

MAY 2020

BIOMETHANE OBSERVATORY

*General overview of the biomethane sector in
France*

siapartners

Pioneer of Consulting 4.0



Executive Summary

General overview

The number of units installed has risen dramatically since the introduction of feed-in tariff in 2011. This upward trend continues in 2019 with **47 new injection sites**, which represent a **62% increase** compared to 2018. The French industry is now the most dynamic one in Europe. With a total **injection capacity of 2.5 TWh/year**, the **139 units** are essentially autonomous agricultural installations with relatively low capacity and injecting biomethane into the distribution grids.

Future prospects

The number of projects with reserved injection capacity has increased sharply, reaching **1,134 registered projects for a total capacity of 25 TWhf/year**. On the demand side, the number of vehicles running on CNG¹ and filling stations distributing bio-CNG has continued to rise, but **it is now biomethane used for heat that represents the major part of the Guarantees of Origin market**, especially the green gas offers for the residential-tertiary sector.

Revision of the objectives of the PPE (Programmation Pluriannuelle de l'Énergie)

As expected, **the new PPE, published on April 23, 2020, has scaled down** the ambitions of development for the biomethane sector. Public authorities have set a range **from 14 TWh to 22 TWh injected in 2028**. Feed-in tariffs will evolve towards of a **tendering system** with a targeted feed-in tariffs of 75 €/MWh in 2023, then 60 €/MWh in 2028.

Impact of the coronavirus crisis

The current crisis and containment measures will certainly have **an impact on the development of the sector**: the installations of all levels of maturity have been affected, the implementation of **some projects may be postponed and production may decrease**. To limit these effects, the government has announced 2 main measures: **additional delays** granted to ongoing projects for their implementation as well as a **suspension of purchase contracts** for struggling producers.

Summary

1. Language elements
2. General overview of biomethane
3. Regulations and perspectives
4. Your contacts

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Language elements



Biomethane and its advantages

- **Biomethane** is a renewable gas produced essentially **from organic waste**.
- Today it is obtained by **biogas upgrading** to achieve the same properties as natural gas.
- Biomethane can therefore be **injected into the gas grid**.
- This renewable gas can then be used for the same purposes as gas: heating, cooking, industrial processes, etc. |
- It can also be upgraded to NGV (Natural Gas Vehicle), it is referred as Bio-NGV or **Biomethane fuel**.

The advantages of biomethane in figures

3.2

M. Tonnes
of waste

Waste recovery

3.2 million tonnes of waste were recovered in 2018, a third of which comes from household waste and another third from WWTP¹ sludge.

30

gCO₂ eq
/km

Decarbonization of transport

Bio-NGV “well to wheel” emissions amounts to 30g CO₂ eq/km, while for gasoline, they reach 190 and for electric motorization, 40.

- 50%

chemical
fertilizer

Organic fertilizer production

The digestate from anaerobic digestion is an excellent fertilizer and can reduce the farmers’ consumption of chemical fertilizers.

3 to 4

jobs

Job creation

The biomethane production industry creates between 3 and 4 local jobs per plant that cannot be relocated.

23

gCO₂ eq
/kWh

Decarbonization of the gas mix

1 kWh PCI of biomethane produced, injected into the grid and consumed in residential or tertiary use emits 23.4 gCO₂ eq/kWh, approximately 10 times less than natural gas.

- 95%

fine
particles

Reduction of local pollutants

In addition to reducing noise and odor nuisance, bio-NGV reduces fine particle emissions by 95% and nitrogen oxides by 70% compared to the Euro VI standard.

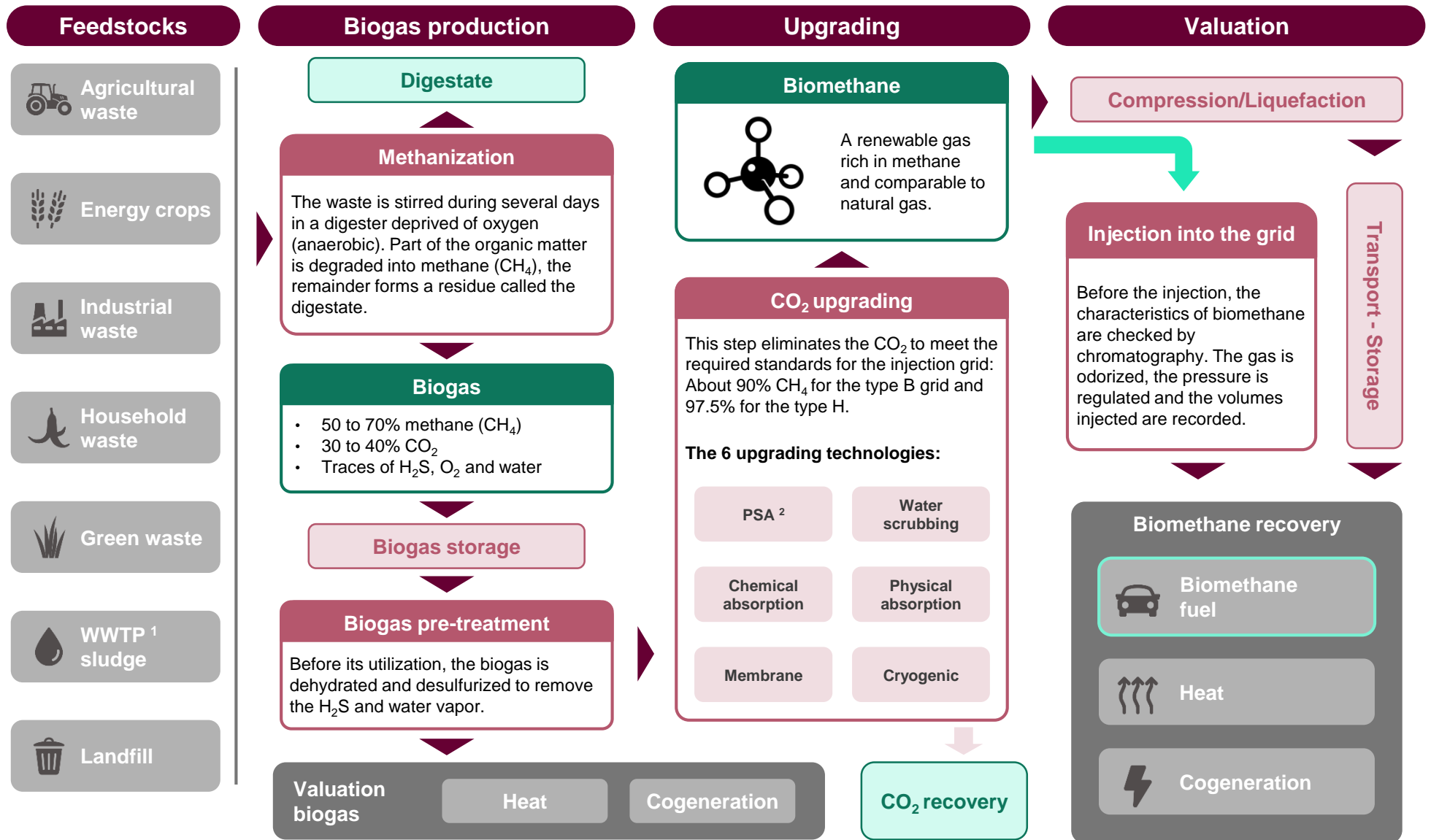
Sources: 2018 renewable gas overview, Web-agri, GRDF and AFGNV

Language elements

Biomethane production in France

¹ WWTP: Wastewater treatment plant

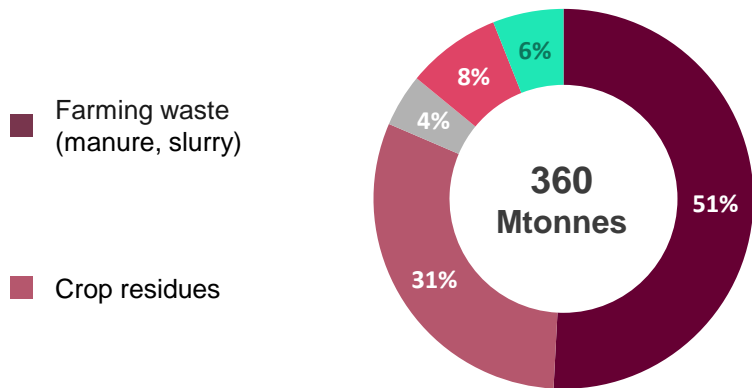
² PSA: Pressure Swing Adsorption



Language elements

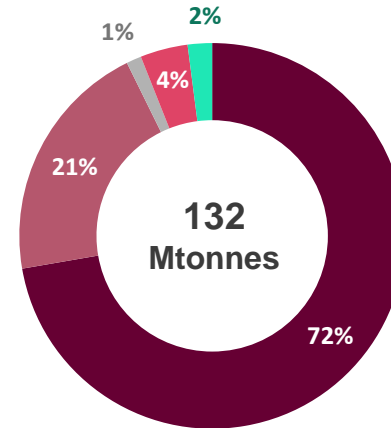
The potential for biomethane in France

¹ WWTP: Wastewater treatment plant
 Source: Sia Partners analysis according to Ademe study April 2013

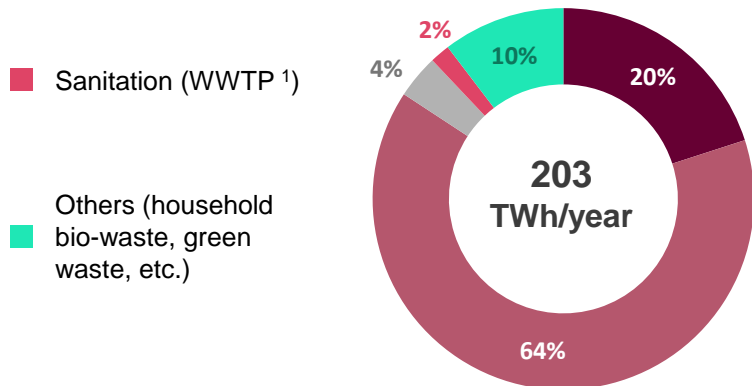


Gross potential deposit

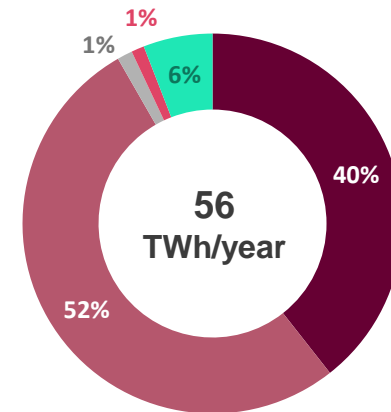
Mass in Mtonnes



Mobilizable deposits in 2030



Energy in TWh



The methanogenic potential of the feedstocks is heterogeneous

The methanogenic potential of a substrate reflects its ability to produce methane during the methanization process.

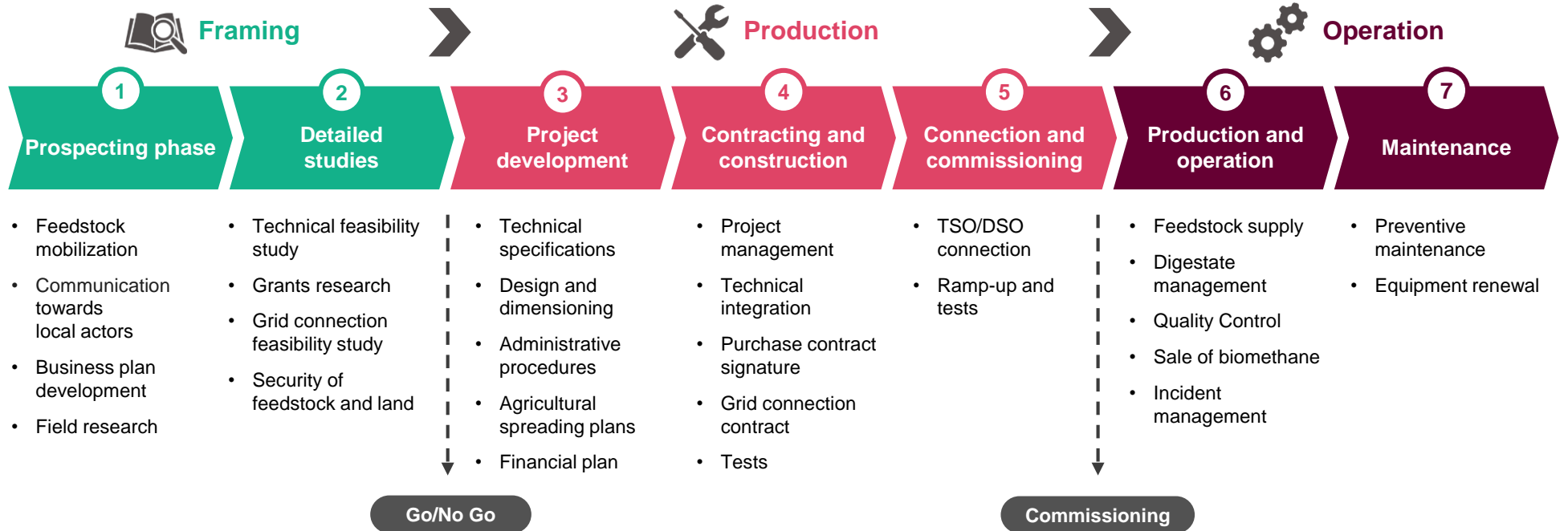
This figure varies considerably depending on the type or the quality of the feedstocks. It can reach more than 350 m³ of biomethane produced for a tonne of raw material of rapeseed meal.

This property explains the relative differences between the masses of available material and the energy potentials of the different types of feedstocks.

By 2030, the mobilizable fraction of the methanizable gross potential deposit is estimated at 132 million tonnes for 56 TWh/year. Mainly based on agricultural resources, this technical potential should be compared to the national objectives for 2030 - between 21 and 30 TWh of biomethane injected into the gas grids.

Language elements

A typical biogas project



Different actors are involved in a biogas project



Language elements

The Guarantees of Origin market

- A **Guarantee of Origin (GO)** is an electronic certificate that guarantees the traceability of biomethane once it is injected into the gas grid.
- Each **MWh** produced and injected provides a **GO** to the gas supplier that has concluded a purchase contract with the producer of this MWh.
- **Suppliers** may exchange GOs, before **valuing them through an offer for the end consumer according to their use** (fuel, residential, industrial, others).

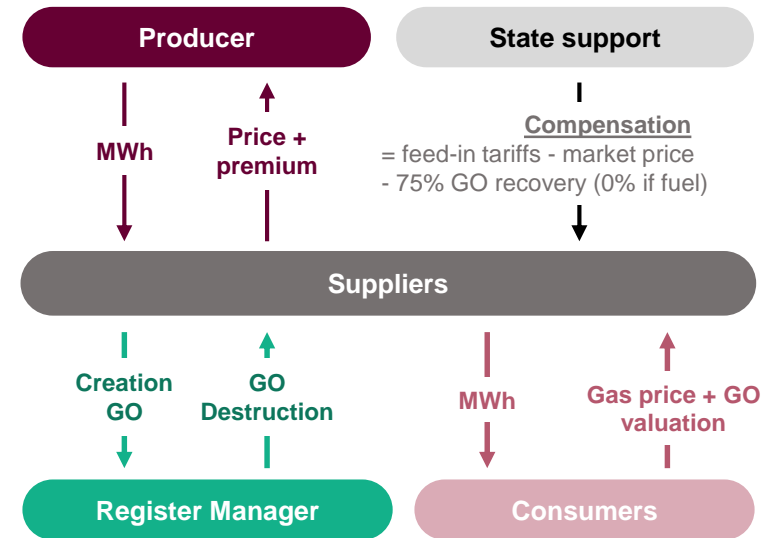
The system of Guarantees of Origin operates over the counter: gas suppliers sign a contract directly with biomethane producers: one MWh is purchased at the regulatory feed-in tariffs (giving access to a compensation compared to the market price of natural gas), to which a premium for Guarantees of Origins is added and then valued in a green gas or bio-NGV offer.



In the case of heating purposes, 75% of the value of the GO is transferred to the compensation fund of the Caisse des Dépôts et Consignation that funds the National Energy Transition Account, and in particular the feed-in tariffs for biomethane.

For vehicle fuel use, the supplier keeps 100% of the valuation of the GO.

The national register of Guarantees of Origin is recorded by GRDF under a 5-year public service delegation, renewed in 2018.



The Guarantees of Origin connects the production (supply) and the consumption (demand) of biomethane by clearly marking out heating et vehicle fuel uses. The current system (over-the-counter contracting) is under revision: the Climate Energy law of 2019 provides for the pre-emption of the Guarantees of Origin by the State and their auctioning from November 2020.

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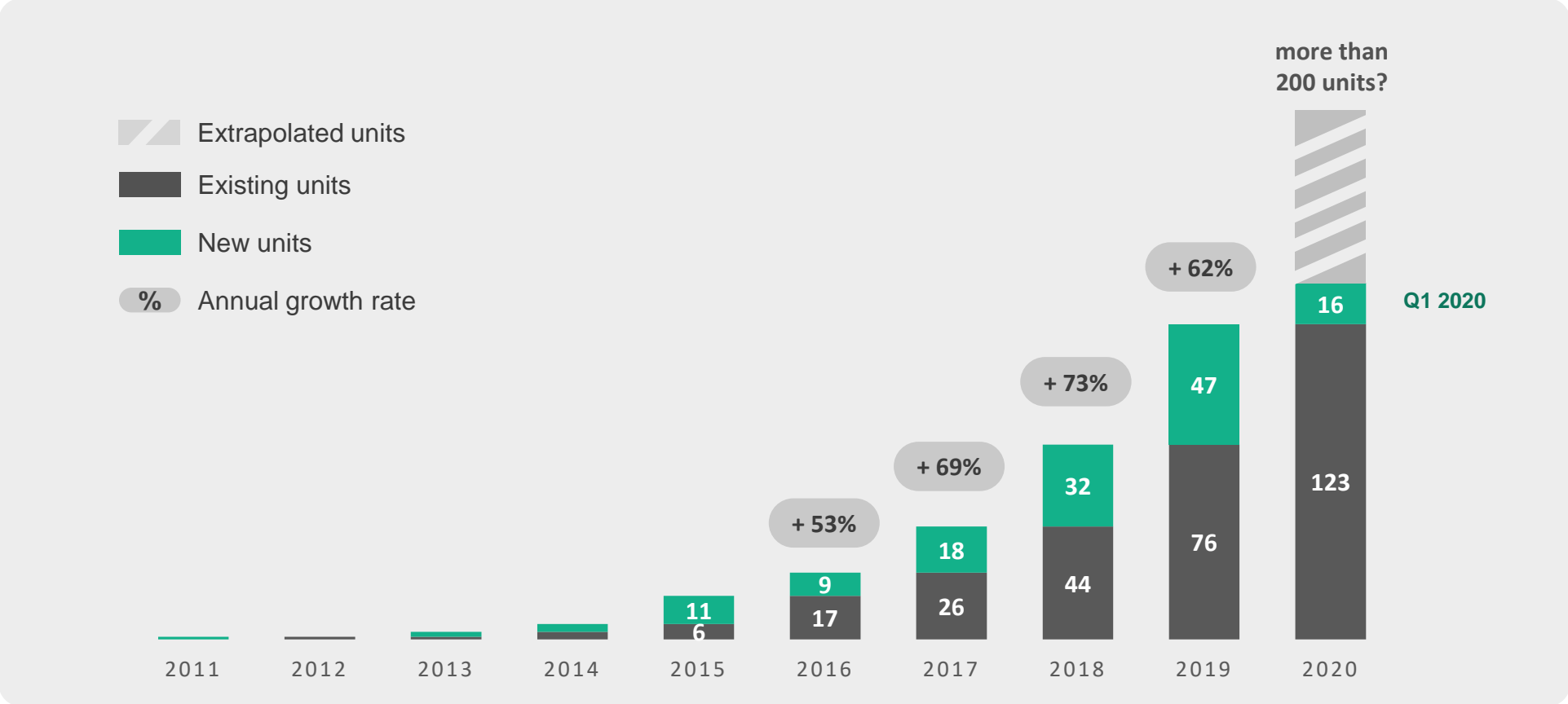
General overview of biomethane



General overview of biomethane

Evolution of the number of biomethane injection units

Source: Open Data Réseaux Energies, Sia Partners analysis

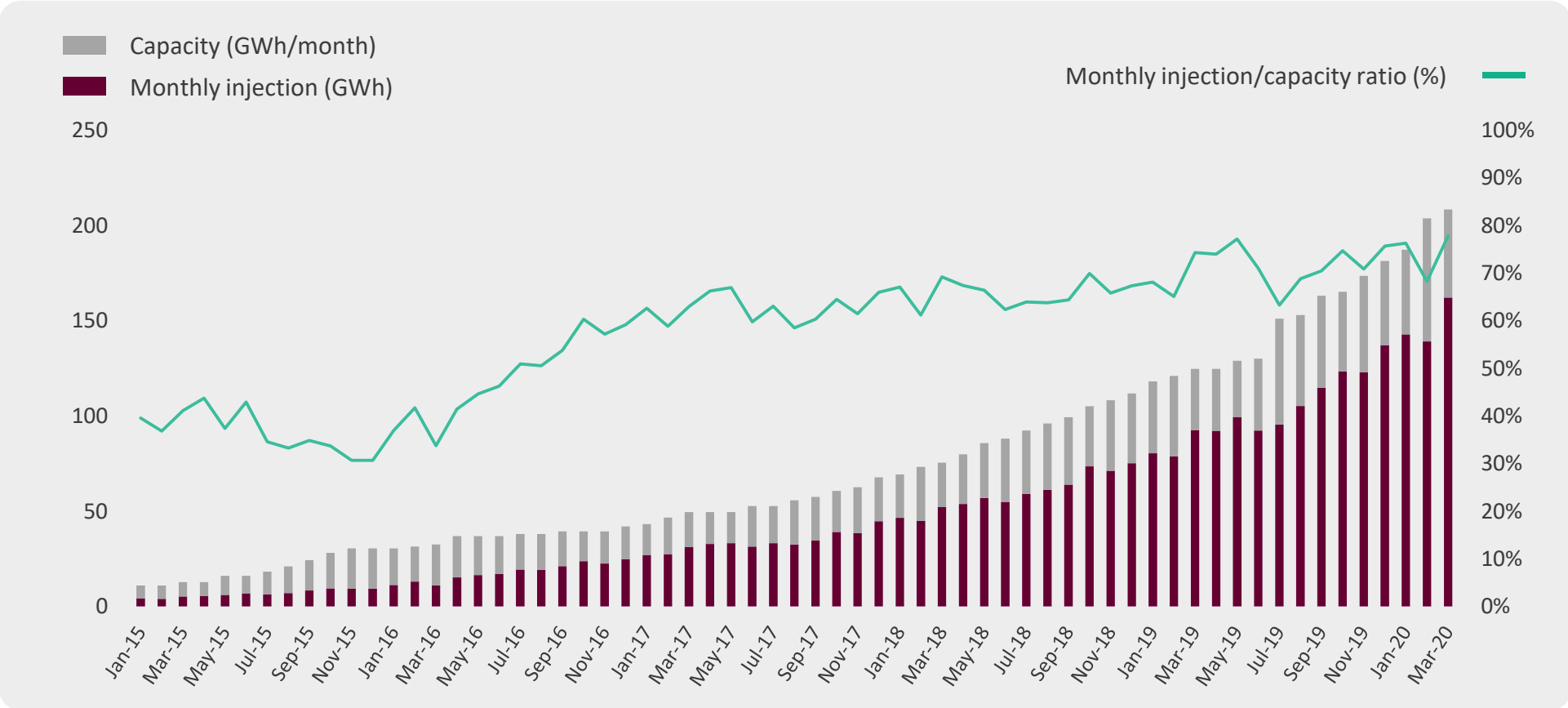


With 123 units in service at the end of 2019, the growth in the biomethane sector still goes up. Assuming this dynamics continues, the total number of units could exceed 200 units at the end of 2020. However, the coronavirus crisis has already considerably slowed down the ongoing projects, and a sharp decline in the upward trend can be expected for 2020.

General overview of biomethane

Evolution of injection capacity and monthly production

Source: Open Data Réseaux Energies, Sia Partners analysis

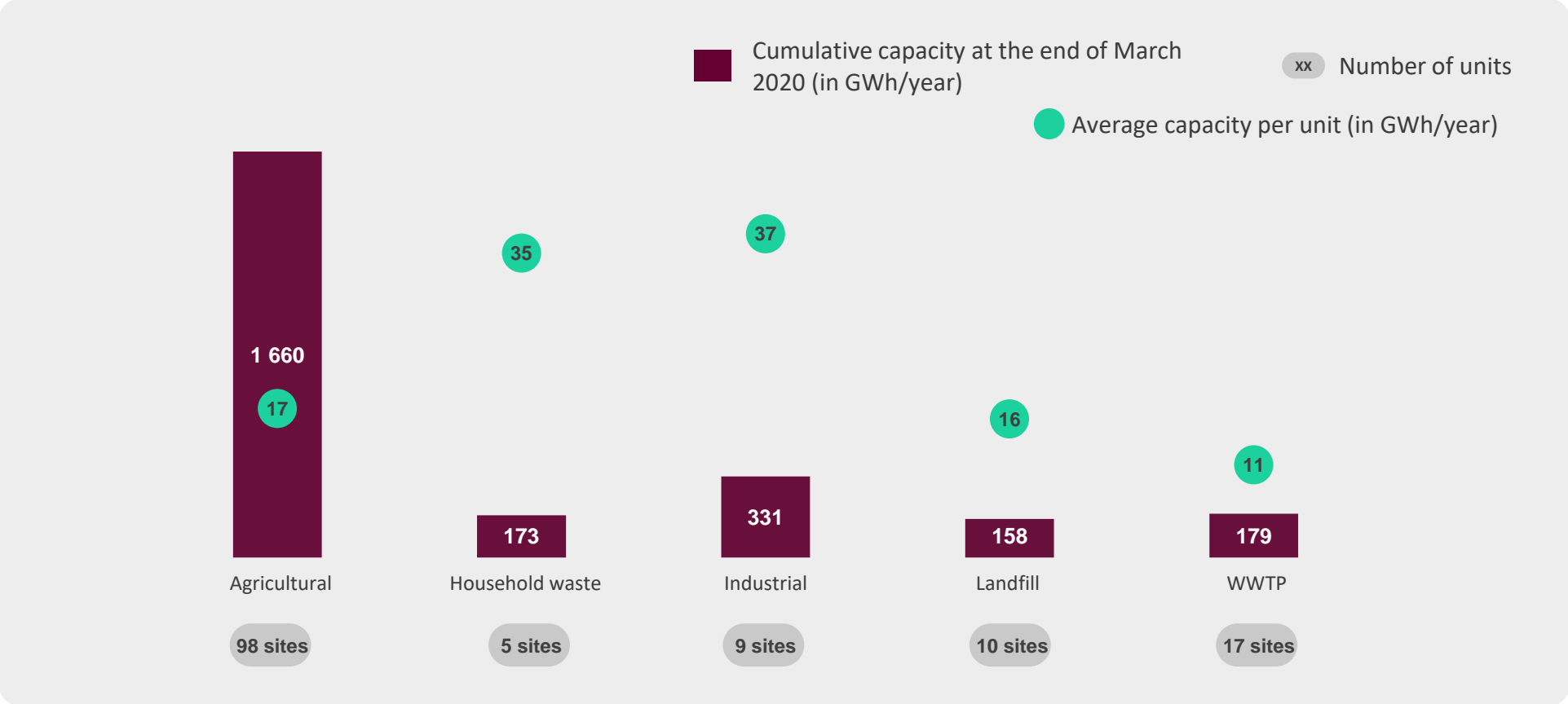


The units installed reached a capacity of 2.2 TWh/year at the end of 2019 among which 1.2 TWh have been injected in 2019. The ratio between the volumes of energy injected and the capacity illustrates the rapid growth of the sector: the units installed require a time of "ramp -up" before producing nominally, generating a delay of the injection over the capacity.

General overview of biomethane

Number of units and production capacity by type of installation

Source: Open Data Réseaux Energies, Sia Partners analysis

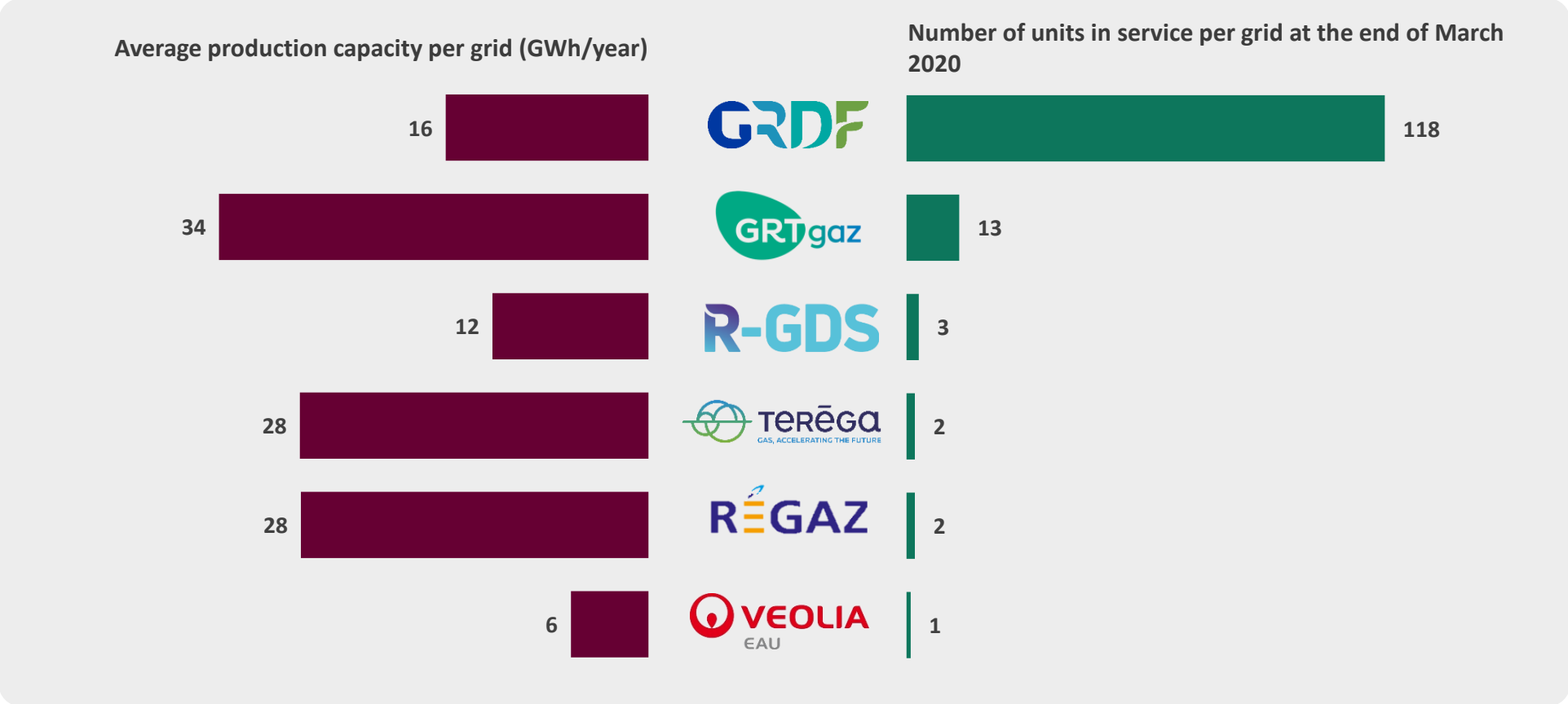


The French biogas plants are mainly composed of agricultural units of low to medium capacity compared to other European countries. Not only has the agricultural sector the largest feedstock capacity that can be mobilized, but it also benefits from a feed-in tariffs with favourable specific premiums. This trend reflects the orientation of the national biomethane policy that supports the development of the agricultural sector.

General overview of biomethane

Analysis of connection operators

Source: Open Data Réseaux Energies, Sia Partners analysis

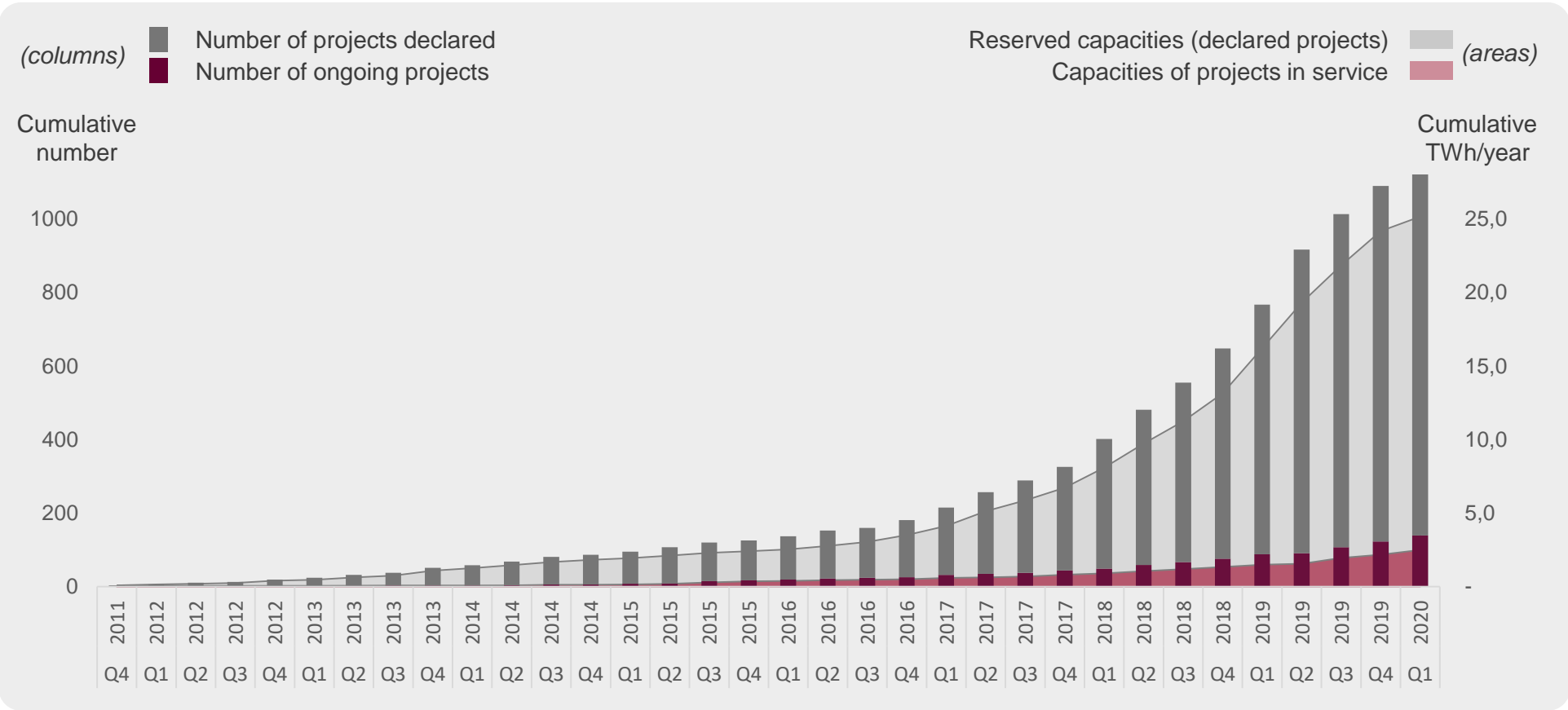


The vast majority of units injects into the GRDF distribution grid. This breakdown is mainly explained by the area covered respectively by each grid for the same connection cost (around 1000€/linear meter for high-pressure transport grids in steel, compared to around 100€/linear meter for low pressure distribution in polyethylene).

General overview of biomethane

Evolution of the number and capacity of projects recorded in the capacity register (declared and ongoing projects)

Source: Open Data Réseaux Energies, Sia Partners analysis

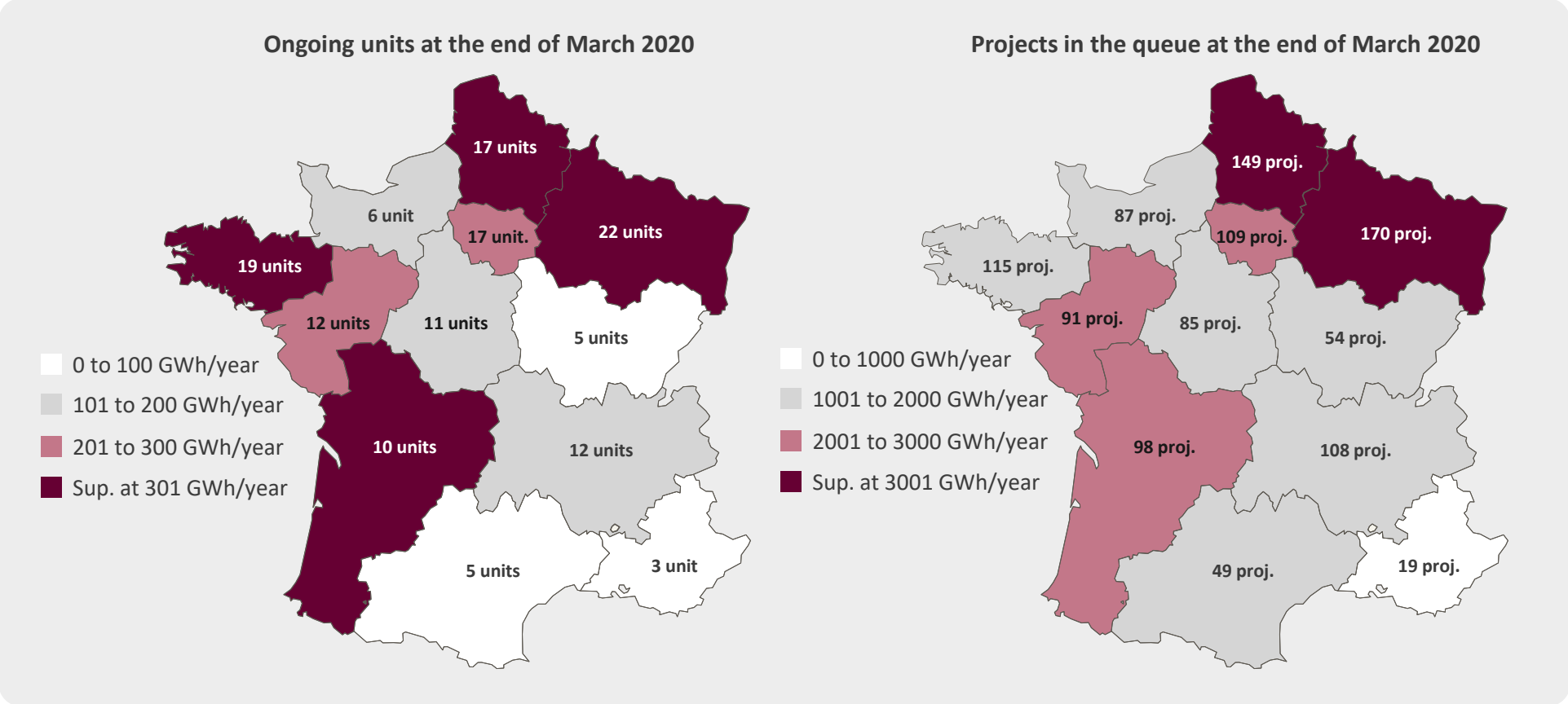


The thousand projects declared at the end of March 2020 suggests a significant wave of installations in the coming years. After two years of massive capacity reservations (more than 10 TWh), the slowdown in the number of new projects is the first sign of a stabilization of the sector and of its response to public policies (PPE, feed-in tariffs, Guarantees of Origins).

General overview of biomethane

Number of units and projects pending by region

Source: Open Data Réseaux Energies, Sia Partners analysis

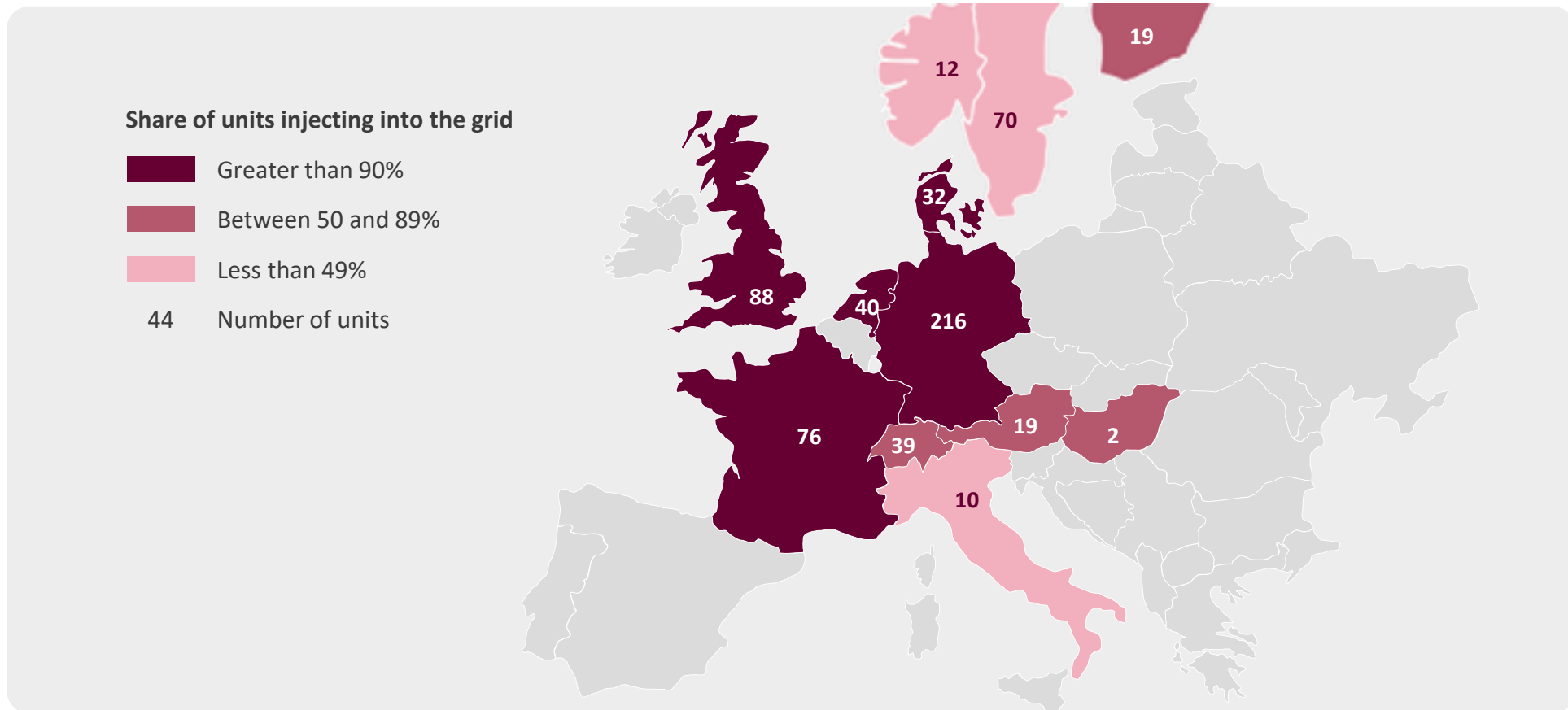


Most regions have experienced fast growth, especially in the Grand-Est, Hauts-de-France, Ile-de-France and Nouvelle-Aquitaine regions. These territorial dynamics are the results of the feedstock capacities of the regions (agricultural and industrial), the topology of the gas grids and local policies.

General overview of biomethane

Number of units of the main producers in Europe at the end of 2018

Source: Sia Partners publication (2019): Biomethane European Benchmark (data at end 2018)

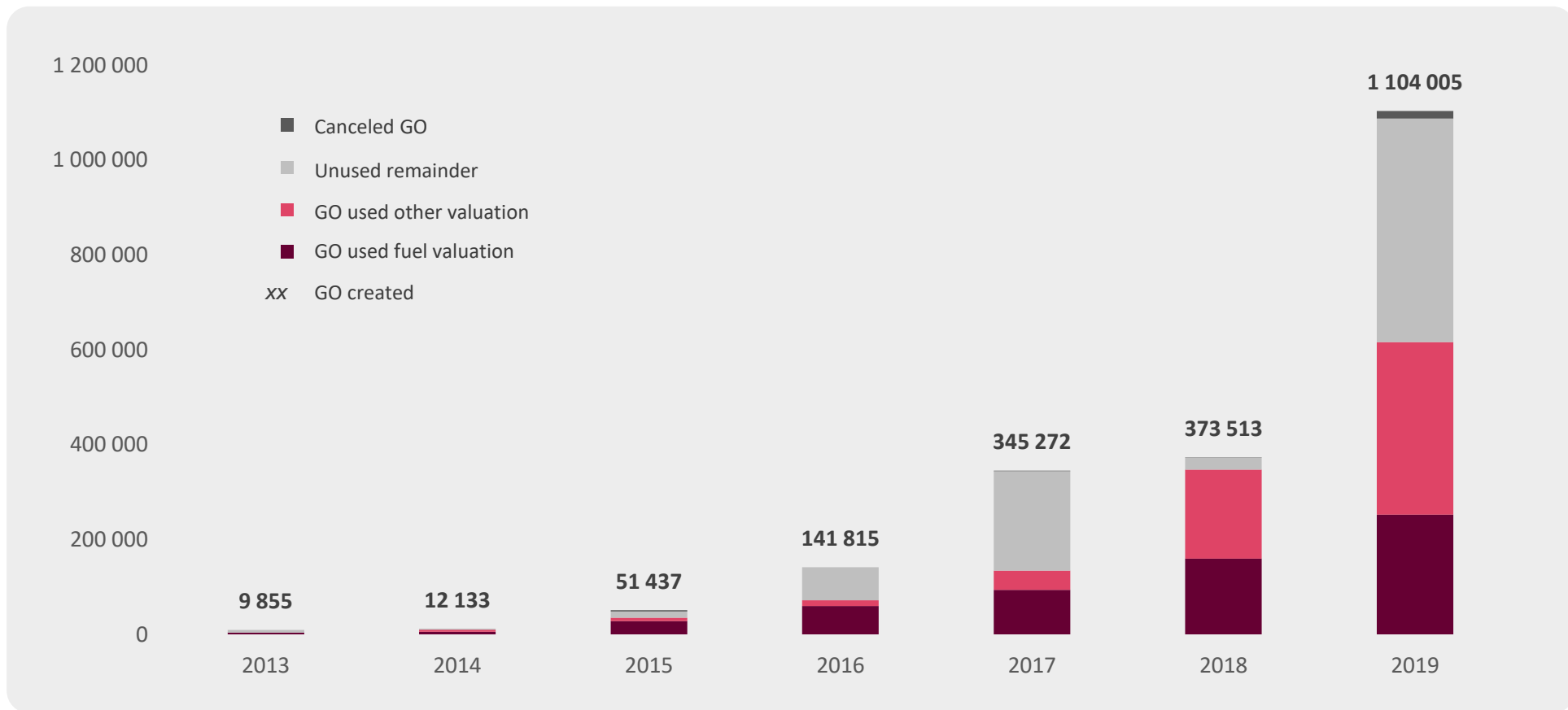


In 2018, France was the 3rd European producer of biomethane in terms of the number of units installed but the country is ranked 6th in terms of capacity due to the predominance of autonomous agricultural installations in the distribution. The share of units injecting into the grid reflects the government policies regarding biomethane as well as the level of development of the gas grid.

General overview of biomethane

Evolution of the number of Guarantees of Origin

Source: GRDF, Register of Biomethane Guarantees of Origin

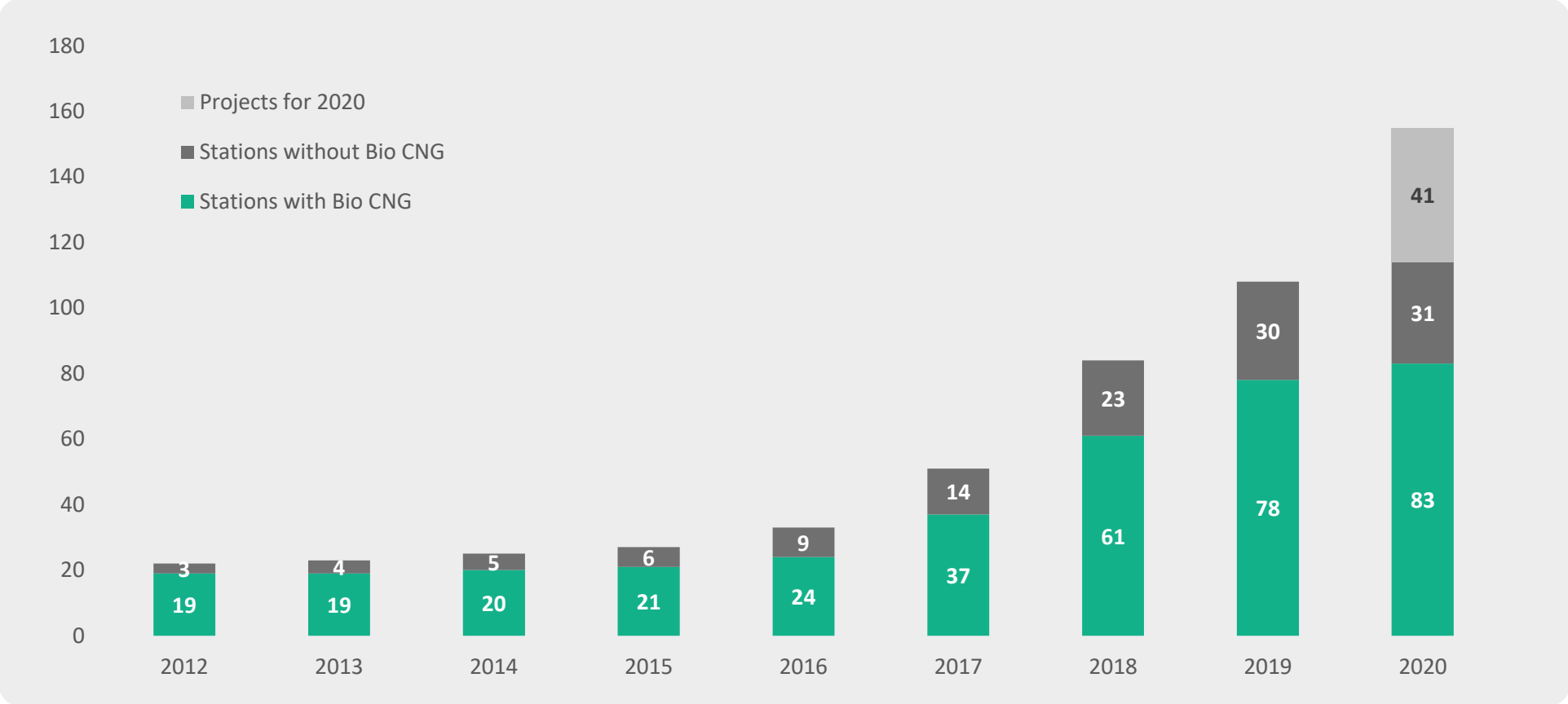


95 of the 123 units in service at the end of 2019 were recorded in the Guarantees of Origin register. In 2019, the 1.1 M of GO created have accounted for 89% of the biomethane injected on the grid (1 GO = 1 MWh). 2019 is a capital year for Guarantees of Origin: the number of GOs used has increased by 77% and the GOs created have been multiplied by 3. The question now is: will the biomethane demand follow this trend in 2020 ?

General overview of biomethane

Evolution of number of CNG distribution stations

Source: AFGNV, Open Data Réseaux Energies

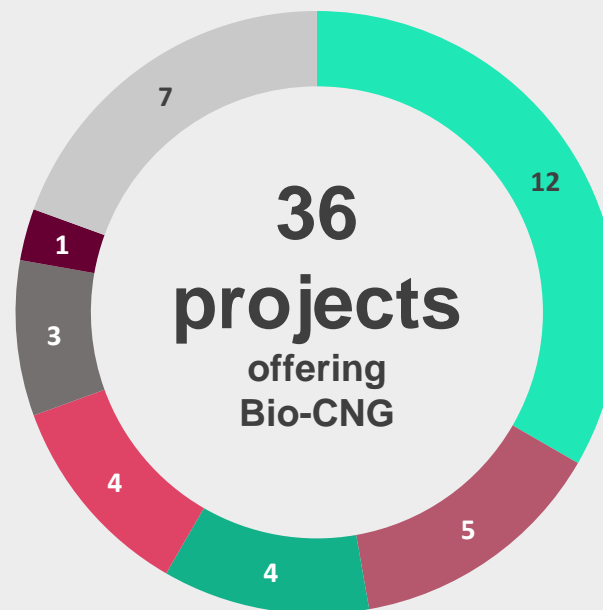
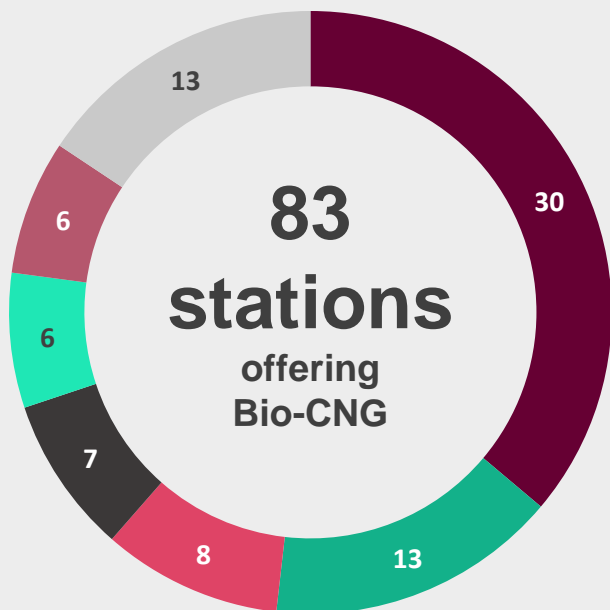


The new PPE adopted in April 2020 sets a target of between 140 and 360 stations distributing CNG in 2023, and between 330 and 840 stations in 2028. The text plans to amend the legislative system to facilitate the deployment of stations. A new AFGNV scenario plans to reach 1,700 stations in 2035 (410 stations in 2023 and 910 in 2028) for an overall investment cost estimated at 1.2 billion euros.

General overview of biomethane

Operators on stations and projects offering Bio-CNG

Source: AFGNV, Open Data Réseaux Energies



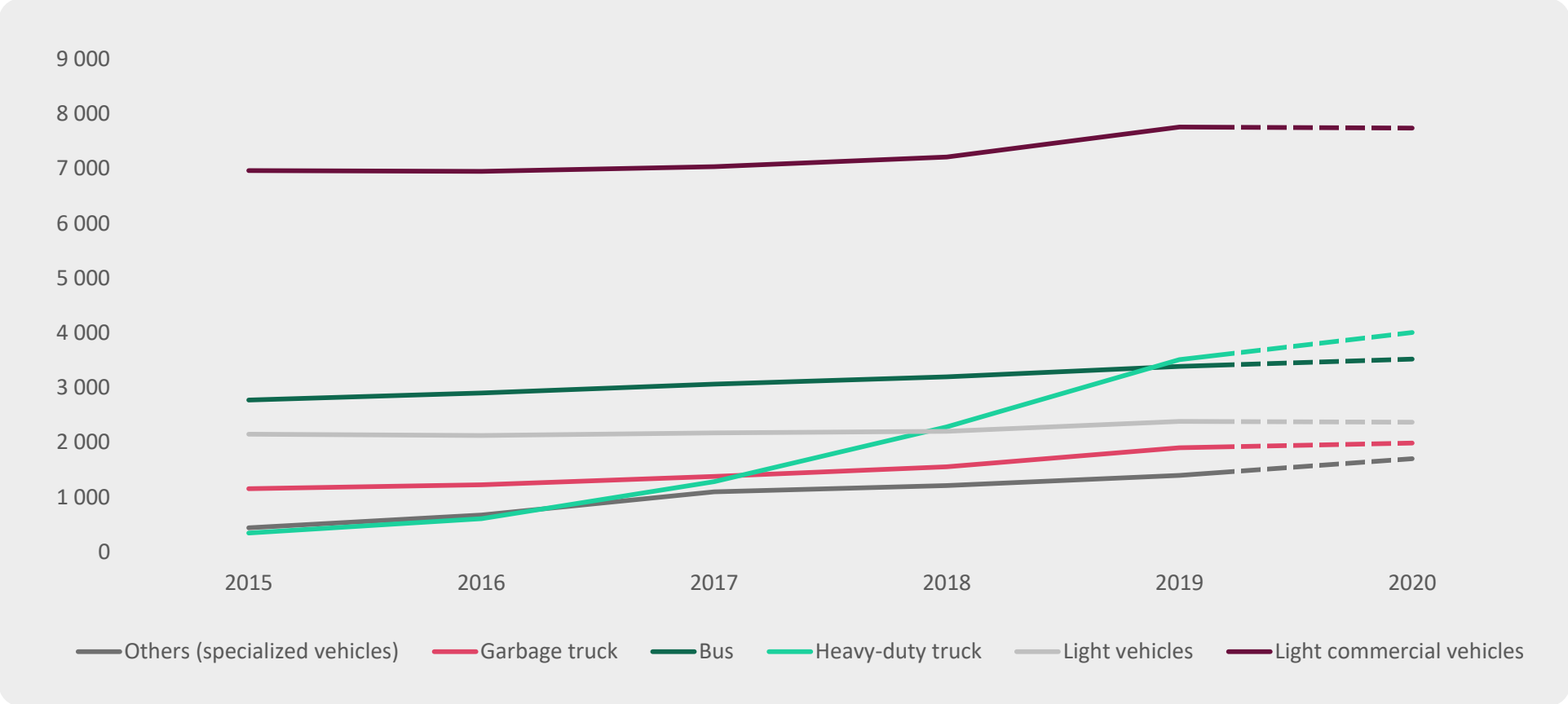
GNVert Liquid air AS24 Endesa Total Proviridis/Vgas Avia-Primagaz Other

GNVert, a subsidiary of Engie, is the main operator of stations with Bio-CNG in the country. The emerging market is predominantly supported by large French companies and includes few "pure players" like Proviridis. With 36 projects offering Bio-CNG for 2021 the momentum remains fairly moderate and could be slowed down by the coronavirus crisis which has a severe impact on the economic balance of the stations.

General overview of biomethane

Evolution of the number of NGV vehicles

Source: AFGNV, Open Data Réseaux Energies



In February 2020, 21,500 vehicles were running on NGV in France. The dynamics have been mainly driven by heavy-duty vehicles, which are supported by an additional depreciation system on purchase and by professional utility vehicle fleets. The number of city buses and garbage trucks introduced ten years ago to tackle air quality issues in the city, has increased slightly.

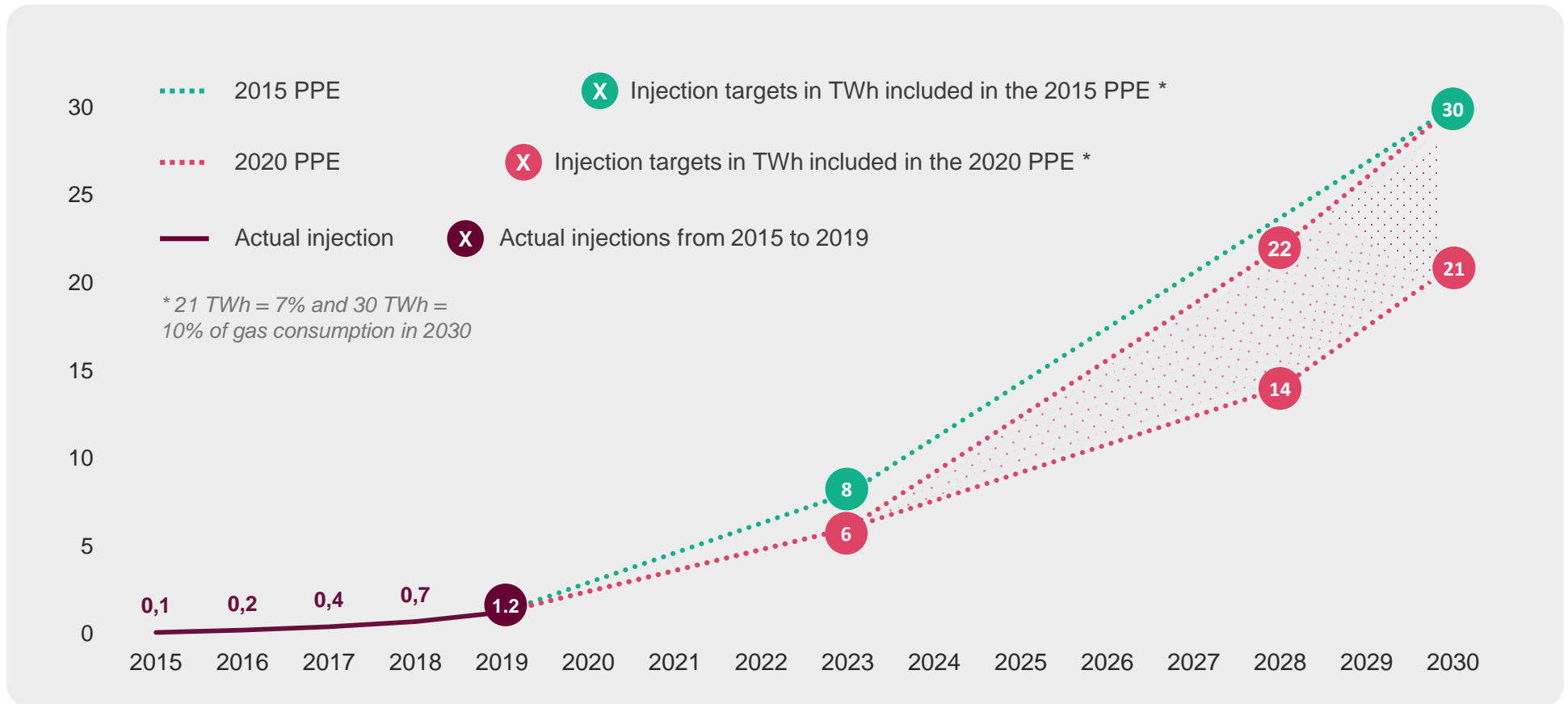
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Regulations and perspectives



Regulations and perspectives

Revised objectives from the Programmation Pluriannuelle de l'Énergie (PPE) published in April 2020



In the new PPE published in the Official Journal on April 23, 2020, the public authorities have scaled down the development ambitions of the biomethane sector. By 2028, a range of 14 to 22 TWh/year is set as a target, with lower production costs as an adjustment variable. This decision combined with the coronavirus crisis could impact the number of projects implemented in the coming years.




Regulations and perspectives

Evolution of feed-in tariffs

Since 2011, an open counter system exists for biomethane units. **All projects connected to the gas grid can benefit from feed-in tariffs at a guaranteed price level for their production** (around **100€/MWh**, adjusted according to the feedstocks and the size of the project). In this system, there is no limit to the number of installations per year.

The new text of the PPE (April 2020) provides **a revision of the level of the biomethane feed-in tariffs accompanied by the implementation of a system of tenders**, in which the winners will benefit from feed-in tariffs at the price indicated in their offer. These half-yearly bid solicitations would cover 350 GWh, or approximately 20 units of 200 Nm³/h (average size of an installation in France). For the smallest units, the open counter could still be available depending on the amounts mobilized by the calls for tenders. **The implementation in practice of this new feed-in tariffs (by decree) is expected for 2020.**

Example of tariff evolution for 3 biomethane installations of different typologies and sizes

Unit types	Feed-in tariffs in open counter (in force since 2011)	Feed-in tariffs allocated by calls for tenders or Open counter for small installations
 Agricultural methanization 100 Nm unit ³ /h (~ 9 GWh/year)	123 €/MWh	PPE target costs 2023: 75 €/MWh 2028: 60 €/MWh Maximum feed-in tariffs 2023: 90 €/MWh 2028: 80 €/MWh
 Agricultural methanization 200 Nm unit ³ /h (~ 18 GWh/year)	101 €/MWh	Precision expected by decree (to come up): <ul style="list-style-type: none">• Level of the feed-in tariffs in an open counter system by sector (agricultural, STEP, Landfill)• Potential premiums for feedstocks• Practical procedures for calls for tenders• Threshold between open counter and calls for tenders
 Landfill methanization 300 Nm unit ³ /h (~ 27 GWh/year)	77 €/MWh	

The regulations will evolve towards a tendering system which will encourage the sector to lower its costs. The new feed-in tariffs will help managing the public envelope supporting biomethane (a budget of 9.7 billion € announced by 2028 in the PPE).

Regulations and perspectives

Impacts of the coronavirus crisis on the biomethane sector and national measures

Impacts identified at all levels



Development phase: delays to be expected on land formalities, environmental impact studies or the examination of requests for administrative authorizations.



Construction phase: delays on construction sites due to the slowdown in the activities of subcontractors or suppliers. An increase in construction costs associated with these delays: site security, guarding services, storage of equipment, etc.



Connection: the essential activities referred as “degree 0” mainly aim at ensuring the continuity of production and gas supply. In this context the connections of new units could be postponed.



Operation: a drop in the supply of bio-waste due to the closure of restaurants and slowdown in transport activities. This lack of consistency may result in difficulties for certain producers to meet the injection plans.

Government measures to help the sector



Status of anaerobic digestion activities: agriculture and sewage treatment plants are considered essential, however for household waste, incineration would have priority over biological treatments.



Normally, commissioning must take place within 3 years after signing the biomethane purchase contract. Following the announcement of the Minister for Ecological Transition, **an additional period will be granted for the commissioning of the sites in construction.**



A temporary suspension of purchase contracts for installations which has encountered trouble in production

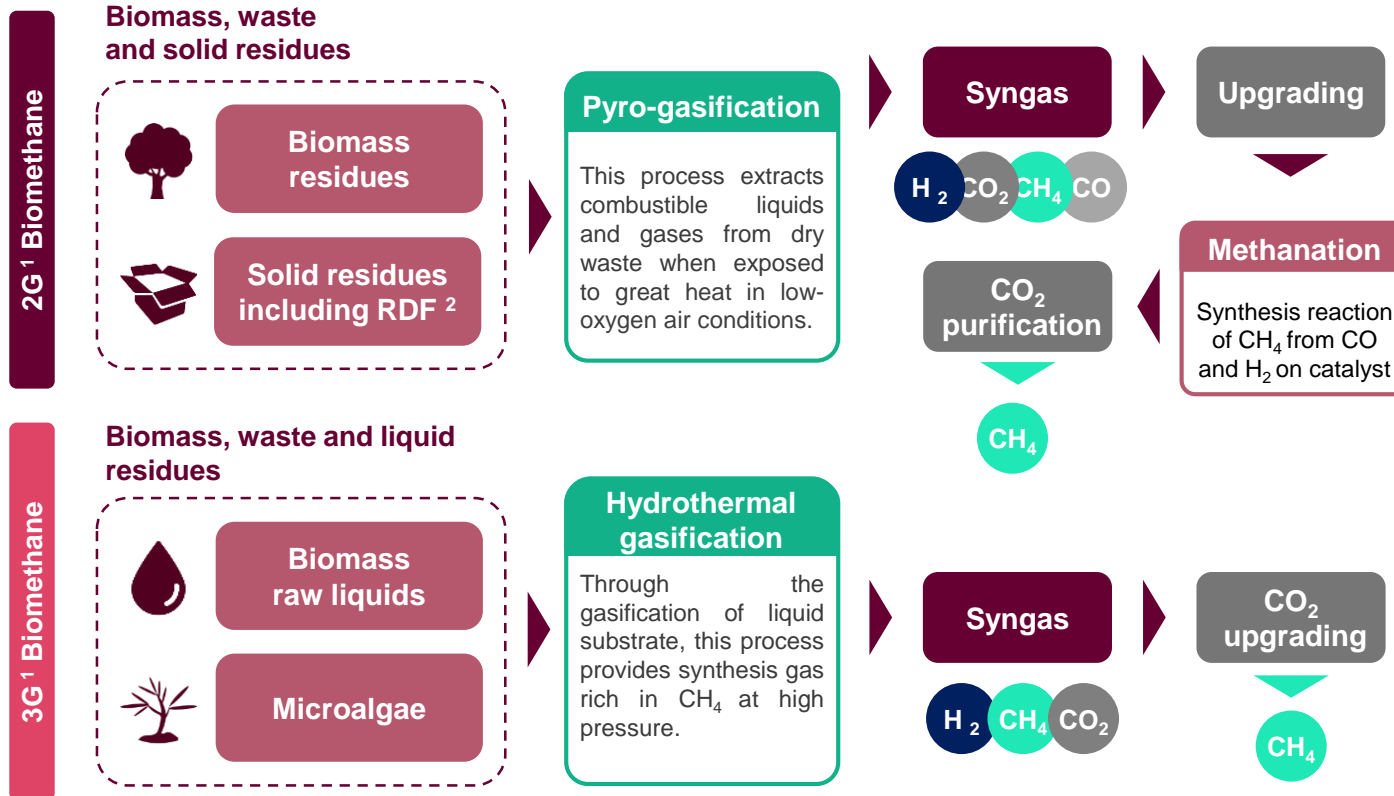
Sources: SER, GRDF, ATEE

Measures dedicated to biogas and biomethane have been taken to limit the impact of the coronavirus crisis on the development of the sector. The federations are now working with the DGEC to specify the procedures to implement these announcements. However, the situation highlights how critical energy resources are as well as the benefit that a local and renewable source represents in this crisis context.

Regulations and perspectives

Alternative biomethane production methods

New fields valorize renewable feedstocks to produce biomethane



¹ 2G, 3G: 2nd and 3rd generation ² Refuse-derived fuel

Sources: 2018 Renewable Gas Panorama, Gaya Project

The GAYA project

Launched in 2011, the GAYA project is an experimental platform which aims to validate the feasibility of biomethane production by **gasification of biomass and methanation of syngas**.



Led by Engie and bringing together **11 French and European partners**, the project is based on the recovery of biomass lignocellulosic (solid waste and residues) in biomethane via the **pyro-gasification process**.

The new biomethane production methods of 2nd and 3rd generation use feedstocks that are complementary to biomethane from anaerobic digestion (1st generation). The processes, that are still under study in R&D, are tested on pilots meant to demonstrate the technical and economic feasibility of these sectors.

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Your contacts



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