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BIOMETHANE EUROPEAN BENCHMARK

December 2019



http://france-biomethane.fr/



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Synthesis

Current situation

There are **621 plants** in the major biomethane producers of Europe at the end of 2018. These facilities have a combined biogas upgrading capacity of 567,000 Nm³/h which represents **22 TWh of biomethane per year**. As a comparison, this production in 2019 would represent about 5% of France's final consumption of natural gas. **More than 80% of these plants are now connected to national gas grids** and are mainly powered by energy crops, organic or agricultural wastes. The part of biogas valorized as biomethane still grows even though the 16,500 biogas plants in the 11 studied countries remain mainly used for electricity generation.

Trends

The dynamism and maturity of the analyzed countries are quite heterogeneous. After having doubled its number of plants over the last 4 years, biomethane growth in the sector seems to be stabilizing in Europe. Growth remains strong with **an increase of 9% in the number of installations and 6% on installed capacity.** The dynamism of Europe might even strengthen, if some "young" countries regarding biomethane, such as Italy, benefit from a new favorable regulatory framework.

Outlook

Feed-in tariffs for biomethane have strongly supported the sector growth in the past years. **Today, several countries including France, are mature enough to put tendering systems in place.** This will encourage producers to reduce their costs and become more independent of support mechanisms. Other countries want to **stimulate demand for biomethane as vehicle fuel** by imposing biofuel quotas coupled with a system of guarantees of origin. This is the case, for example, in the United Kingdom, which is drastically changing its strategy toward biomethane support, or in Italy, the champion of natural gas vehicles in Europe, which already has 900 applications for connections to the grid.



Cross analysis



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Number of biogas plants and biogas upgrading rate



Biogas development in Europe is heterogenous, even between countries with similar feedstocks potential. Germany is still, by far, the biomethane leader in Europe. Regarding biogas valorization, we can observe 2 strategies : the use of biogas for CHP (Combined Heat and Power) or biogas upgrading (biomethane). The support mechanisms have allowed the biomethane sector to become more competitive in France, the UK and the Netherlands . These countries caught up with the Danish and Swedish sector, which were more advanced.





Regulatory environment evolution



Apart from Germany, most of the European country have strengthened their support mechanism towards biogas and biomethane between 2012 and 2019. 2 main strategies are emerging : on one side the countries with a Feed-in-Tariffs scheme that insure the producer with a stable revenue and support a steady and sound growth rate as in France and the UK. On the other side, countries supporting the demand of "biomethane fuel", with a lower but more "natural" growth rate as in Sweden.



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Evolution of plants number and capacity over 3 years



There are currently 3 production levels in Europe: Germany and the United-Kingdom lead with a cumulative capacity of more than 100 000 Nm³/h of treated biogas, which serve as examples for most Western European countries. Secondly, Sweden (despite a lack of dynamism), Denmark, France and the Netherlands have capacities of about 35 000 Nm³/h. The other countries have a capacity 3 times lower with a particular case for Italy, the country is lagging behind its neighbors but has a high potential and could grow rapidly.



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Number of plant per countries and injection rate in the network



The biomethane sectors in Europe remain rather heterogeneous and despite the progress of France and the United Kingdom, Germany continues to weigh more than one-third of the number of units on the old continent. Apart from Sweden, which was the first country to develop its biomethane production, most of the major producers chose the injection on the grid which was largely motivated by feed-in tariffs. In the near future, the systems put in place around biofuel quotas could reverse the trend.



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Share of feedstocks used by country



Germany, the United Kingdom and Austria are the only countries using energy crops to produce biomethane. France, Denmark and the Netherlands are focusing on the re-use of agricultural waste, while most other countries in Europe favour organic waste (household or industrial). Co-digestion, present in Sweden, Switzerland and Denmark, enables the use of agricultural, household or industrial waste to produce biomethane and facilitates the development of larger capacity units.



Evolution of cumulative capacity and feedstock mix



Driven by Germany and the United Kingdom - leading producing countries - energy crops represent nearly 40% of the capacity in Europe. These feedstocks are still controversial in most countries that plan to limit the land used for energy rather than food production. The sewage treatment plants in Switzerland and Sweden have been replaced in proportion by agricultural and organic waste units of Denmark and the Netherlands. Production of biomethane from landfill gas is negligible even if it's still widely used to produce raw biogas.



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Countries sheets



How to read the country sheets ?

By **SIQ**OOrthers



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Injected volume 2018

10 TWh

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Germany has shifted its supports mechanism scheme to a tender offer system, stopping Feedin-Tariffs for biogas and bonuses for biogas upgrading. The tender offer system fixes a cap on the amount of electrical power to be installed per year. The market is thus receiving fewer subsidies and should stagnate in the coming years.



The Feed-in-Tariffs were removed in 2014, instead of the EEG regulation introduced tenders offer. They limit the amount of electrical power to be installed. The tariffs do not concern biogas upgrading.

• Guarantees of origin are under DENA's supervision and international traded are allowed with Denmark and Austria.

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- Plants operating with energy crops can not apply for Feed-in-Tariffs.
 - Fuel originated from biogas are not exempted from taxes since 2015



% of plants injecting on the gas grid

84%

Support mechanisms

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Estimated injected volume 2018

300 GWh

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In spite of Feed-in-Tariffs in place since 2013, the Austrian biomethane sector is experiencing a slow growth rate. The small average plant capacity might be caused by a lack of investment subsidies, which are only available at the regional level. In the meantime, the regulation forces plants to be more efficient.

Austria

Regulations

- The 2016 Green Electricity Act steers the plant with more than 150 kW to upgrade biogas to the natural gas quality, to reach a 67.5% energy efficiency and to be less than 5km from the grid.
- Feed-in-Tariffs for 15-year contracts are available for the plants using less than 30% of energy crops. The amount allocated to the Feed-in-Tariffs doubled, compared to the previous scheme, to 11.7 M€/year.
- Guaranties of origins certificate are accepted by the AGCS (Austrian Gas Clearing & Settlement). They can be exchanged with Denmark and Germany.







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Injected volume 2018

1,75 TWh

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The strong growth rate in Denmark, where the plants have large injection capacity, have soared the amount allocated for the biomethane sector. Thus, a tender offer system was installed, aiming to limit the amount of Feed-in-Tariffs and subsidies allocated to the sector each year.

Denmark

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#### Regulations

- After 2020, tenders offers will limit the number of plants to be installed. The cap will be fixed on a maximum amount of subsidies of 32 M€/year. Feed-in-Tariffs for 20 years will be awarded through the tender offer with a ceiling cap price.
- Plants registered on the Energinet register can sell their guaranties of origin in Germany and Austria
- Subsidies are awarded to the winner of the tender offer, their amount are still to be fixed.
- CO<sub>2</sub> tax and energy tax are exempted for biomethane plants reserving their gas for transport use.



% of plants injecting on the gas grid

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**Injected volume 2017** 

100 GWh

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Mechanisms to support the purchase and investment of biogas will probably continue to grow the Finnish market, which remains rather limited. At the same time, the increase in demand through the setting up of biofuel quotas could encourage producers to favor purification at the HPCs.

Regulations

Finland

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Number of plants evolution

- Feed-in-tariffs are applied since March 2011 but only for electricity production.
- Ambitious biofuels quotas set at 20% in 2020 and 40% for 2030 could boost demand for biomethane fuel.
- Investment subsidies to biogas plants up to 30% of the acceptable investment costs paid by the Ministry of Employment and Economy.
  - Biomethane installations are exempted of energy and CO2 taxes.



France

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Existing feedstocks

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Injected volume 2018

714 GWh

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Faced with the impressive growth of the sector and the cost of the Feed-in-Tariffs, the public authorities are now moving towards a tendering system that would limit the amounts injected into the sector. This new mechanism aims to encourage the producers which are now more mature to reduce their costs.

#### Regulations

- Support by GRDs and TSOs of 40% of connection costs to the distribution network.
- Price for the purchase of biomethane injected into the network is granted to producers for 15-year contracts at around € 95 / MWh.
- The valuation of Guarantees of Origin is fully preserved for the biomethane used for mobility.
- Subsidies are granted by ADEME and local aid for the financing of anaerobic digestion projects.
- Biomethane installations are exempted of Internal Tax from Natural Gas Consumption



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Italy

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**Existing feedstocks** 

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Injected volume 2018

100 GWh

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In March 2018, the government adopted a ministerial decree promoting the development of biomethane. This text gives new impetus to the Italian biomethane sector, which is likely to increase significantly over the 2018-2022 period: 23 contracts and 900 preliminary connection requests are already pending.

#### Regulations

- 20% reduction of connection costs for biomethane facilities.
- A bonus for the acquisition of CICs (production certificate) for "advanced" biomethane of around 61€/MWh.
- A system of biofuel quotas and certificates has been put in place, setting a biomethane integration rate for suppliers: 0.6% in 2019.
- Biomethane producers produce Guarantees of Origin that can be sold to comply with emission guotas.
- Additional CICs are generated when biomethane distribution facilities are installed.





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Existing feedstocks Support mechanisms Injected

Injected volume 2017 120 GWh

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The Norwegian industry takes off with difficulty despite the proposed investment aid. This is due to a lack of a national guideline and a biomethane fuel demand stimulation system as implemented in its northern neighbours.

Regulations

Norway



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 Investment subsidies are granted by about 30% and are set by the EEA (The European Economic Area Agreement).

- These grants can reach up to 50% for pilot projects or research projects.
- Biogas upgraded in biomethane for fuel use is exempted of taxes.





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### The Netherlands

**Existing feedstocks** 

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the gas grid

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Injected volume 2018

1,1 TWh

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The sector is growing steadily and consists of large capacity units. The balance reached in the support schemes should encourage the production of biomethane, which is increasingly demanded for mobility uses and requires imports.

#### Regulations

- Feed-in-Tariff is set for production of electricity, gas and renewable heat (biogas and biomethane).
- Guarantees of Origin for biomethane can be valued on the market as a complementary source of income.

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- A 10% biofuel quota is set for the transport sector and a minimum sales requirement is imposed on the country's suppliers.
- A 150 million € aid fund is reserved for small capacity units.
- Up to 36% tax exemption for investments related to a biogas facility.



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**Injected volume 2017** 

4,13 TWh

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After experiencing one of the fastest growth rates in Europe, the British biomethane sector seems to be slowing down. A shift in energy policy direction may limit supports to the biogas sector from 2019 and could stimulate the return of biomethane development for heat and mobility uses.

#### Regulations

Renewable Heat Incentive: 20-year guaranteed revenues for biogas combustion and biomethane injection.

- Electricity feed-in tariffs will end in 2019. ٠
- Recoverable Certificates of Origin certify the origin of the injected biomethane.

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- Renewable Transport Fuel Obligation: requirements for fuel suppliers to incorporate a share of renewable fuel (including biomethane).
- Exemption from climate change tax for heat and electricity (including biogas and biomethane).



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#### Source : Analysis Sia Partners based on NNFCC, IEA, GIE & EBA

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Sweden, a precursor of biomethane in Europe, is now experiencing rather weak growth. The support mechanisms are mainly focused on boosting demand for biomethane fuel and are mostly ending in 2019/2020. Industrialists are advocating in parallel for ambitious goals such as 100% biomethane in the networks by 2050.



- Local support allocated for all investments contributing to the reduction of greenhouse gases.
- Exemption from CO2 and energy tax for biomethane producers used as fuel until the end of 2020.
- 40% reduction in income tax for the use of company NGV until the end of 2019.
- The tax exemption for green vehicles is being replaced by a bonus / malus system favoring electric vehicles.







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**Injected volume 2017** 

341 GWh

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Organic waste installations, supported by Feedin Tariffs, as well as production from sewage sludge plants are still experiencing growth in Switzerland. The new contracts with Feed-in-Tariffs are ending in 2022, which could result in a significant number of requests over the coming 3 years

Switzerland



- Only plants based on agricultural and industrial waste are available to receive Feed-in-Tariffs. However, the period to apply to those tariffs terminates in 2022, the tariffs already awarded have a 15 year life span.
- Guarantees of origin are labeled « Naturmade » and can also be traded in Germany.
- Plants based on household waste or sewage sludge can still benefit from subsidies up to a maximum of 20% of initial CAPEX.





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# 3 — Contacts



# About France Biométhane, the think tank dedicated to biomethane

#### Goals :

The think tank aims to make the biomethane produced by anaerobic digestion known and show its important role in the energy transition.

It offers a pedagogical approach to the aspects of biomethane and intervenes in the public and political debate. Its purpose is to promote methanization as a solution for environmental protection and biomethane as green energy to national decision-makers. The think tank also capitalizes on the know-how of precursor countries and brings together business partners.

#### **Operations :**

France Biométhane aims to accelerate societal acceptance and the image of biomethane. Cédric de Saint Jouan served as president for more than two years. Today, Pierre de Froidefond, founder of Cap Vert Energie, and Alain Planchot, president of Evergaz, hold the presidency of the think tank.

They are surrounded by the following members of the Bureau: Aurélien Lugardon (Naskeo), Frédéric Flipo (Evergaz), Arnaud Bossis (CVE), Philippe Spannagel (Naskeo), Fabien Haas (Fonroche) and Frédéric Terrisse (Engie Biogaz).

Experts, professors, researchers, academics, industrialists, technicians and financiers, like **Philippe Chalmin, professor at Dauphine,** economist and specialist of raw materials, Denis Clodic, co-winner of the Nobel Peace Prize 2007, are part of this think tank initiated by Cédric de Saint Jouan, renewable energy expert and president of the Vol-V group.

Sia Partners, represented by Charlotte de Lorgeril, Partner Energy, Utilities & Environment, and Antoine Fontaine, Senior Consultant, are responsible for the biomethane observatory. Among its founders are Banque Populaire d'Atlantique, an expert in this sector, Hervé Lucas, co-founder of Cap Vert Energie, Jacques-Pierre Quaak, representing the Association of French Farmer Farmers (AAMF), representatives GRTgaz and GRDF.



# The biomethane observatory

# Word from Sia Partners, represented by Charlotte de Lorgeril, Associate Partner Energy, Utilities & Environment, and Antoine Fontaine, Senior Consultant :

"This observatory emerges from a desire to provide reliable data and analysis on a little known sector which is often considered too technical. It is directed at both the general public and expert populations. As a part of the think tank's approach, its mission is to promote biomethane to create a sector of excellence that generates jobs. Sia Partners, an independent consulting firm, will provide raw data on the state of the industry, with calculated indicators and trends allowing simple comparisons with known mechanisms. Technological and regulatory frames can be treated as well as country comparisons. At the launch of the observatory, we will propose around fifteen indicators that will be enriched through the years. All the contents will be available and accessible for free on the France Biométhane website and Sia Partners' energy blog »

### Goals :

The first edition of the observatory was launched in March 2016, through the website http://france-biomethane.fr/.

Its objective is to provide analysis and indicators on the biomethane sector in order to inform the public debate, in particular on the following aspects :

- · Elements of language
- Rates and methanogenic power
- · State of the industry in France and Europe
- Development prospects
- Mobility & Biomethane Fuel

### Méthode :

The method used is based on public data from industry players, professional organizations and public authorities, supplemented by the expertise of the think tank and Sia Partners. The indicators are calculated, estimated and analyzed by Sia Partners independently. In case of estimation, the hypothesis will all be presented.

All data and indicators are updated over the news and downloadable for free on the website of France Biométhane (<u>http://france-biomethane.fr/</u>) and the Energy Blog of Sia Partners (<u>http://www.energie.sia-partners.com/</u>).



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