting of fossil energy with biogases stimulates leadership in clean technologies and the creation of green jobs, boosting the development of a **European Bioeconomy**.



How do we produce and use biogases?



Organic matter as feedstock:
Household waste, industrial waste, sewage sludge, urban wastewater, agricultural residues

Biogas composition:
60% CH4, 40% CO_2

Co-products:
digestate and bio-CO_2

Biomethane:
Upgraded biogas, a renewable alternative to natural gas

22 bcm of biogases were produced in 2023 in Europe

Combined biomethane and biogas production per year in Europe (bcm)

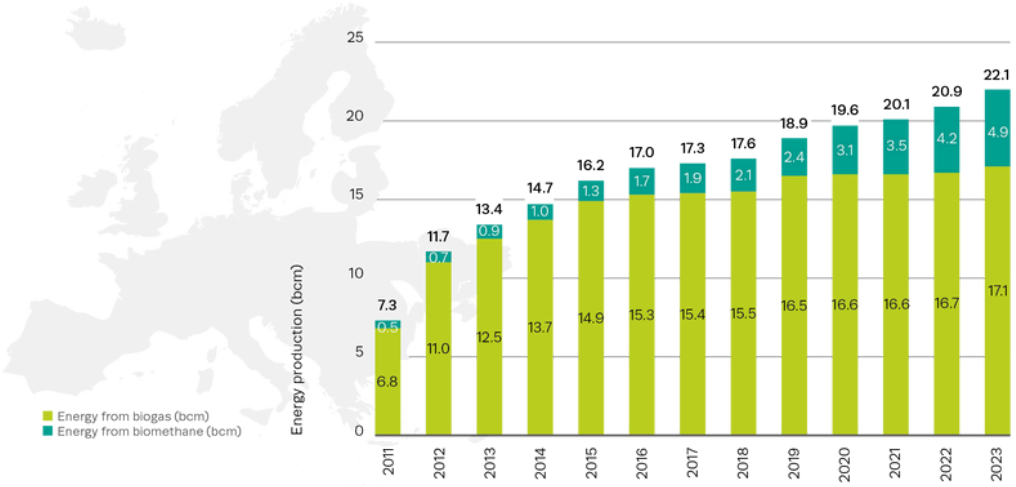
22 bcm/year

=

Gas consumption of Belgium, Denmark, and Ireland combined

=

7% of EU natural gas consumption in 2023

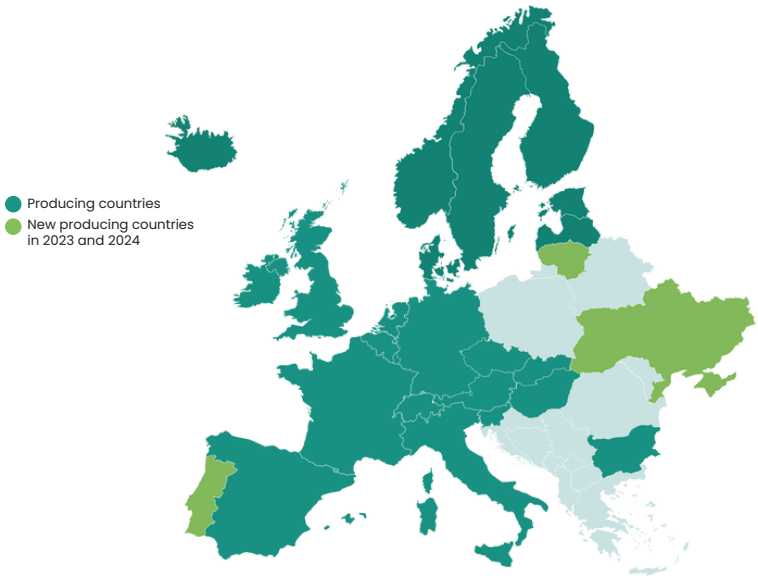


Biggest growth on biomethane production to date

25 European countries are active in biomethane production

- 1,510 biomethane plants in Europe
- 1,324 biomethane plants in EU-27

> 85% connected to gas grid, mainly distribution grid



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

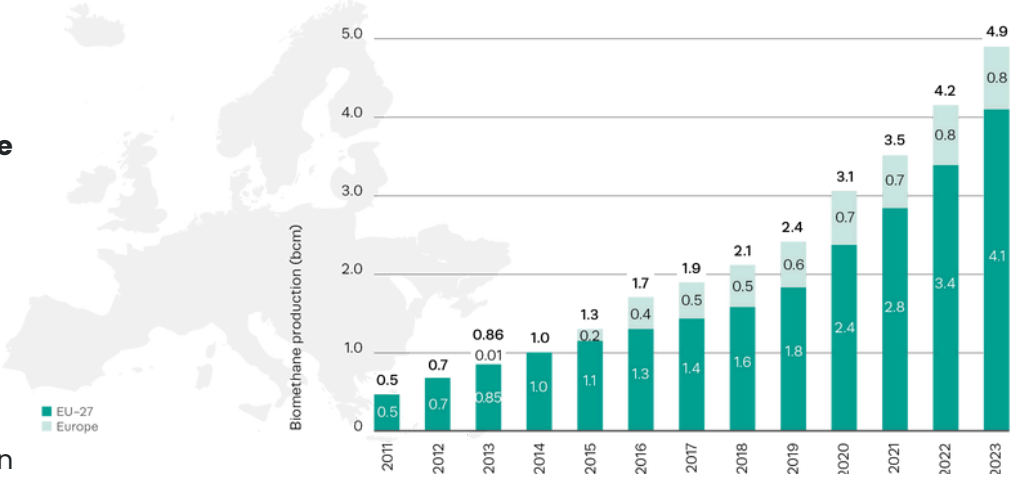
4.9 bcm/year in Europe

= 18% YoY growth

4.1 bcm/year in EU-27

= 21% YoY growth

Italy, France, Denmark, and the UK are leading biomethane production



6.4 bcm biomethane production capacity in Q1 of 2024

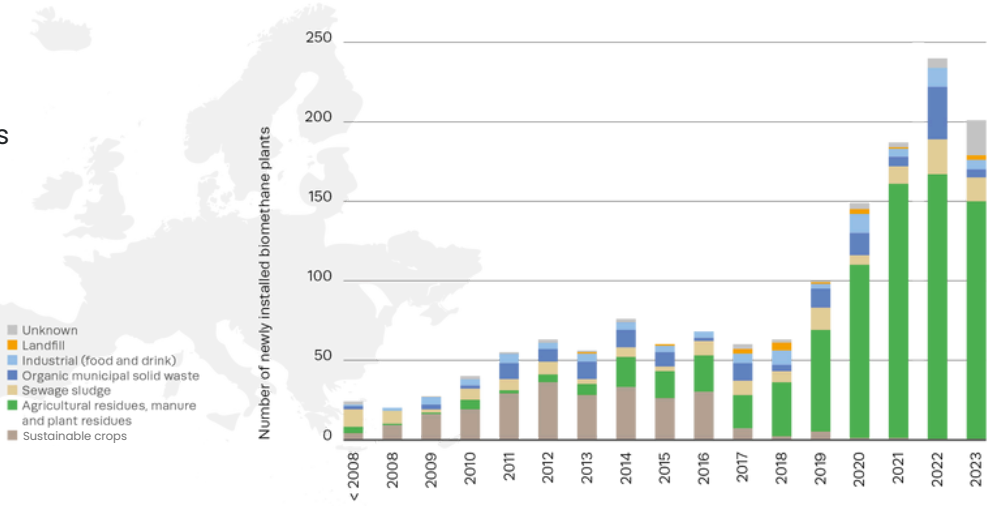
Transition towards sustainable feedstocks

Number of new biomethane plants in Europe per feedstock type, 2008 – 2023

Since 2020, no new plants were established to run on energy crops as main feedstock.

New plants are being built to run on:

- agricultural residues
- organic municipal solid waste
- sewage sludge
- industrial waste



Enabling a resilient energy transition

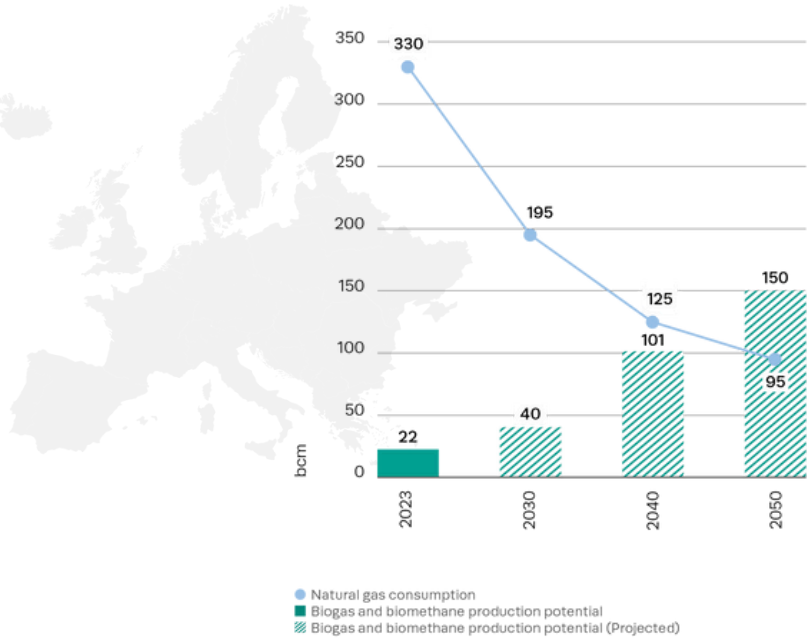
Biogases could significantly replace the future needs of gas, breaking the EU's dependency from natural gas imports with a renewable alternative produced and used in Europe.

Biomethane production potential in EU-27 until 2050 compared to existing production (bcm/year)

Biomethane production potential by **2030** is higher than the 35 bcm proposed in the REPowerEU but needs to be unlocked.

By **2040**, biomethane production could supply 85% of a reduced gaseous fuels demand.

EU countries with the highest potential: Germany, France, Spain, Italy, and Poland



** 2040 Target Plan estimates that combined consumption of natural gas, biomethane and biogas in 2040 will be of around 105 and 155 Mtoe (circa 125-184 bcm).*

Defossilising the EU economy with biogases

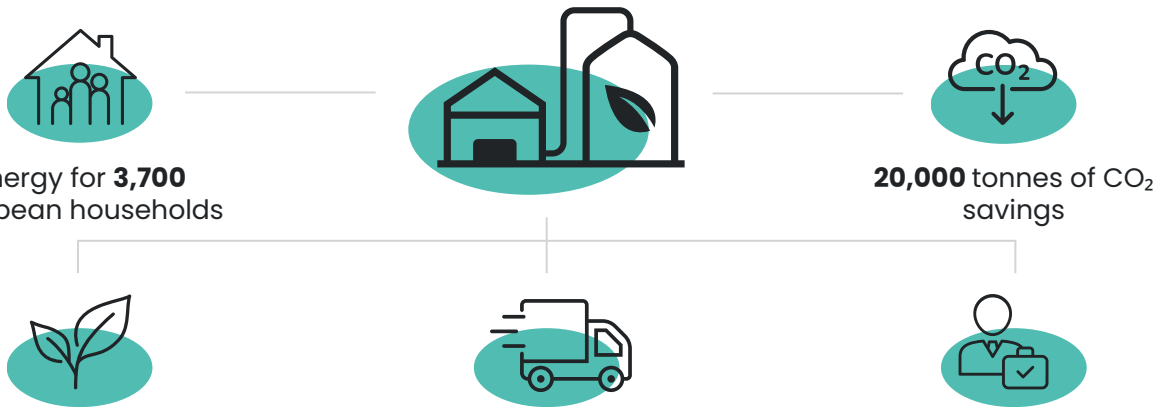
Biogases play a crucial role in complementing and enabling the growth of other renewables, serving as an important source of flexibility within the energy system. They provide clean, dispatchable power generation capacity, which is essential for bridging periods of prolonged low solar and wind output. This requires stronger connections between the electricity and gas systems to compensate for drops in dispatchable power, mitigate grid congestion, and ensure grid stability.

As biomethane is chemically identical to natural gas, it can **swiftly decarbonise the EU gas grid by being directly injected into the existing gas infrastructure**. Reusing this pre-existing asset in the energy transition **avoids the significant costs and time** associated with producing new vehicles, heating appliances, energy storage, or networks. Sustainable biomethane enables faster decarbonisation of our energy system, providing heat and electricity for households and industries, as well as sustainable transport fuels.

+80% of the energy in the EU is consumed in:

Buildings **Industry** **Transport**

The average size of a biomethane plant is **43 GWh/year**. A plant of that size can provide:



Energy for **3,700** European households

20,000 tonnes of CO_2 savings

570 tonnes of organic fertiliser

100 bio-LNG trucks fuelled

60 green jobs created

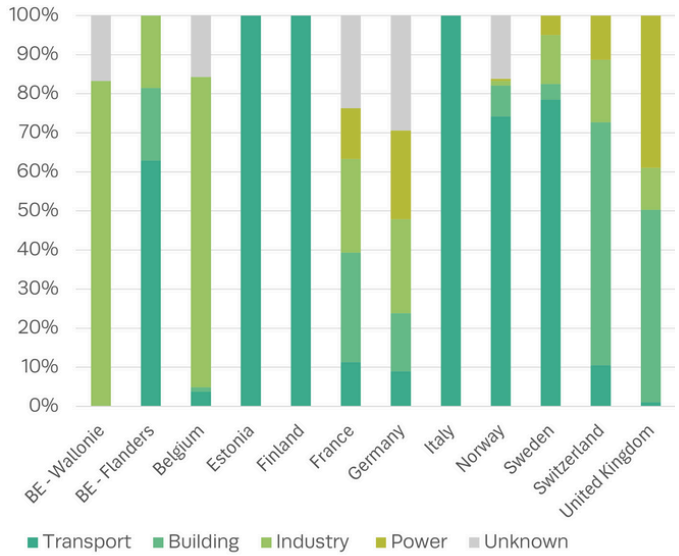
Percentage of biomethane production used in different sectors overall and per country (right)

23% in transport

17% in buildings

15% in power generation

13% in industry



End-uses depend on country:

- **Transport**: Norway, Italy, Sweden
- **Heating or electricity**: Germany

Valorising digestate and bio- CO_2

Digestate is a co-product of biogas production that can be used as an **organic fertiliser**. By doing so, we can replace different types of synthetic fertilisers, on which we are heavily dependent from third countries. This substitution can lead to a reduction in natural gas consumption, as the production of synthetic fertilisers is highly energy-intensive.

Additionally, applying digestate to agricultural soils is recognised as a **sustainable soil management** practice. The stable organic fraction of digestate sustainably enriches the humus content of the soil, forming the foundation of our agri-food system. Soil regulates nutrient, carbon and water cycles, provides a habitat for biodiversity, and plays an essential role in the circular economy and climate change adaptation

With **current digestate production** (31 Mt DM), we could replace:*

6%
Potassium fertilisers

11%
Phosphorus fertilisers

15%
Nitrogen-based fertilisers

But also...

Store **9 Mt** of organic carbon

Save **24 Mt** of CO_2 equivalent, considering the replacement N-synthetic fertiliser

Avoid **2 bcm** of natural gas

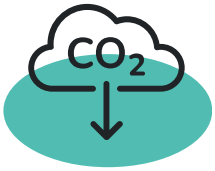
** Data from 2022*

Today, CO_2 as feedstock is mainly from fossil origin, obtained from the production of synthetic fertilisers, which is highly energy-intensive. CO_2 is a needed input to produce chemicals, fuels, food and beverage products or construction materials, among others. **Replacing fossil CO_2 by a sustainable and circular alternative** such as bio-CO_2 leads to a **negative emissions footprint** which is not possible in the production of CO_2 from fossil origin.

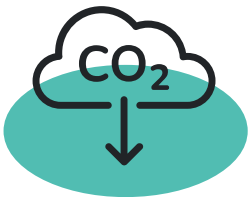
Bio-CO_2 potential from biogas and biomethane production:

29 Mtonne today

46 Mtonne by 2030



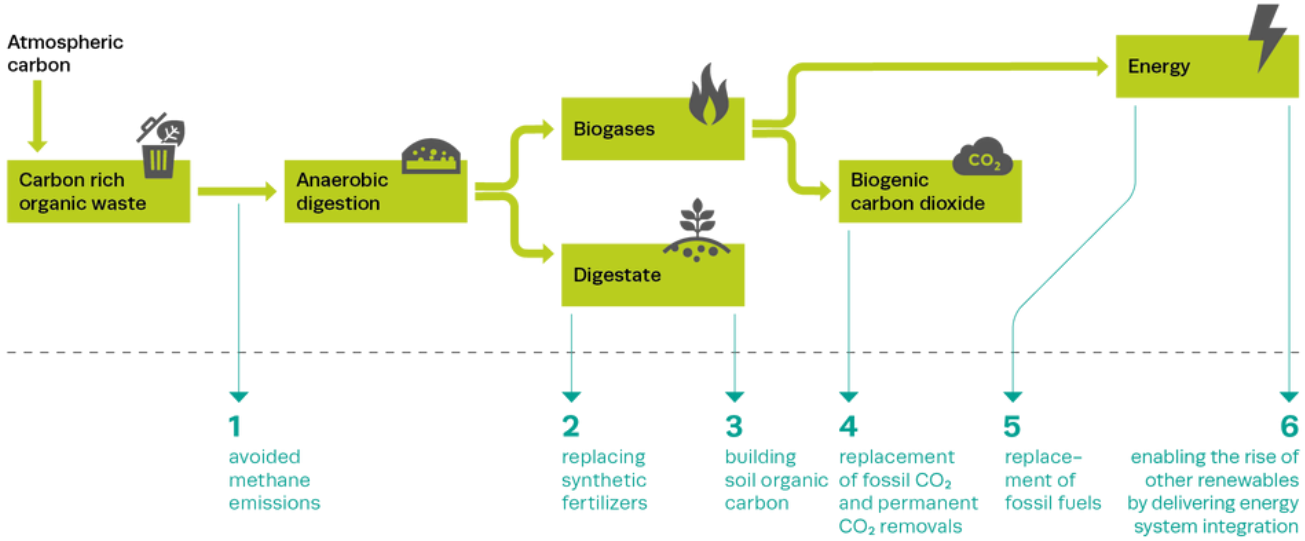
145 Mtonne by 2040



215 Mtonne by 2050

Enabling a negative emissions footprint

The biogases value chain can **reduce GHG emissions in 6 ways**:



This combination of pathways can lead to a negative emissions footprint.

Socio-economic impacts of the biogases value chain

>250,000 JOBS IN 2023

- *70,000 direct*
- *170,000 indirect*

500,000 JOBS IN 2030

1.8 million JOBS IN 2050

15,000 COMPANIES

SOLID **EU VALUE CHAIN**

CLEAN **TECH LEADERSHIP**

SUSTAINABLE GROWTH

RURAL DEVELOPMENT

Every euro invested in biogases will remain in the European economy. At least €25 billion will be invested in Europe's biomethane by 2030. This generates an additional benefit of €12 billion yearly to the European economy.

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About the European Biogas Association (EBA)

EBA fully believes in the future potential of renewable gas in Europe. Founded in February 2009, the association is committed to the deployment of sustainable biogas and biomethane production and use throughout the continent. EBA counts today on a well-established network of nearly 300 national associations and other organisations covering the whole biogas and biomethane value chain across Europe and beyond.

www.europeanbiogas.eu