EBA STATISTICAL REPORT 2020

EBA
European Biogas Association

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About the EBA

The EBA is the voice of renewable gas in Europe. Founded in February 2009, the association is committed to the active promotion of the deployment of sustainable biogas and biomethane production and use throughout the continent. EBA counts today on a well established network of 40 national organisations and over 100 scientific institutes and companies from Europe and beyond.

EBA STATISTICAL REPORT 2020

FOREWORD

Harm Grobrügge, EBA President — It is with great pleasure that I present to you the 2020 edition of the EBA Statistical Report. This report draws on the latest available data on the deployment of biogas and biomethane across Europe. By providing an accurate assessment of the state of play in our sector, the EBA's annual Statistical Report has become a landmark publication for those seeking to understand the role of renewable gases in the future energy mix and the status of our industry in Europe.

The writing of this report is only possible thanks to the coordinated efforts of a motivated EBA Secretariat to conceive, draft and promote it, and to the continued support of national associations in embracing the tremendous potential of biogas and biomethane as a source of renewable energy. We are also extremely grateful for the contribution of our sponsors, who help transform this comprehensive analysis into a high-quality publication showcasing the annual trends in our sector.

Harmen Dekker, EBA Director — The implementation of the EU Green Deal brings with it new opportunities to scale-up biogas and biomethane in Europe. We are proud to report that our sector now produces 167 TWh or 15.8 bcm of biogas and 26 TWh or 2.5 bcm of biomethane. At the end of 2019, we have reached a total of 18,943 biogas plants and 725 biomethane plants across Europe. Biogas and biomethane are accessible sources of renewable energy: the sector is ready for expansion and perfectly placed to make a significant and sustainable contribution to the EU Green Deal. A supportive and consistent legislative framework will accelerate our ongoing progress and encourage investment, helping our sector to reach a minimum of 380 TWh by 2030, with further growth in the years thereafter.

During recent months, the EBA Secretariat has been working tirelessly on a fine-tuned 2020 edition of the Statistical Report, to provide an exhaustive picture of the key drivers of biogas and biomethane development, including a country-specific analysis of 19 countries. This edition features the most recent data and statistics on the development of the European biogas and biomethane markets, as well as potential growth forecasts for the coming years. The figures show that our sector can contribute very substantially to the much-needed decarbonisation of the gas sector, making renewable gases available for transport, industry and heating.

The implementation of the EU Green Deal will be a determining factor in shaping the role of biogas and biomethane in future energy systems, and this report correspondingly includes an incisive analysis of the impact of key EU policies on the scale-up of our industry. The vast potential of biogas and biomethane goes beyond the reduction of emissions in the energy sector. For this reason, the 2020 edition of this report also covers the positive impact of biogas and biomethane on the development of a thriving bioeconomy. On the innovation side, the 2020 edition looks at what is currently one of the most promising areas of growth in the sector: the production of Bio-LNG and Bio-CNG.

We wish you an interesting read.

Harm Grogrügge, EBA President

Harmen Dekker, EBA Director

COLOR KEY

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

Feedstock types

- Agricultural
- Agricultural Residues
- Energy Crops
- Sewage
- Landfill
- Other
- Bio– and Municipal Waste
- Industrial (Food and Drink)

Upgrading technologies

- Pressure Swing Adsorption
- Membrane Separation
- Water Scrubber
- Physical Absorption
- Chemical Absorption
- Cryogenic

Other

- Biogas
- Electricity Generation
- Biomethane
- Installed Electric Capacity (IEC)
- Bio-LNG/Bio-CNG
- Unknown

DEFINITIONS

Feedstock types

- **Agricultural:** All substrates related to agricultural production. This includes manure, straw, cover/catch crops, and crop residues.
- **Agricultural Residues:** All substrates related to agricultural production, except for energy crops.
- **Energy Crops:** Primary crops with a high starch content
- **Sewage:** Sewage sludge produced at 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'.
- **Other:** Various types of organic waste such as bio- and municipal waste, household waste and industrial waste, for example from the food and beverage industry.
- **Bio- and Municipal Waste:** Municipal waste and organic household waste.
- **Industrial (Food and Drink):** Industrial organic waste, for example from the food and beverage industry

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.
- **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.
- **Membrane Separation** uses a permeable membrane to separate carbon dioxide and methane molecules based on their different physical characteristics.

DEFINITIONS

Upgrading technologies

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.

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 in 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 generate more or less electricity according to demand. E.g., the production facility can produce more electricity when demand is high and less when demand for electricity is low.

SHORT OVERVIEW PER CHAPTER

1 A BIOECONOMY WITH RENEWABLE GAS

Chapter 1 gives a textual introduction and explanation of the uses of renewable gas in Europe's bioeconomy.

2 DEVELOPMENT OF THE EUROPEAN BIOGAS MARKET

This chapter examines the development of the biogas market in Europe from 2009 to 2019. It includes data and figures from biogas-only production facilities, without upgrading. Data and figures from production facilities upgrading biogas to biomethane are given in chapter 3. Figures in chapter 2 show the evolution of the number of biogas plants in Europe during the period 2009 to 2019; the number of biogas plants per 1 million head of population in each country in 2019 and the total number of biogas plants per country including an indication of the type biogas plants. The plants are divided into 5 categories: agriculture-based biogas plants, sewage-based biogas plants, biogas plants at landfills, other biogas plants and unknown.

Apart from the number of biogas plants, this chapter holds information on the development of total biogas production and derived electricity generation from biogas in Europe from 2011 until 2019, including an indication of the division per feedstock type. Next, the generated electricity from biogas per capita in 2019 is shown per country on a map.

The development of both biogas production capacity and installed electric capacity for electricity generation from biogas is set out from 2010 to 2019, together with a breakdown by feedstock type. The overall average plant size in Europe and per country is given in terms of installed electric capacity.

Lastly, feedstock use for biogas production in 21 European countries is displayed, expressed as a mass percentage. This overview of feedstock use excludes biogas production from landfill.

3 DEVELOPMENT OF THE EUROPEAN BIOMETHANE MARKET

This chapter examines the growth of the biomethane market in Europe from 2008 to 2019, including figures on the development of the number of biomethane plants in Europe from 2011 to 2019, along with the 2019 figures for the number of biomethane plants per 1 million head of population in each country and the total number of biomethane plants per European country. The plants are divided into 5 categories: agriculture-based biomethane plants, sewage-based biomethane plants, biomethane plants at landfills, other biomethane plants and unknown.

In addition to the number of biomethane plants, this chapter contains information on the development of biomethane production in Europe from 2011 to 2019, in TWh and bcm, together with a breakdown by feedstock type. Next, per capita biomethane production in each country in 2019 is set out in map form.

The development of biomethane production capacity is shown in GW and bcm/year from 2008 to 2019, along with an indication of the size distribution of biomethane plants in Europe. Additionally, the number of new biomethane plants per feedstock type, per year and per country is examined. Lastly, the relative use of different upgrading technologies for purifying biogas to biomethane in Europe is given, together with the number of new plants using each upgrading technology per year and per country.

4

DEVELOPMENT OF THE EUROPEAN BIO-CNG AND BIO-LNG MARKET

This chapter explores the growth in the number of Bio-CNG plants in Europe between 2007 and 2019 as well as the current and projected development in the number of Bio-LNG plants in Europe between 2017 and 2022. The number of Bio-CNG plants per country in 2019 is given. For Bio-LNG, the confirmed Bio-LNG production capacity per country by 2022 is visualized. Additionally, estimates as to the number of Bio-CNG and Bio-LNG filling stations in Europe are included.

5

POLICY TRENDS IN THE BIOGAS AND BIOMETHANE SECTORS IN EUROPE

Chapter 5 includes an analysis of the impact of key EU policies on the development of the biogas and biomethane sectors. Amongst others, the European Green Deal; the EU Fertilising Product Regulation; the Renewable Energy Directive; the Land Use, Land Use Change and Forestry (LULUCF) Regulation; agriculture policy and transport policies are discussed.

6

GROWTH POTENTIAL FOR BIOGAS AND BIOMETHANE

In this chapter, the growth potential for the biogas and biomethane sectors according to different studies is summarised and visualised. The key characteristics of each study are described, together with the main methodology and assumptions.

7

COUNTRY SPECIFIC ANALYSIS

Chapter 7 comprises country-specific analysis of 19 countries. The development of the national biogas and biomethane markets in each country is examined, including the effects of specific schemes and policies impacting on that development. Country-specific topics and trends are discussed. The countries included in chapter 7 are: Austria, Belgium, Switzerland, the Czech Republic, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Ireland, Italy, Latvia, the Netherlands, Poland, Sweden, the United Kingdom and Norway.

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METHODOLOGY

The Statistical Report of the European Biogas Association is an extensive examination of the state of the biogas and biomethane 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 shown 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 2020 and REGATRACE report D6.1, "Mapping the state of play of renewable gases in Europe". Although the EBA database is mainly based on official 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 2019. Where 2020 numbers are already available, those are mentioned in the text. In contrast, where 2019 data is not yet available, the 2018 data is reused as 2019 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. Therefore, differences between this and previous EBA statistical reports may exist. To deliver the comprehensive statistical report presented here, data from different sources is combined (the EBA database, EBA-GIE biomethane map 2020 and REGATRACE D6.1). However, this sometimes leads to small inconsistencies between figures.

National biogas associations, national statistical reports and industries provide the EBA database with data on the number of biogas and biomethane plants, biogas production capacity, the amount of biogas and biomethane production and electricity generation from biogas. In contrast to previous EBA statistical reports, this report includes figures on the development of the amount of biogas production and biogas production capacity next to the amount of electricity generation from biogas and installed electric capacity. This enables a more accurate comparison between biogas and biomethane production in Europe.

For countries where national data on biogas production and biogas production capacity is not available, the figures are calculated from the electricity generated from biogas and the installed electric capacity, assuming a CHP electrical efficiency of 38%. In some cases, to convert data from biogas production capacity to biogas production and vice versa, biogas and biomethane plants are assumed to have 8,000 yearly productive hours. A conversion factor of 10.61 kWh/m^3 was used to calculate from bcm to TWh and vice versa.

Although every effort is made to make the EBA database as accurate as possible, some countries do not produce separate statistics for biogas and biomethane, instead including the number of biomethane plants in their figures for biogas, which makes it impossible to draw a clear distinction between biogas and biomethane. This may lead to a small overestimation of the number of biogas plants in some countries and in Europe as a whole. Bio-CNG and Bio-LNG plants are also considered as biomethane plants and thus included in the biomethane statistics.

7

COUNTRY ANALYSES

7.1 AUSTRIA

Country highlights

- In 2019, Austria was home to 423 operational biogas plants, with a total reported biogas production of 1,487 GWh.
- 15 biomethane plants were operational in Austria in 2019, with a combined biomethane production of 146 GWh.

National EBA contributor for 2020

kompost & biogas verband

By the year 2010 – the first year of data in the EBA database – growth in the Austrian biogas market had already begun, mainly thanks to the Green Electricity Act, which came into force in 2003. Many plants started operation between 2003 and 2005 and were granted a subsidy period of 13 years. The Austrian biogas sector negotiated successfully with the government to prolong the subsidies and prevent the otherwise likely closure of nearly all operating biogas plants in Austria by 2019. Nevertheless, some plants ceased operation in 2016 (Figure 7.1) and by 2020, national subsidy contracts were expiring on a regular basis. The operators affected are hoping for a change in the subsidy scheme, whether it is an extension of the feed-in tariff for renewable electricity or an incentive to switch to upgrading to biomethane. In 2019, there were 423 operational biogas plants in Austria.[7]

190 of Austria's biogas plants – just under half of the total number in 2019 – belong to the country's agricultural sector, but plants treating sewage and plants using organic, municipal and industrial waste (classed in the 'other' category) also make up a considerable portion of the total number, constituting 24% and 28% respectively.

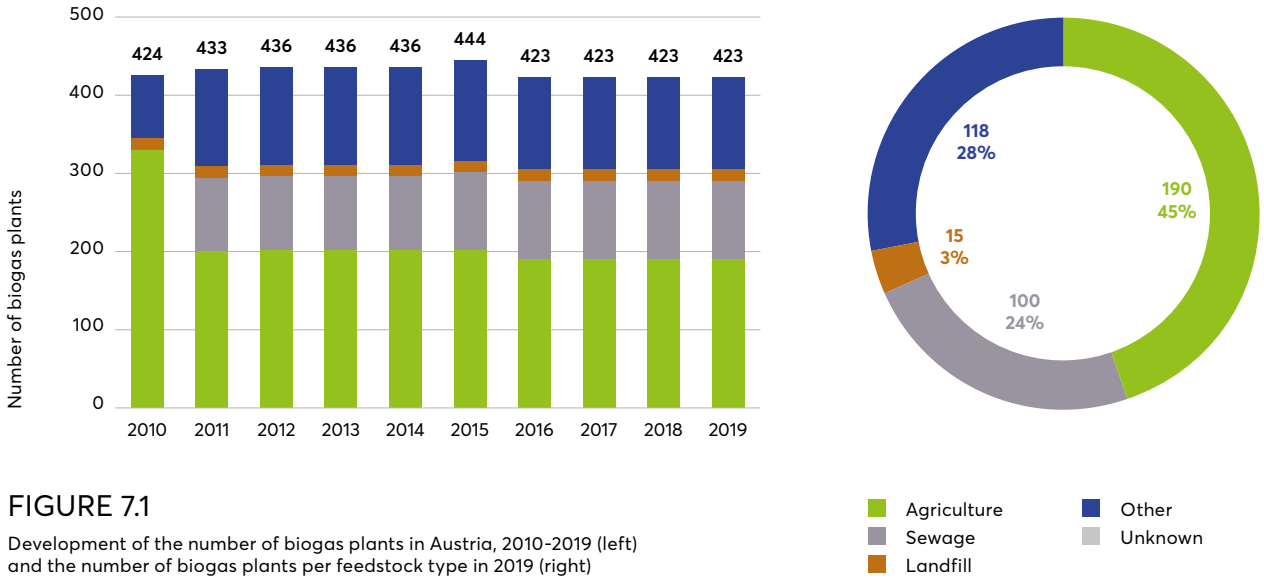


FIGURE 7.1

Development of the number of biogas plants in Austria, 2010-2019 (left) and the number of biogas plants per feedstock type in 2019 (right)

7 REGATRACE D6.1 – Mapping the state of play of renewable gases in Europe

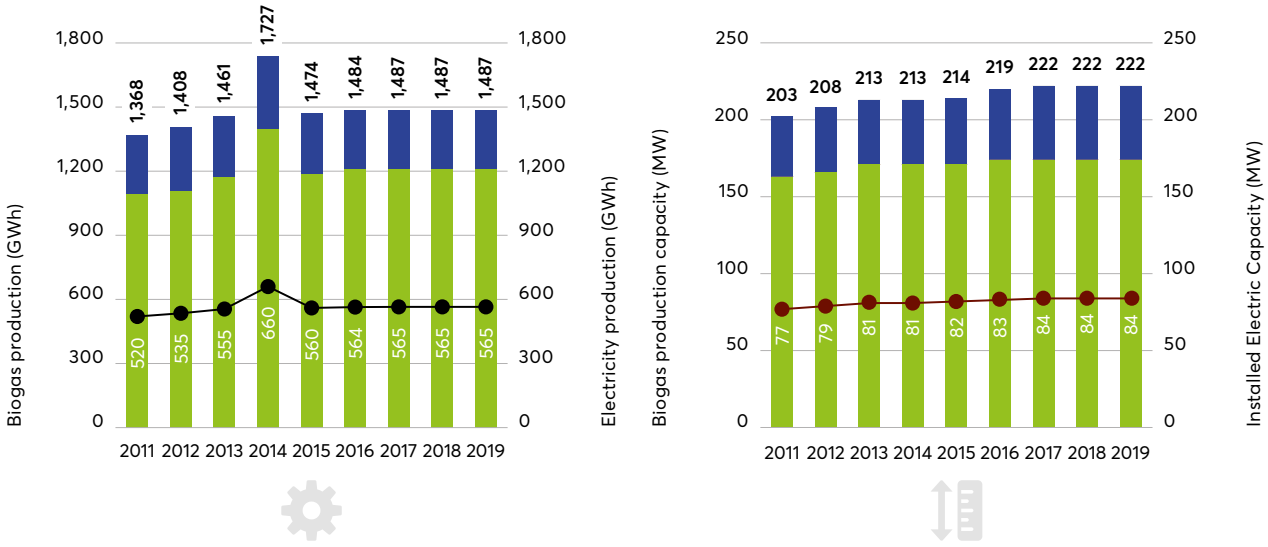


FIGURE 7.2

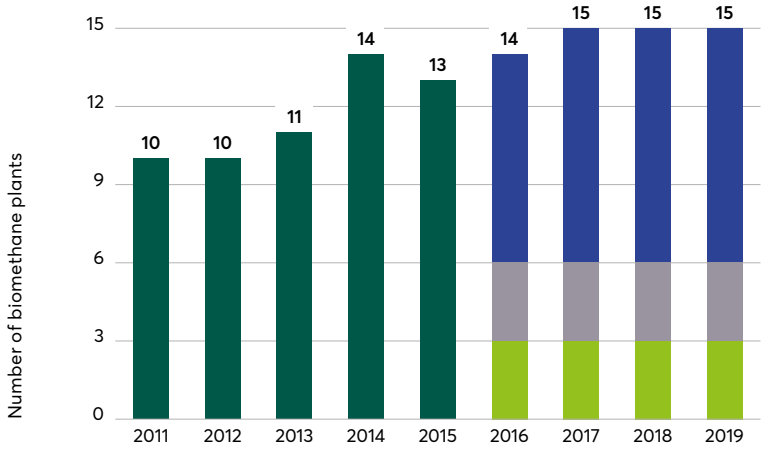
Development of biogas production available for electricity generation in Austria, 2011-2019, set against together with actual electricity produced, both in GWh (left) and development of Austrian biogas production capacity, 2011-2019 set against Installed Electric Capacity, both in MW (right)

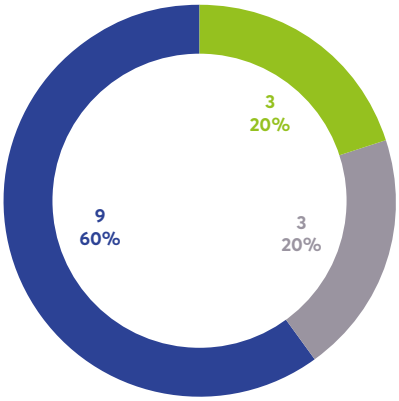
Like the number of biogas plants, Austrian biogas production and biogas production capacity have grown only slightly in the last decade, reaching a reported biogas production of 1,487 GWh in 2019 and a reported biogas production capacity of 222 MW. The actual electricity generated from the available biogas in 2019 amounted to 565 GWh. Data are only available for the 'agricultural' and 'other' categories of plants.

Austria's first biomethane plant started operation in 2005, followed by additional plants in 2007 and 2009. Today, there are 15 biomethane plants in Austria (Figure 7.3). At the end of 2019, there was still no direct subsidy scheme available in Austrian for biomethane production. The number of plants has therefore increased only slowly over the last decade and has not risen at all since 2017. Indirect support for biomethane was paid out for the first time in 2012, on the basis that biomethane is injected into the grid, at which point it changes ownership from the biomethane plant operator to an electrification plant operator providing renewable electricity. The subsidy is then paid to the electrification plant operator and not the biomethane plant operator. Such financial subsidies must be monitored closely, which is only possible by tracking the movement of the renewable gas. With this as a primary objective, the Austrian Biomethane Registry, operated by the Austrian Gas Clearing and Settlement AG (AGCS), was established in July 2012.[8] The Austrian Biomethane Registry is also working beyond the country's borders to establish a European biomethane market. In 2016, AGCS entered into cooperation with the German Biogas Registry, operated by the German Energy Agency (DENA), to enable cross-border trade in renewable gas certificates. Austrian stakeholders are thus able to sell their renewable gases on the German market.

14 out of the 15 biomethane plants currently operating in Austria are connected to the gas (distribution) grid. 10 plants produce Bio-CNG on site. In addition, Austria has a total of 185 Bio-CNG filling stations. Five of them provide Bio-CNG 100% originating from biomethane; 180 provide Bio-CNG blends. Austria has a total biomethane production capacity of 3,065 m^3/h, equivalent to 32.5 MW.[9] The development of the number of biomethane plants in Austria and Austria's biomethane production are set out in Figure 7.3 and Figure 7.4.

8 REGATRACE D6.1 – Mapping the state of play of renewable gases in Europe
9 EBA-GIE Biomethane map 2020





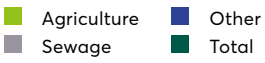
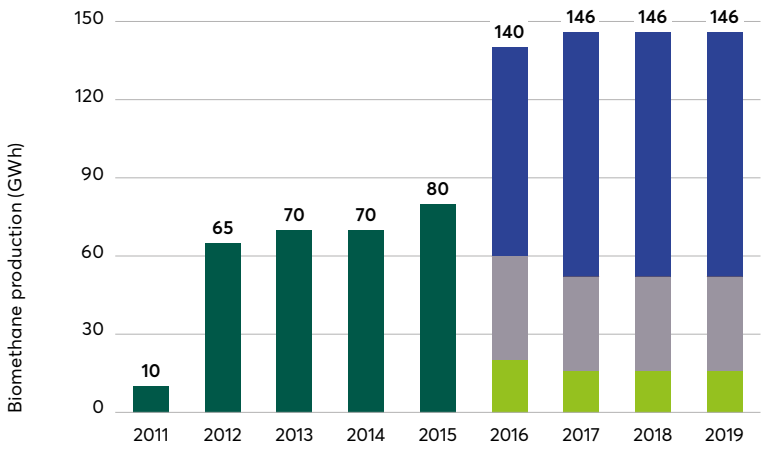
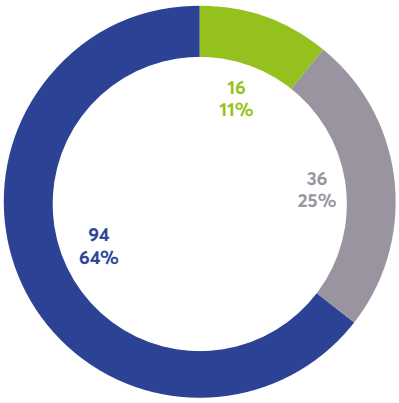


FIGURE 7.3
Development of the number of biomethane plants in Austria, 2011-2019 (left) and the number of biomethane plants per feedstock type in 2019 (right)





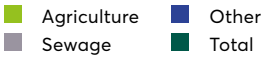


FIGURE 7.4
Development of biomethane production in Austria in GWh, 2011-2019 (left) and Austrian biomethane production per feedstock type in 2019 (right)

The main upgrading technique in use in Austria is pressure swing adsorption (PSA), which is used in 8 out of the country's 15 biomethane installations, as shown in Figure 7.5.

FIGURE 7.5
Number of biomethane plants per upgrading technique in Austria in 2019