



BIOENERGY EUROPE
**STATISTICAL
REPORT**
2021

REPORT
BIOGAS





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ABOUT

THE STATISTICAL REPORT

Every year since its debut release in 2007, Bioenergy Europe's Statistical Report has provided an in-depth overview of the bioenergy sector in the EU-28 Member States.

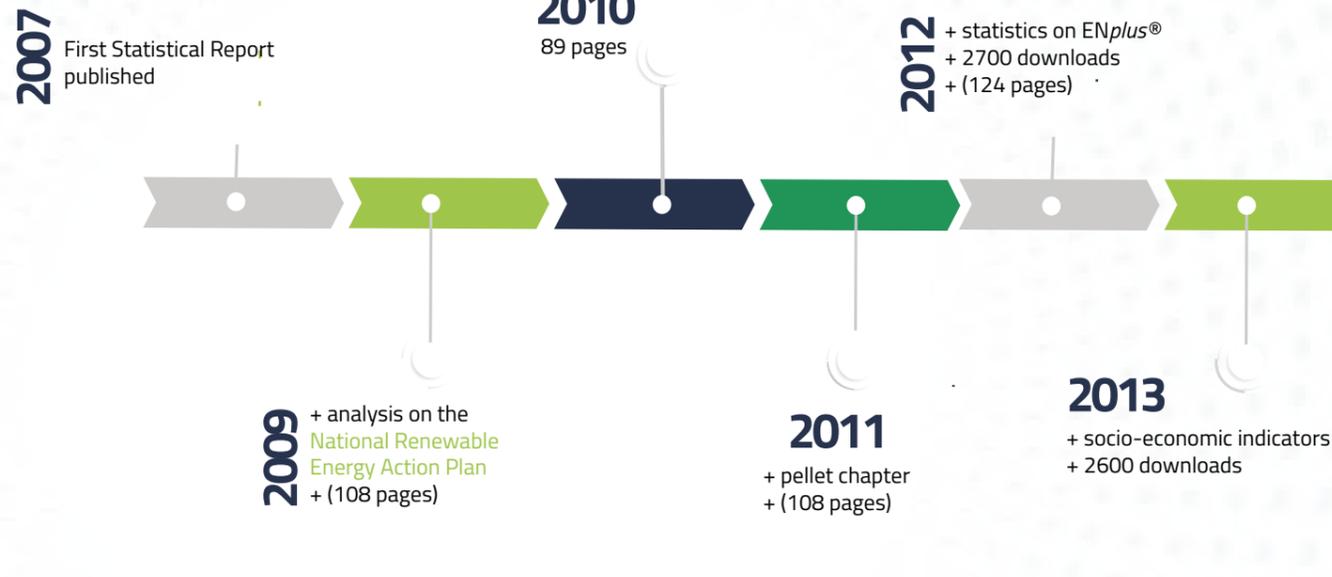
Bioenergy Europe's Statistical Report has been enriched each year with new figures and information, collecting unique data on the developments of the European bioenergy market from a growing number of international contributors.

Bioenergy Europe develops detailed reports that aid industry leaders, decision makers, investors and all bioenergy professionals to understand the situation of bioenergy in Europe.

With more than 150 graphs and figures, readers of Bioenergy Europe's Statistical Report can get accurate and up-to-date information on the EU-28 energy system such as the final energy consumption of biomass

for heat and electricity, the number of biogas plants in Europe, the consumption and trade of pellets, the production capacity of biofuels and other key information to help break down and clarify the complexity of a sector in constant evolution.

In 2017, the Report was rewarded by the European Association Awards for being the 'best Provision of Industry Information and Intelligence', a recognition after a decade of collective work.



ABOUT

BIOENERGY EUROPE

A bit of history

Bioenergy Europe is the voice of European bioenergy.

It aims to develop a sustainable bioenergy market based on fair business conditions. Founded in 1990, Bioenergy Europe is a non-profit, Brussels-based international organisation bringing together more than 40 associations and 90 companies, as well as academia and research institutes from across Europe.

Our vision

Bioenergy Europe will be the leading player in ensuring that sustainable bioenergy is a key pillar in delivering a carbon neutral Europe.

Our mission

Bioenergy Europe facilitates the development of a sustainable, strong, and competitive bioenergy sector through:

- Promotion towards European policymakers and stakeholders for awareness, acceptance, and reputation of bioenergy.
- Promote the development of consistent, realistic, and sustainable bioenergy scenarios in the heat, electricity, and transport sectors.
- Pro-active proposals to develop more favourable European legislation.
- Market intelligence to support decision making.
- Services to members, including a support to advocacy at national level.
- Tools, including certification schemes, to sustain market growth and credibility.
- Industry collaboration throughout the entire supply chain.
- Promotion of efficient and innovative technologies within the bioeconomy.



OUR ACTIVITIES

Bioenergy Europe carries a wide range of activities aimed at supporting its members on the latest EU and national policy developments. Bioenergy Europe works to voice their concerns to EU and other authorities, including, advocacy activities in key policy areas as well as the organisation of dedicated working groups.



Working Groups

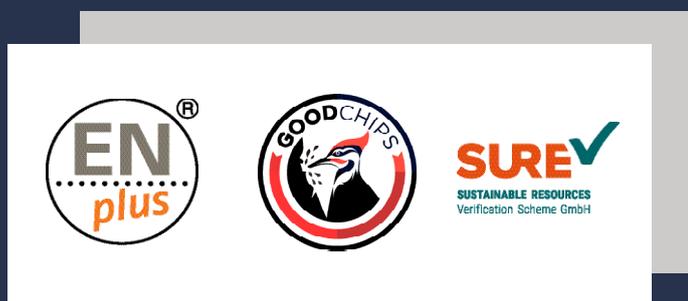
Bioenergy Europe's working groups act as a platform for members to discuss common issues and exchange information on the state of play of bioenergy.

There are currently 7 active working groups:

- Agrobiomass & Energy Crops;
- Biopower & CHP;
- Competitiveness;
- Domestic Heating;
- Sustainability;
- Pellets;
- Wood Chips.

Certification Schemes

Thanks to the experience and authority acquired over the last 20 years, Bioenergy Europe has successfully established three international certification schemes to guarantee high quality standard for fuels, namely, **ENplus®**, **GoodChips®** as well as the latest edition in the certification for sustainable bioenergy: **SURE**.



Networks

Bioenergy Europe is the umbrella organisation of both the **European Pellet Council (EPC)** and the **International Biomass Torrefaction Council (IBTC)**. These networks



have been created thanks to the dynamics of Bioenergy Europe members. Today, these networks bring together bioenergy experts and company representatives from all over Europe and beyond.

The European Pellet Council (EPC), founded in 2010, represents the interests of the European wood pellet sector. Its members are national pellet associations or related organisations from over 18 countries.

EPC is a platform for the pellet sector to discuss issues relating to the transition from a niche product to a major energy commodity. Issues include the standardisation and certification of pellet quality, safety, security of supply, education and training, and the quality of pellet-using devices. EPC manages the ENplus® quality certification.

Launched in 2012, the **International Biomass Torrefaction Council (IBTC)**, aims to build the first platform for companies that have common interests in the development of torrefied Biomass markets. Currently, the IBTC initiative is supported by more than 23 companies worldwide.

IBTC's objective is to promote the use of torrefied biomass as an energy carrier and to assist the development of the torrefaction industry. In this respect, IBTC's key activities are to undertake studies or projects, and to commonly voice its members' concerns to third parties to help to overcome barriers of market deployment.

For further information on Bioenergy Europe's Networks & Certification Schemes visit www.bioenergyeurope.org

OUR MEMBERS*

As the common voice of the bioenergy sector, Bioenergy Europe, aims to develop a sustainable bioenergy market based on fair business conditions and does so by bringing together national associations and companies from all over Europe – thus representing more than 4000 indirect members, including companies and research centres.

Associations



Academia



Companies



*Members as of June 2021.

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(Exclusive to Bioenergy Europe Members)

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You can find further information about this opportunity on the Bioenergy Europe website.

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- ✓ Limited supply chain and conversion costs



SURE enables all economic operators along the supply chain, from biomass producers to biomass and biogas plants, to prove sustainable use of biomass in electricity and heat production

SUSTAINABLE RESOURCES

Verification Scheme GmbH

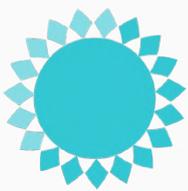
with the principles of the European Energy Directive (RED II) and enables all economic operators within the bioenergy sector to demonstrate compliance with RED II requirements*.

SUSTAINABLE RESOURCES Verification Scheme (SURE) is a voluntary certification scheme that aims at ensuring the sustainable and responsible use of biomass within the energy sector. SURE's set of criteria is in accordance

Interested to learn more? Visit our website:

www.sure-system.eu

* after recognition by the European Commission



Salón del
gas_renovaBle

First exclusive technology fair for professionals aimed at promoting business opportunities between companies related to renewable gas in Spain, Portugal and Latin America, as well as to disseminate and promote the development of biogas and biomethane as a source of renewable energy to society. The first RENEWABLE GAS FAIR in SPAIN is held in parallel to EXPOBIOMASA and the International Bioenergy Congress on September 21, 22 and 23, 2021.

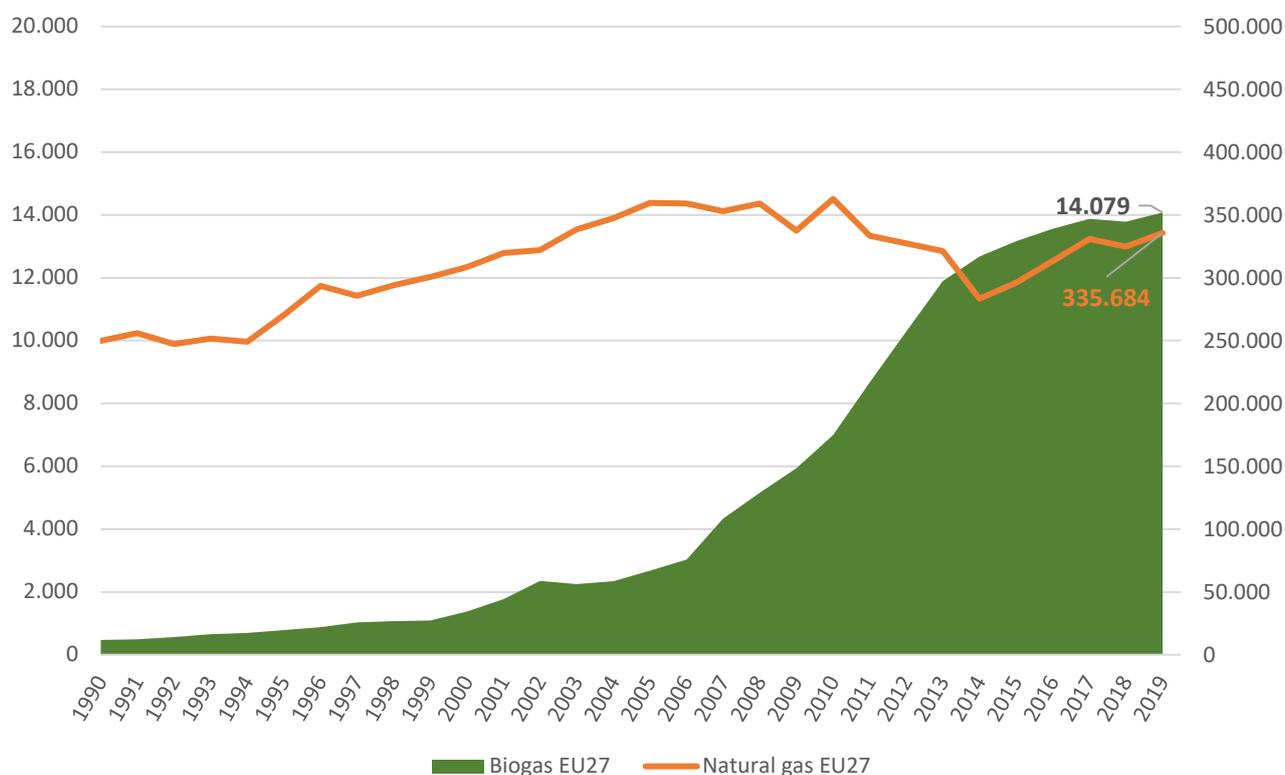
<https://www.salondelgasrenovable.com/>

1. Biogas in Europe

The gross inland energy consumption of biogas has tremendously increased since 1990 and has been multiplied by a factor of 25. This increase was supported by the fast development of advanced technologies, resulting in higher plant efficiency, cheaper digesters and upgrading units used for the conversion of raw biogas to biomethane of natural gas grade. The use of digestate as an organic fertiliser also offers a sustainable and locally produced alternative to mineral fertilisers. BioNGV (bio-Natural Gas for Vehicles) and BioLNG (bio-Liquified Natural Gas) used in maritime and rail transportation is a promising feature towards the decarbonisation of the transport sector.

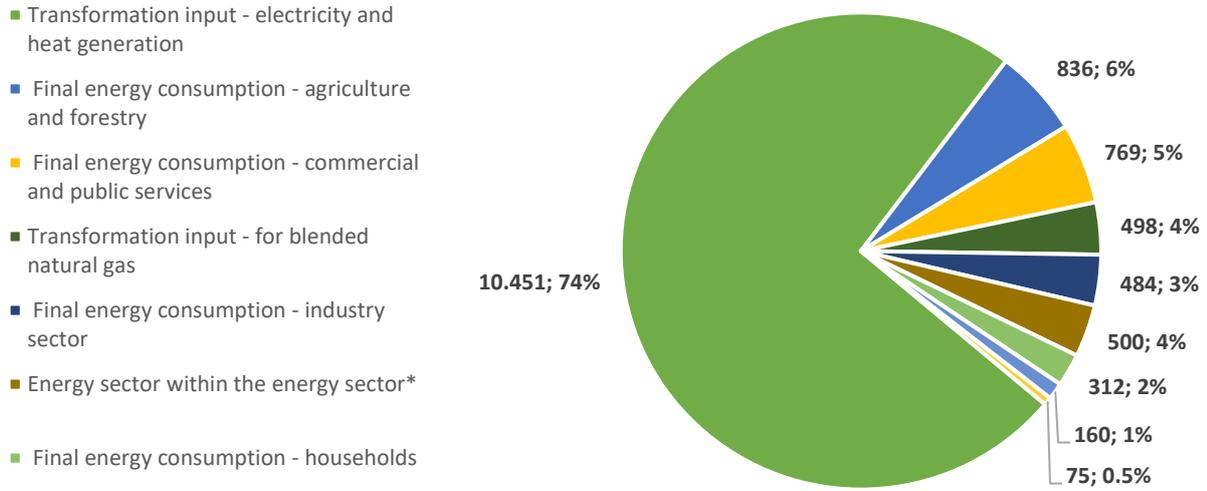
Nevertheless, in 2019 biogas provided a marginal share of the total gross inland energy consumption of the EU27, (only 1%), representing 10% of the bioenergy. In the figure 1, it can be seen that the total gross inland energy consumption of biogas is equivalent to around 4% of natural gas consumed across Europe in 2019. Those figures show on one hand side that biogas cannot be as readily available alternative of fossil gas but on the other hand that there is a real need to promote biogas as one of the reliable solutions for a low-carbon energy transition.

Figure 1 Evolution of the gross inland energy consumption of biogas and natural gas (right axis) in EU27 (in ktoe)



Source: Eurostat

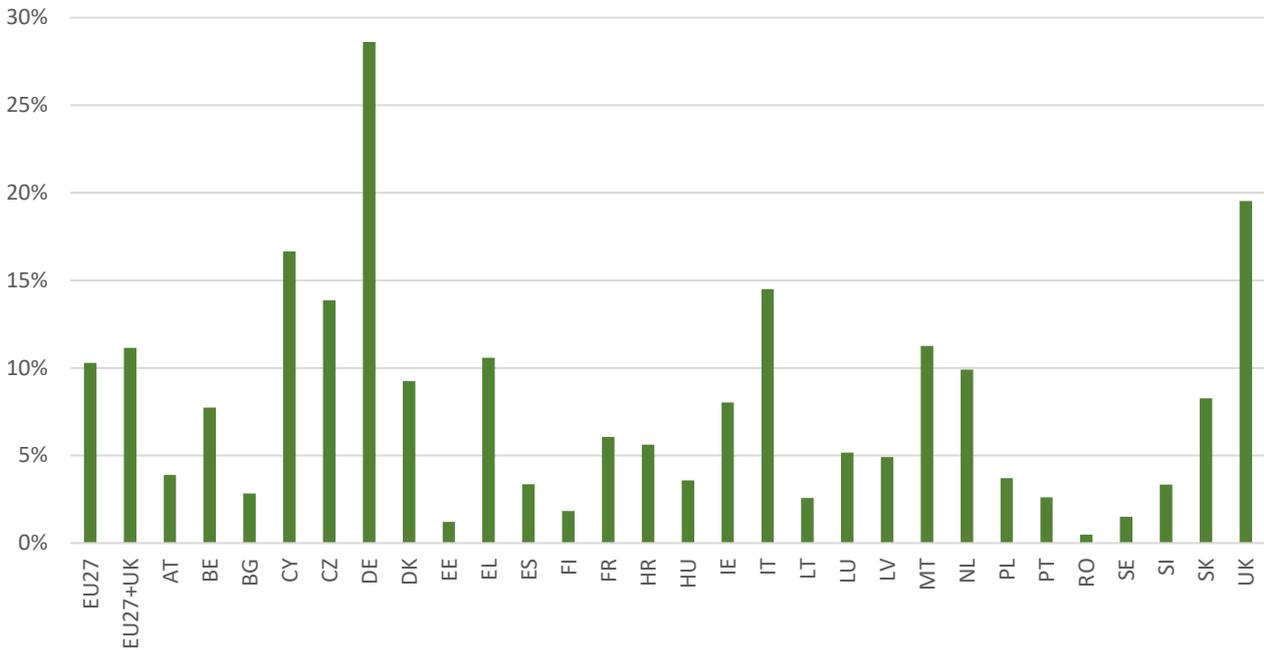
Figure 2 Biogas gross inland energy consumption by end-use in 2019 in EU27 (in ktoe and %)



* Mainly the biogas consumed as energy for support operations in biogas gasification plants (475 ktoe)

Source: Eurostat

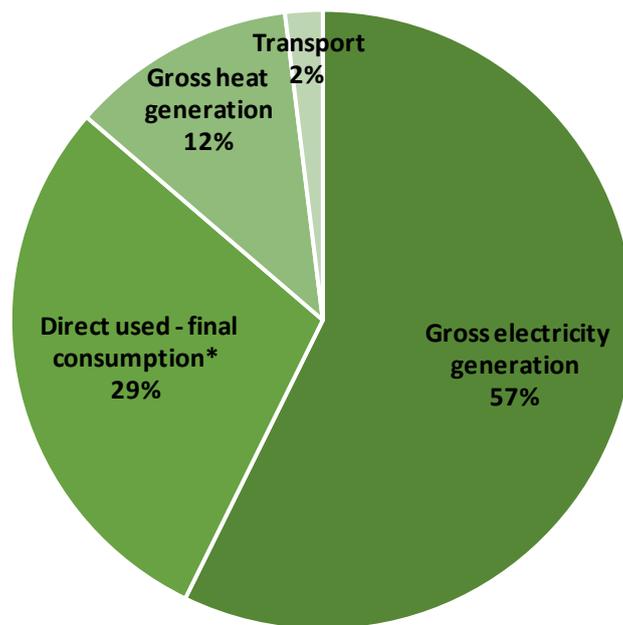
Figure 3 Share of biogas within the total bioenergy gross inland consumption in 2019 (in %)



Source: Eurostat

Almost one third of biogas final consumption is directly used within different sectors (commercial and services, agricultural, industrial, and residential). Transport represented only 2% of the final usage of biogas in 2019 (in the form of biomethane). Germany and Italy are the leaders in biogas consumption within EU27 with 7.550 ktoe and 2.013 ktoe, respectively. These two countries also consume respectively 56% and 13% of the gross final energy consumption of biogas within EU27. The United Kingdom remains a big biogas production country with a 2.745 ktoe for 2019.

Figure 4 Gross final energy consumption from biogas by end-use in EU27 in 2019 (in %)



* In agriculture, industry, commercial, households & others.

Source: Eurostat

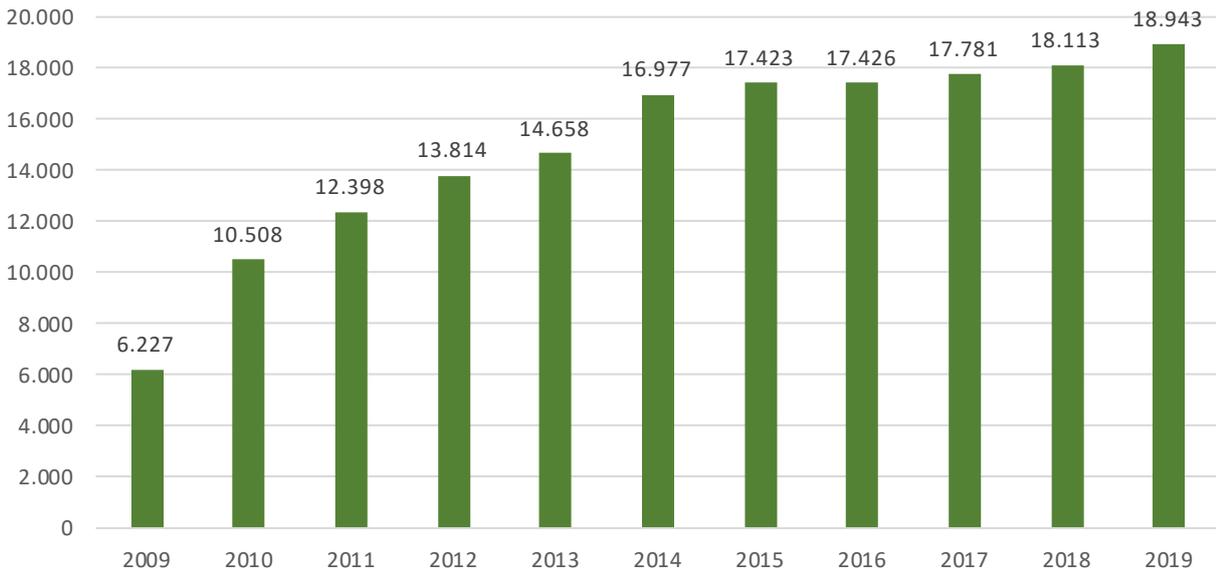
Table 1 Gross final energy consumption from biogas by end-use in EU27 Member States and UK in 2019 (in ktoe)

	Gross final energy consumption	Gross electricity generation	Derived heat* generation	Direct used - final consumption (agriculture, industry, commercial etc.)	Transport
EU27	8.092	4.725	966	2.401	160
Growth rate (2018-2019)	2%	0%	12%	3%	5%
EU27+UK	8.890	5.376	966	2.549	160
Growth rate (2018-2019)	2%	-0,3%	12%	3%	5%
AT	93	53	4	36	0
BE	191	81	13	96	0
BG	32	20	5	7	0
CY	12	5	1	6	0
CZ	384	217	17	150	0
DE	4.518	2.830	393	1.295	57
DK	132	55	49	29	0
EE	8	3	2	3	5
EL	68	32	0	35	0
ES	133	78	0	55	0
FI	148	31	21	96	1
FR	510	222	77	211	0
HR	47	34	12	0	0
HU	43	27	3	12	0
IE	26	16	0	10	0
IT	1.022	712	274	36	0
LT	25	13	2	9	0
LU	12	6	3	3	0
LV	58	30	19	8	0
MT	1	1	0	1	0
NL	212	77	9	126	0
PL	214	98	24	92	0
PT	30	23	0	7	0
RO	16	5	5	7	0
SE	62	1	11	50	97
SI	14	8	4	1	0
SK	83	46	16	21	0
UK	798	651	0	148	0

*See definition in Annexes.

Source: Eurostat

Figure 5 Evolution of the number of biogas plants in Europe*

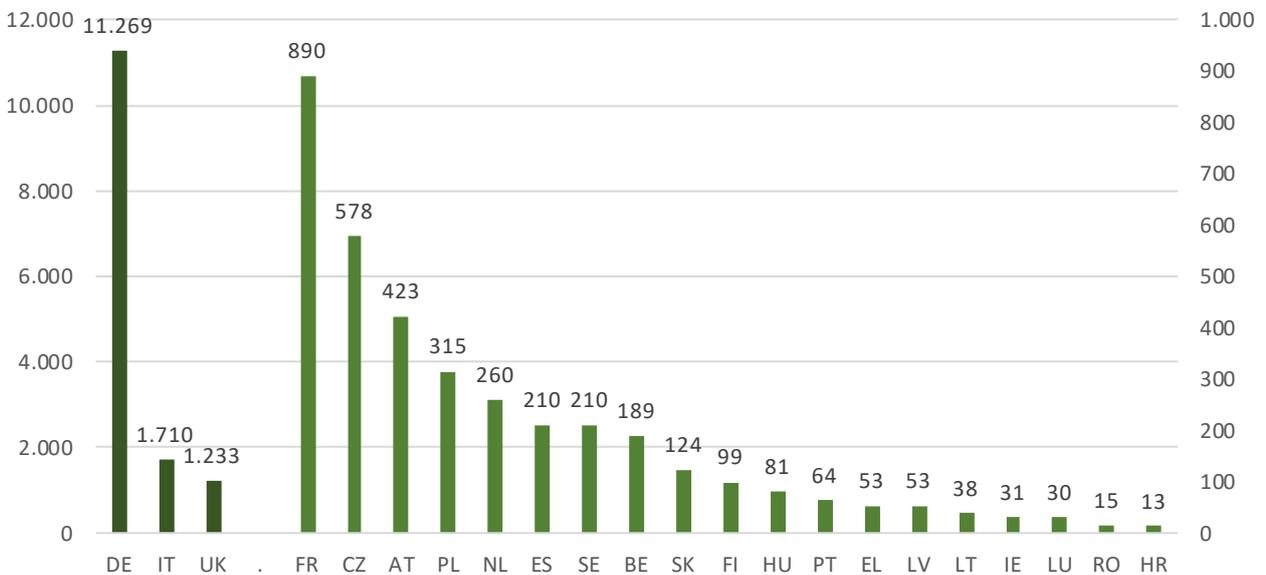


*EU27 + UK + Switzerland + Norway + Serbia + Iceland

Source: European Biogas Association, EBA

The biogas sector is expanding and has experienced major improvements in the last decade in terms of efficiency (physical and economic) due to research and innovation. Germany is the European leader in biogas production. Its number of biogas plants increased in 2019 by 185 installations compared with 2018. The United Kingdom surpassed one thousand plants by increasing the fleet with the remarkable figure of 518 additionally reported. Italy and France have also registered a significant increase in the number of new plants in operation (+55 +53 respectively).

Figure 6 Number of biogas plants in EU27 Member States and UK in 2019 (n° of plants) (separated scale for Germany, Italy and United Kingdom)



Source: European Biogas Association, EBA

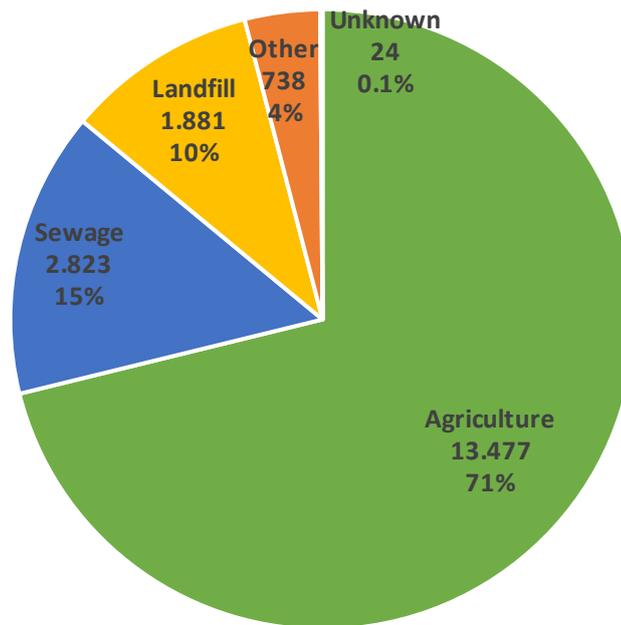
In EU27, landfill and sewage gas accounts for around 19% of total biogas production while most of the biogas is produced from anaerobic fermentation of agricultural feedstock.

Table 2 Primary Energy Production of biogas by type in EU27 Member States and UK in 2019 (in ktoe)

	Total Biogas	Landfill gas	Sewage sludge gas	Other biogases from anaerobic fermentation	Biogases from thermal processes
EU27	14.079	1.576	1.132	11.205	166
Growth rate (2018-2019)	2%	2%	1%	2%	5%
EU27+UK	16.824	2.658	1.558	12.442	166
Growth rate (2018-2019)	2%	-2%	3%	3%	5%
AT	214	1	34	179	0
BE	232	17	26	183	5
BG	51	n.a.	5	46	0
CY	14	1	1	12	0
CZ	581	20	44	517	0
DE	7.550	104	488	6.958	0
DK	397	397	n.a.	n.a.	0
EE	14	1	7	6	0
EL	125	67	20	38	0
ES	260	145	64	23	27
FI	190	16	18	30	126
FR	977	284	45	648	0
HR	82	6	3	73	0
HU	90	10	29	51	0
IE	50	31	11	8	0
IT	2.013	329	51	1.626	8
LT	39	9	7	23	0
LU	18	0	2	16	0
LV	81	8	2	71	0
MT	2	n.a.	n.a.	2	0
NL	356	10	63	283	0
PL	299	42	121	136	0
PT	80	65	6	9	0
RO	19	n.a.	n.a.	19	0
SE	182	6	78	98	0
SI	22	2	1	20	0
SK	143	5	8	130	0
UK	2.745	1.082	426	1.237	0

Source: Eurostat

Figure 7 Distribution of biogas plants by feedstock in Europe* in 2019 (number of plants)



*EU27 + UK + Switzerland + Norway + Serbia + Iceland

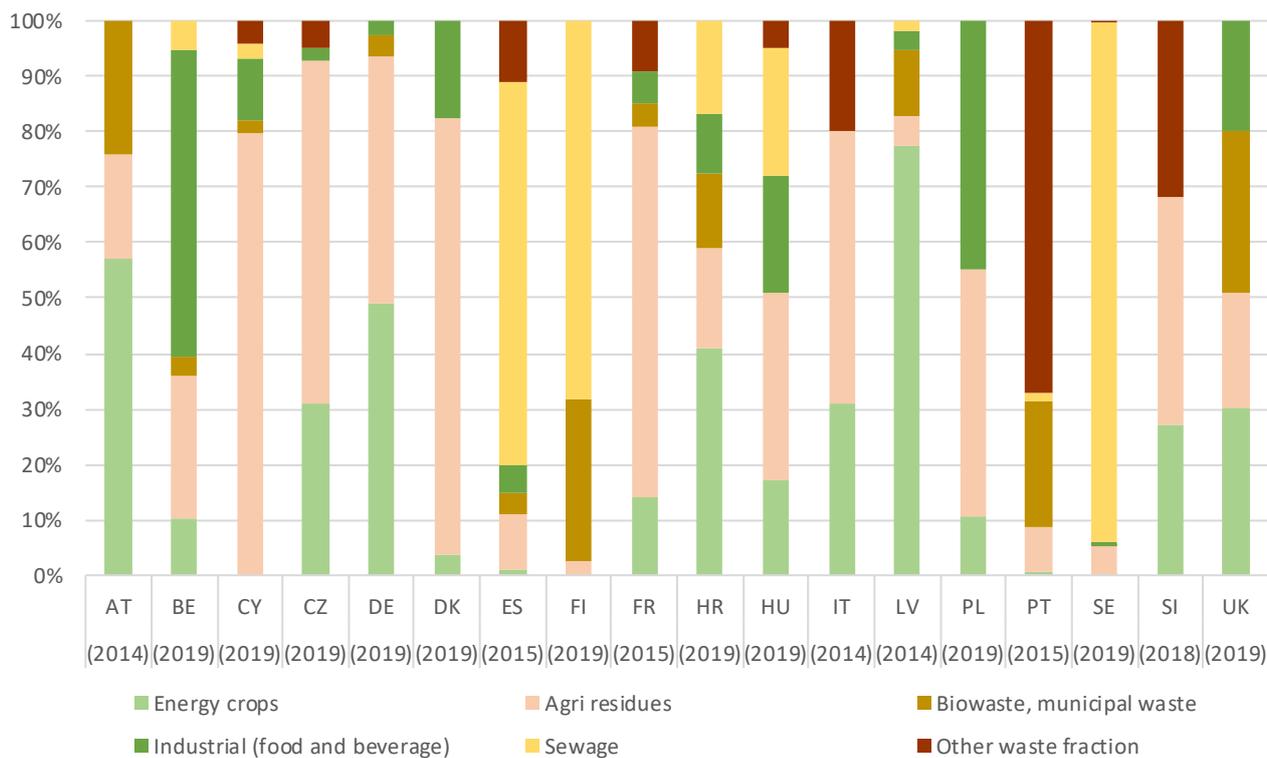
Source: European Biogas Association, EBA

In Europe, up to 71% of the biogas plants use feedstocks from the agricultural sector such as energy crops, manure, and other agricultural residues. The utilisation of agricultural residues such as manure is particularly important in countries like Denmark, France, and Italy. This underlying growth in synergies between animal farming and biogas provides a profitable manure management solution.

In most countries, there is one dominant feedstock type for biogas production, although which feedstock type that is, varies between countries. For instance, in Belgium, Poland and Ukraine, a sizeable share of industrial organic waste from the food and beverage industry goes towards the production of biogas. In Estonia, Poland and Sweden, sewage sludge clearly dominates the biogas market. In Germany, energy crops and agricultural residues are of equal importance, and together make up the vast majority of the feedstock used. In the future, it is expected that the use of energy crops to produce biogas will be replaced by sustainable cropping such as secondary crops and cover crops.

The organic waste (municipal – included in Figure 8 in “other”, or industrial – from food and beverage industry) still has the potential to be developed for use in biogas production as it is currently underrepresented, except in some countries (e.g. Belgium, Poland, or Portugal).

Figure 8 Feedstock use for biogas production in European countries (excluding landfill - expressed as a mass percentage)



Note: data is not available for all countries, the year refers to date of the data

Source: European Biogas Association, EBA

EUROPEAN BIOGAS ASSOCIATION EXPERT REVIEW

Europe counts today almost 19.000 biogas plants and more than 700 biomethane producing facilities. All European biogas and biomethane plants together produced approximately 18 bcm natural gas equivalent in 2019. This amount is similar to the total gas consumption of Belgium and can cover over 4% of Europe's inland gas consumption. Both sectors combined have been continuously growing the past ten years and the share of biomethane is increasing each year. This trend is expected to continue with a shift from biogas production towards biomethane production in the upcoming decade.

The scale-up of the sector is expected to grow in the coming years. When looking at different studies forecasting the future potential of biogas and biomethane, there a strong consensus that by 2030, these sectors combined can almost double their production. The potential biogas and biomethane production calculated for 2030 could reach up to 44 bcm, equivalent to 467 TWh. By 2050, this production can more than quadruple towards 100 bcm. This is equal to 25% of current fossil natural gas usage in Europe.

When total gas consumption comes down over the years, biomethane can cover 35 – 40% of gas demand by 2050.

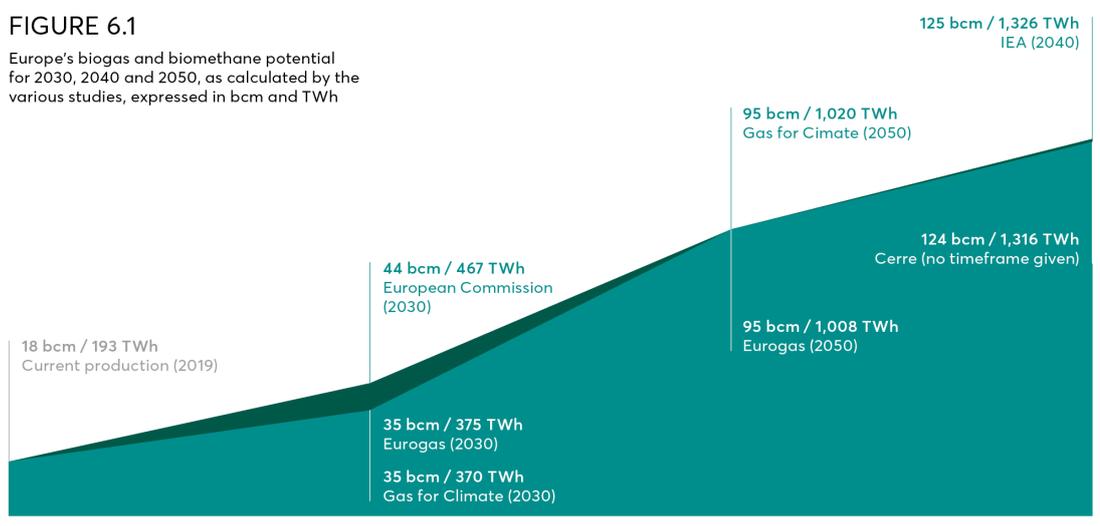
This growth will be realized with sustainable feedstocks usage only. The large production potentials will be untapped both by expanding existing production routes as well as untapping potentials in the fields of for example sequential crops usage and biogas production from industrial wastewaters.

One of the most promising areas of growth in the sector is the production of Bio-LNG and Bio-CNG, which can play a major role in the decarbonization of transport. Despite all current efforts from the EU, transport is the only sector which is not decarbonizing but shows even an increase in GHG emissions on a yearly basis since 2014.



FIGURE 6.1

Europe's biogas and biomethane potential for 2030, 2040 and 2050, as calculated by the various studies, expressed in bcm and TWh

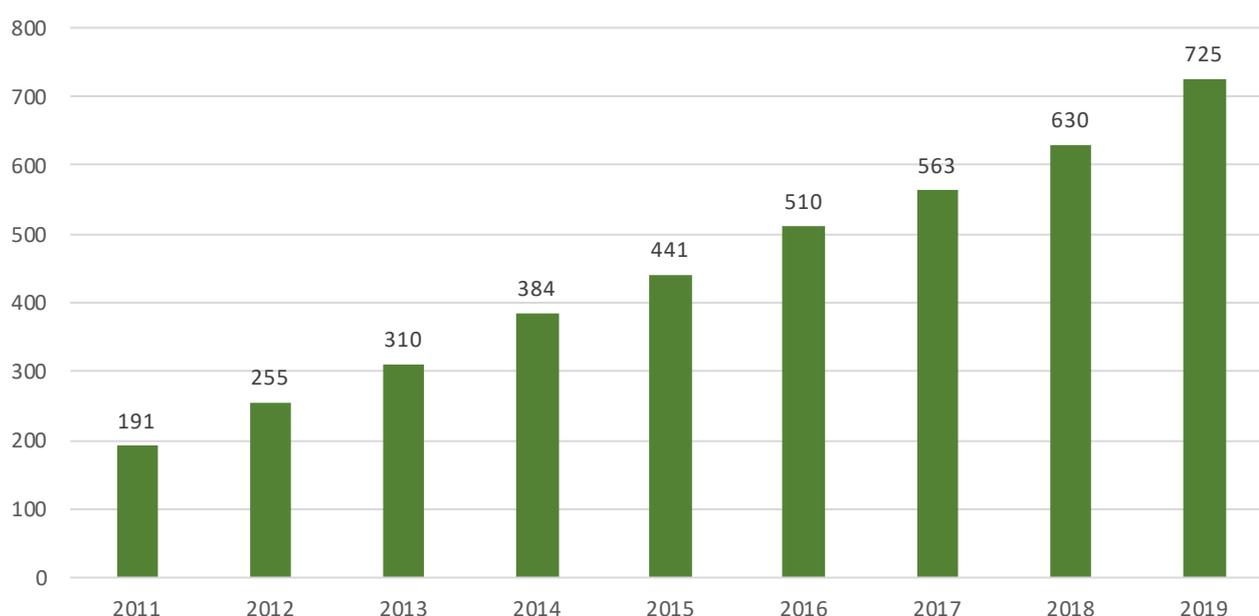


2. Biomethane in Europe

Biomethane is defined as methane produced from biomass, with properties close to natural gas. The initial product is raw biogas, containing 40-60% methane, which is purified (upgraded) to reach a high methane content (usually >96%) which can then be used in the gas grid or as a fuel for transport.

The number of biomethane plants have more than tripled from 2011 to 2019, adding 95 new plants during the last year, indicating the fast development of this sector. For more information on the biomethane plants in Europe, see [the GIE - EBA Biomethane Map](#).

Figure 9 Evolution of the number of biomethane plants in Europe*



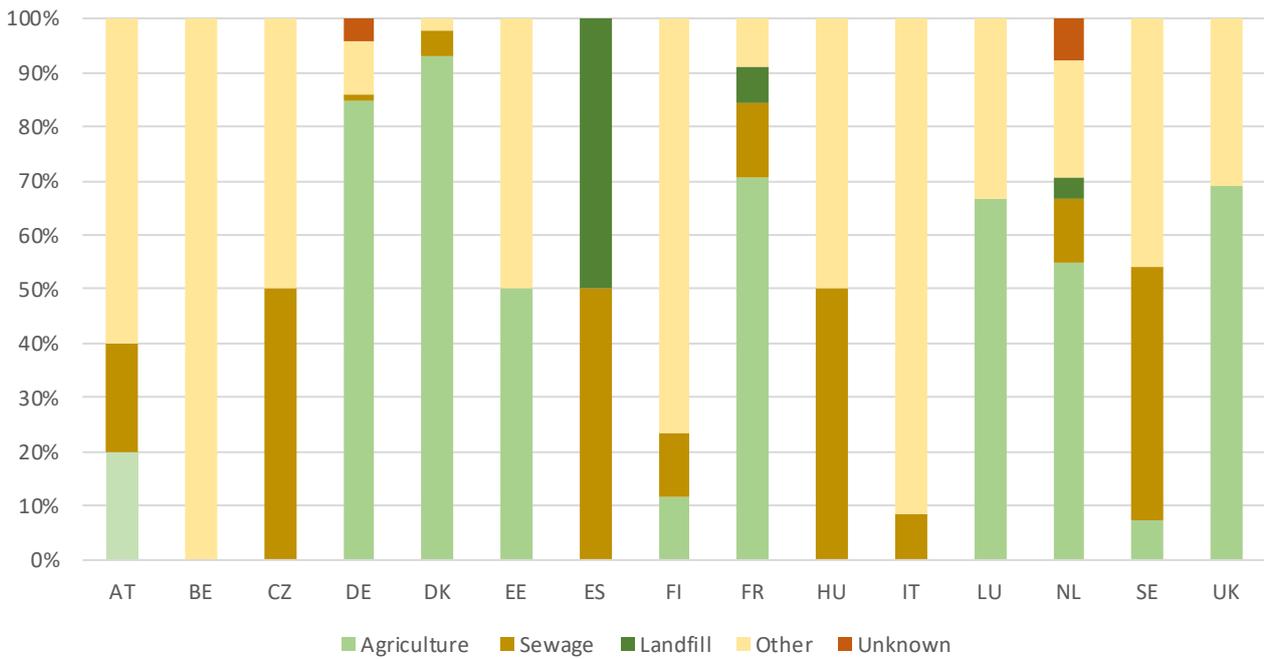
*EU27 + UK + Switzerland + Norway + Iceland

Source: European Biogas Association, EBA

During the year of 2019, the biomethane sector expanded significantly with a 16% increase of biomethane plants. With 95 additional plants, 2019 is the year with the biggest increase in biomethane plants to date. Germany reached 232 biomethane plants in 2019, while in France, 47 additional plants were installed in 2019, reaching a total of 123 biomethane plants.

2019 saw the Czech Republic join the biomethane producing countries in Europe with the opening of its first 2 plants, close behind Belgium (Flanders) and Estonia, who started producing biomethane in 2018. In the course of 2020, Ireland, Latvia, and the Walloon part of Belgium also made the first injections of biomethane into their gas grids, bringing the total number of biomethane-producing countries in Europe to 20. Lithuania plans to start producing biomethane in 2021.

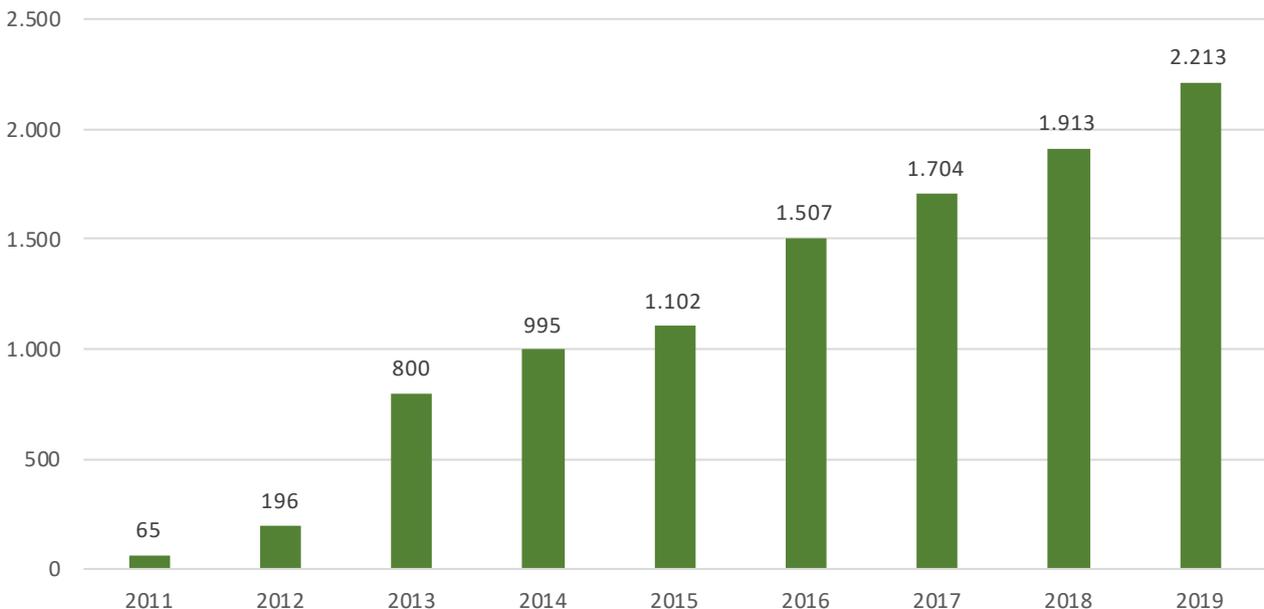
Figure 10 Distribution of biomethane plants by feedstock type in 2019 for some European Countries



Note: Within the agriculture category, there are energy crops, manure and agri-residues.. 'Other' includes among others, biowaste – municipal (e.g. in Belgium) and industrial (food and drink) (e.g. in Denmark).

Source: European Biogas Association, EBA

Figure 11 Evolution of the production of biomethane in Europe* (in ktoe)

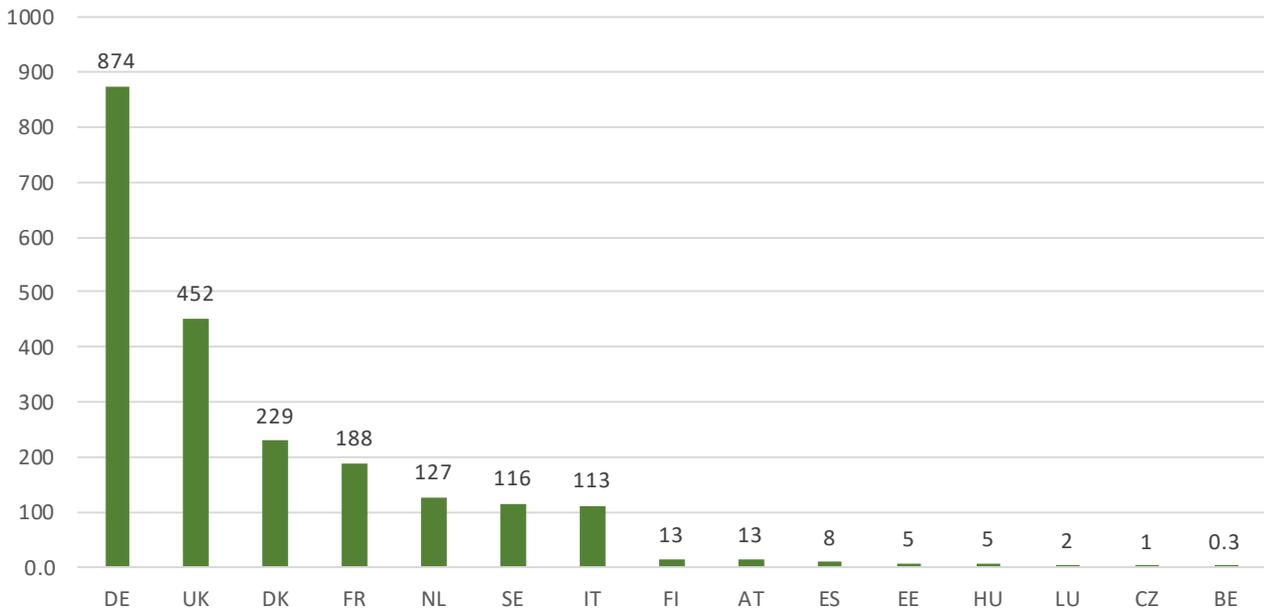


*EU27 + UK + Switzerland + Norway + Iceland

Source: European Biogas Association, EBA

In 2019, the biomethane produced in Europe showed an increase of 16%.

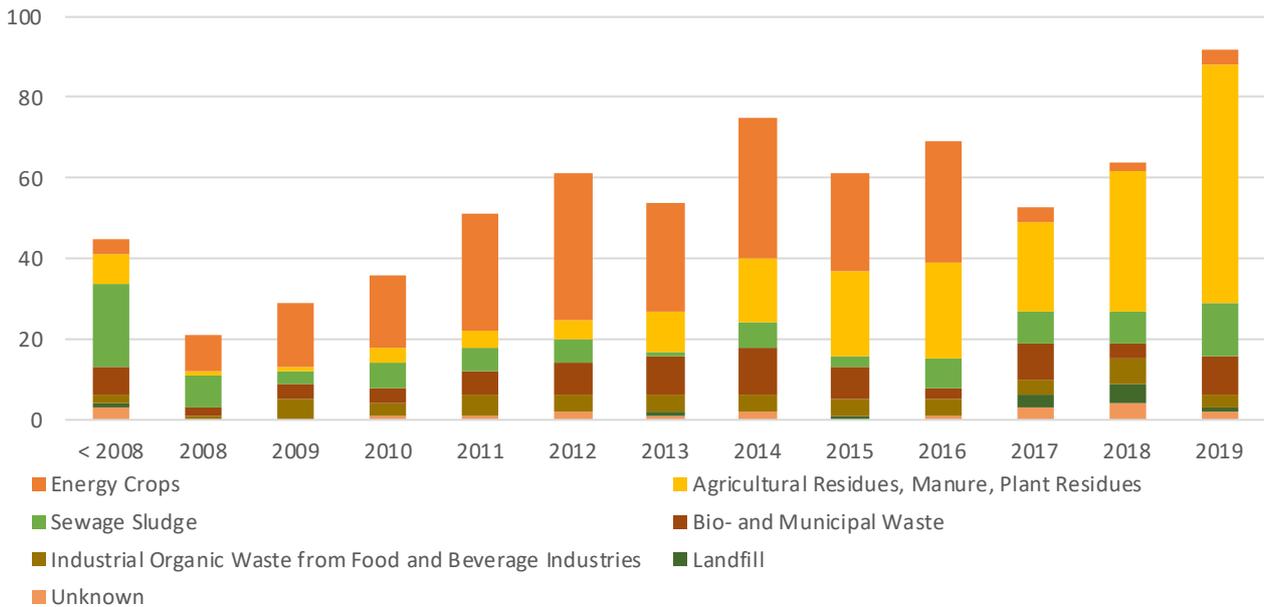
Figure 12 Production of biomethane in European countries in 2019 (in ktoe)



Source: European Biogas Association, EBA

It is worth noting the double increase of biomethane plants in Italy and the respective big increase in Denmark. The Netherlands reached 51 plants in 2019 while there were only 39 plants in 2018.

Figure 13 Evolution of newly installed biomethane plants per main feedstock



Source: EBA

Figure 13 displays the number of newly installed biomethane plants each year in overall terms, and for each different feedstock type. A clear trend is visible in feedstock usage: 2013 saw the beginning of a move away from energy crops, towards agricultural residues, bio- and municipal waste and sewage sludge. From 2017, almost no new plants were established to run on energy crops. This change partly reflects the fact that growth in biomethane production is no longer

located primarily in Germany, with more plants instead being built in France, the Netherlands, Denmark, and Italy. Whereas in Germany, a large share of plants run on energy crops, plants in the countries currently leading growth in the sector run principally on agricultural residues and to a lesser extent also on bio- and municipal waste and sewage sludge. This trend is expected to continue. Moreover, energy crops are expected to be replaced in the future by sustainable cropping such as sequential cropping and cover crops.

3. Annexes

Definitions

Derived heat (DH)	According to Eurostat, derived heat covers the total heat production in heating plants and in combined heat and power plants. It includes the heat used by the auxiliaries of the installation which use hot fluid and losses in the installation/network heat exchanges. For auto-producing entities (= entities generating electricity and/or heat wholly or partially for their own use as an activity which supports their primary activity) the heat used by the undertaking for its own processes is not included.
Gross electricity generation	The gross electricity generation is measured at the outlet of the main transformers, i.e. the consumption of electricity in the plant auxiliaries and in transformers is included.
Gross final energy consumption	Final energy consumption + consumption of electricity and heat by the energy branch for electricity and heat generation (own use by plant) + losses of electricity and heat in transmission and distribution.
Gross inland consumption	Gross inland consumption is the quantity of energy necessary to satisfy inland consumption of the geographical entity under consideration. It is calculated using the following formula: primary production + recovered products + imports + stock changes – exports – bunkers. International Marine Bunkers are quantities of fuels delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters.

Table 3 Country Codes

EU28	European Union (28 members)	CH	Switzerland
AT	Austria	IS	Iceland
BE	Belgium	NO	Norway
BG	Bulgaria	RS	Republic of Serbia
CY	Cyprus		
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		
LU	Luxembourg		
LV	Latvia		
MT	Malta		
NL	Netherlands		
PL	Poland		
PT	Portugal		
RO	Romania		
SE	Sweden		
SI	Slovenia		
SK	Slovak Republic		
UK	United Kingdom		

Table 4 Symbols and Abbreviations

Symbol	Meaning
,	Decimal separator
.	Thousand
n.a.	Data not available

Table 5 Decimal Prefixes

10 ¹	Deca (da)	10 ⁻¹	Deci (d)
10 ²	Hecto (h)	10 ⁻²	Centi (c)
10 ³	Kilo (k)	10 ⁻³	Milli (m)
10 ⁶	Mega (M)	10 ⁻⁶	Micro (μ)
10 ⁹	Giga (G)	10 ⁻⁹	Nano (n)
10 ¹²	Tera (T)	10 ⁻¹²	Pico (p)
10 ¹⁵	Peta (P)	10 ⁻¹⁵	Femto (f)
10 ¹⁸	Exa (E)	10 ⁻¹⁸	Atto (a)

Table 6 General Conversion Factor for Energy

to from	1 MJ	1kWh	1 kg oe	Mcal
1 MJ	1	0,278	0,024	0,239
1 kWh	3,6	1	0,086	0,86
1 kg oe	41,868	11,63	1	10
1 Mcal	4,187	1,163	0,1	1



BIOENERGY EUROPE
**STATISTICAL
REPORT**
2021

Supported by:



**Européenne
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In collaboration with:



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