EBA Statistical Report 2023

Tracking biogas and biomethane deployment across Europe

EBA
European Biogas Association

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About the EBA

The 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.

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Preface

Harmen Dekker
CEO

Delving into the pages of the statistical report by the European Biogas Association, we are reminded of the remarkable journey the European biogas community has undertaken. It is a story of innovation, sustainability and system resilience.

In 2022, the European Union spent a record €316 billion on gas imports and in 20 EU Member States, dependence on natural gas from external energy suppliers was higher than 90%. This demonstrates unequivocally the importance of renewable gases produced within Europe. Biogases production is scaling up. Following the 35 bcm biomethane target in the REPowerEU plan, we see positive developments in Member States and at industrial level.

Biogases already provide Europe with 21 bcm of renewable gas and EBA's 1st biomethane investment outlook shows that at least €18 billion have already been earmarked for investment in biomethane production in the years ahead. By 2050, the sector can deliver up to 167 bcm, meeting 2/3 of future gas demand.

Again, EBA has expanded its report, offering more statistical insights in our sector. You will find a wealth of information providing a panoramic view of the European biogases sector. From production trends to technological innovations, from regulatory landscapes to nutrient recycling, this report offers a comprehensive overview of the sector's current status. This year we have dedicated a chapter to the economics of biogases; we have looked in depth at the various end uses of biogases and expanded our consideration of digestate.

The EBA technical staff, led by Mieke Decorte, have diligently collected, analysed and presented the information. Years of data collection, cross checking and analysis provide an unparalleled overview of our sector.

This report would not have been possible without the invaluable contributions of our national associations, experts, governments, researchers and industry leaders, who shared their insights, data and expertise. We extend our heartfelt gratitude to each and every contributor: your commitment to the sharing of knowledge has enriched this report immeasurably. We are also grateful to all our sponsors, whose generosity has supported the publication of this report.

It is my hope that this report will serve as a foundation upon which further research, innovation and collaboration can be built. All this will be key in our quest to achieve 35 bcm/year of biogases production by 2030 and carry on beyond that to play a leading role in providing sustainable energy security for Europe.

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Preface

Giulia Cancian
Secretary General

The year 2023 marks a turning point in the European Union's climate and energy policies. Comprehensive reviews and strategic revisions have helped define our pathway to achieving ambitious climate and energy targets, prominently featured in the Renewable Energy Directive.

Renewables must make up 42.5% of the EU's energy consumption by 2030, with the aim of achieving 45%. Renewable energy projects including biogas and biomethane will enjoy shorter permitting procedures. Renewable fuels in the transport sector should lead to a 14.5% reduction of its greenhouse gas emissions.

These targets are not merely benchmarks; they are beacons guiding us toward a more sustainable, resilient and secure energy future.

One and a half years after the REPowerEU plan, adopted as a crisis response to energy insecurity and extreme price volatility, the industry remains committed to delivering the 35 bcm biomethane target by 2030.

The necessary growth will only materialise through collaborative efforts involving market actors, civil society and policymakers. Together, we must identify and dismantle existing barriers, enhance market access opportunities, foster tradability, and chart clear trajectories towards the envisioned target.

Sustaining this momentum requires an evidence-based approach. Policymakers, industry leaders and stakeholders alike must join forces to craft regulatory frameworks that facilitate continued growth and innovation. At the beginning of 2024, the European Commission will launch a Communication on 2040: a midterm assessment of the effort to achieve climate neutrality by mid-century. The biogas sector stands ready to increase ambition for 2040 and 2050 and take its place as a cornerstone of the energy transition: a secure and sustainable gas produced in Europe.

The European Biogas Association (EBA) Statistical Report meticulously tracks the achievements of our dynamic and forward-looking sector. It equips us with the data and insights we need to make informed investment decisions and develop robust policy frameworks as we look towards the future.

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Colour key

The following colour coding is used in the graphics contained in this report.

Feedstock types

- Agricultural
- Agricultural residues
- Monocrops
- Sequential cropping
- Manure
- Sewage sludge
- Landfill
- Organic municipal solid waste
- Industrial solid waste
- Industrial (food and drink)
- Industrial wastewater
- Other

Upgrading technologies

- Pressure swing adsorption
- Water scrubbing
- Membrane separation
- Physical absorption
- Chemical absorption
- Cryogenic separation

Connection to grid

- Distribution grid
- Not connected
- Transport grid

Other

- Biogas
- Bio-LNG/ Bio-CNG
- Biomethane
- Unknown

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Definitions

Feedstock types

- **Agricultural:** All substrates relating to agricultural production. The category is further broken down as follows:
  - **Agricultural residues** (straw, husks and cobs stripped of kernels of corn)
  - **Manure**
  - **Sequential crops** (grown before or after the main crop, such as cover crops or catch crops)
  - **Monocrops** (other fresh crops, or primary crops)
- **Sewage:** Sewage sludge produced at municipal wastewater treatment plants.
- **Landfill:** Organic waste on a landfill site. As the waste breaks down it produces biogas, which can be collected on-site and is also referred to as 'landfill gas'.
- **Organic municipal solid waste:** Municipal waste and organic household waste.
- **Industrial (food and drink):** Industrial organic waste, for example from the food and beverage industry. A further distinction is made as follows:
  - **Industrial solid waste**
  - **Industrial wastewater**
- **Other**

Upgrading technologies

- **Pressure swing adsorption** separates carbon dioxide and methane molecules by using differences in their degree of attraction to a surface under elevated pressures.
- **Membrane separation** uses a permeable membrane to separate carbon dioxide and methane molecules based on their different physical characteristics.
- **Water scrubbing** dissolves the carbon dioxide molecules in water and thus separates them from the methane molecules.
- **Chemical absorption** dissolves the carbon dioxide molecules in a chemical solvent and thus separates them from the methane molecules.
- **Physical absorption** dissolves the carbon dioxide molecules in a liquid under pressure and thus separates them from the methane molecules.
- **Cryogenic separation** cools the raw biogas to the condensation point of carbon dioxide. The methane molecules remain in their gaseous form, meaning that the liquid carbon dioxide stream can be easily separated.

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Definitions

Other definitions

Biogas production capacity: The maximum amount of biogas which can be produced by the facility in question at any one point in time. E.g., a biogas plant with a biogas production capacity of 1 MW can produce a maximum of 1 MWh of biogas each hour (1 MWh being the consistent production of 1 MW over the course of an hour).

Biogas production: The actual amount of biogas produced within a certain time interval. E.g., the biogas plant actually produced 0.8 MWh of biogas in the past hour.

Flexible electricity generation: Where an electricity-producing facility can adjust its electricity generation according to demand. E.g., the production facility can produce more electricity when demand is high and less when demand for electricity is low.:

Distribution grid: In this report, the distribution grid refers to the gas distribution grid. The gas distribution grid delivers natural and renewable gas to individual homes and business. It is mostly operated at low pressure.

Transport grid: In this report, the transport grid refers to the gas transport grid. The gas transport grid transports gas over long distances nationally and internationally. It is mostly operated at high pressure.

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Abbreviations

Countries

AT	Austria
BE	Belgium
CH	Switzerland
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LV	Latvia
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
RS	Serbia
SI	Slovenia
SE	Sweden
SK	Slovakia
UK	United Kingdom
UKR	Ukraine

Other acronyms

AD	anaerobic digestion
bcm	billion cubic metres
Bio–CNG	biological compressed natural gas
Bio–LNG	biological liquified natural gas
CHP	combined heat and power
CNG	compressed natural gas
DG	Directorate General
EC	European Commission
ETS	Emissions Trading Scheme
EU	European Union
FiP	Feed in Premium
FiT	Feed in Tariff
GHG	greenhouse gas(es)
GO	Guarantee of Origin
k–, M–, GW, TW	Kilo–, Mega–, Giga–, Terawatt
LNG	liquified natural gas
M–, G–, TWh	Mega–, Giga–, Terawatt hour
Mt	million tonnes
NECP	National Energy and Climate Plan
NGV	natural gas vehicle
Nm³	normal cubic metres
NREAP	National Renewable Energy Action Plan
RED	Renewable Energy Directive
RED II	Renewable Energy Directive II
RED III	Renewable Energy Directive III
RES	renewable energy sources
tpd	tonnes per day
TRL	technology readiness level

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Short overview per chapter

1 A circular economy with biogases

Chapter 1 introduces and explains the role of biogases in Europe's total energy mix. The topics covered in this chapter are: primary energy production within the EU; energy consumption by sector; Europe's dependence on gas imports; future projections of natural gas demand; current versus required biomethane growth rate; European dependence on fertiliser imports; and fossil fuel subsidies versus subsidies for renewables.

2 The biogases market

This chapter analyses the development of the biogases market in Europe from 2011 to 2022. Growth in the sector is illustrated by examining the total amount of renewable energy produced and the number of anaerobic digestion plants active in Europe.

Particular attention is paid to biomethane, with analysis of the new plant installations in each year identifying growth trends in specific countries. The most commonly used upgrading technologies and different national tendencies in feedstock usage are also considered, along with the average biomethane plant size per European country.

Lastly, the chapter looks at the percentage of biomethane plants connected to the distribution and transport grids and the portion of plants without a grid connection, as well as including some information on the cross-border trade of biomethane.

3 Growth prospects and innovations

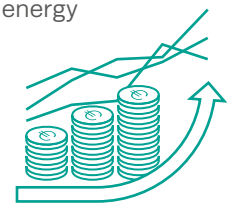
This chapter illustrates the growth potential of the biogases sector. Based on projections made by several different studies, it calculates average figures for potential biogas and biomethane production per feedstock type and per country. The chapter includes a review of national biomethane and renewable gas targets in Europe and a compilation of the draft NECPs to be consolidated in 2024. The chapter concludes by highlighting the importance of current innovation in the biogases industry.

4 End uses of biogas and biomethane

This chapter looks in depth at the various uses of biogases. It is split into sections on power, buildings, industry and transport; it explores the natural gas consumption, renewables consumption and share of biogases for end uses in these categories in Europe. It provides relevant case studies and considers the policy context relevant to each end-use sector. The transport section gives additional insights into the current and projected development of Bio-LNG production between 2018 and 2025. Estimates as to the number of Bio-CNG and Bio-LNG filling stations in Europe are included.

5 The economics of biogases

This chapter describes the contribution of biogases to the European economy. It starts by monetising the system-wide benefits of biomethane (besides energy provision) and investigates the role of biomethane in energy system integration. It continues by analysing the contribution of biogases to the European economy in terms of turnover and jobs created, and highlights the low-cost GHG savings biogases offer. Results from the 1st biomethane investment outlook are also included.



6 Completing the nutrient cycle with digestate

This chapter describes the advantageous characteristics of digestate, from agricultural to environmental benefits, covering both common applications and novel uses. It also includes, estimates as to total digestate production in Europe, together with the potential to replace synthetic fertilisers. In terms of environmental impact, the chapter examines the GHG reduction potential of digestate as well as natural gas consumption avoided by the use of digestate as a substitute for synthetic fertilisers. It presents the available figures from the EBA database relating to the digestate production of different European countries. Finally, relevant policies and regulations are discussed.

7 Country analyses

Chapter 7 comprises country-specific analyses of 27 countries. The development of the national biogas and biomethane markets in each country is examined, including the impact of specific schemes and policies. Country-specific topics and trends are discussed and, where available, data on feedstock usage and digestate production and use are included. The countries examined in chapter 7 are: Austria, Belgium, Switzerland, the Czech Republic, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Croatia, Hungary, Ireland, Italy, Lithuania, Latvia, the Netherlands, Norway, Poland, Portugal, Serbia, Slovenia, Sweden, Slovakia, the United Kingdom and Ukraine.

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References and methodology

The European Biogas Association Statistical Report is an extensive examination of the state of the biogases industries in Europe. The report covers the EU-27 Member States as well as Iceland, Norway, Serbia, Switzerland, Ukraine, and the United Kingdom.

The data used in this report originates mainly from national biogas associations, national statistical reports and industries present in the respective countries. This data is supplemented with data from the EBA-GIE biomethane map 2022-2023, EBA publications, insights from European projects, and scientific publications. Although the EBA database is primarily based on solid facts and figures, in some specific cases, qualified estimates, such as extrapolation from survey data, are made by national stakeholders and by the EBA.

Graphs in this report generally include figures for the period to the end of 2022. In the few cases where 2022 data are not yet available, the 2021 data are reused as 2022 data and will be updated in next year's report. Data from all years are continuously updated according to newly available information and new insights. There may, therefore, be differences between this and previous EBA statistical reports.

For countries where national data on biogas production is not available, the figures are calculated based on the electricity generated from biogas, assuming a CHP electrical efficiency of 38%. In some cases, to convert data on biogas or biomethane production capacity to actual production figures, biogas and biomethane plants are assumed to have 8,000 yearly productive hours. A conversion factor of 10.61 kWh/m³ was used to calculate from bcm to TWh and vice versa. Production figures expressed in bcm refer to bcm natural gas equivalents.

Bio-CNG and Bio-LNG plants are considered as biomethane plants in the EBA database and thus included in the biomethane statistics. Gasification plants and biomethane production from gasification are not yet included in the statistics considered here.

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