

BIOMETHANE FICHE – France (2021)

BIOMETHANE PRODUCTION, POTENTIALS AND PATHWAYS

Biomethane is upgraded (purified) biogas to the quality of natural gas (methane). Currently, biogas is dominantly used for the production of electricity and heat in CHP plants.

Biogas/biomethane is 100% of domestic origin and has cross-sectoral effects.

Upgrading of biogas in the EU started in 2011. In 2021, total biomethane production in the EU27 was 3.5 bcm. REPowerEU has biomethane as one of the short and medium-time measures to reduce natural gas imports by boosting biomethane production to 35 bcm by 2030.

BIOGAS / BIOMETHANE IN FRANCE (DATA FROM 2021)

Energy Balances (Eurostat, 2021) report:

- production of 1.6 bcm of biogases, without distinguishing the type.
- Biogases make 3.8% of the natural gas supply.
- 1.6 bcm of biogases are used mainly to produce electricity, either in electricity only or CHP plants (82%). Final energy consumption (18%) is recorded in other sectors (14%) and industry (4%).
- Biomethane use in transport is not recorded.

National statistics (SDES, 2021^{1,2}) reports:

- Production of 4 338 GWh (0.4 bcm) of biomethane injected in natural gas grid and 2,7 TWh of biogas (0.25 bcm).
- 945 biogas plants producing electricity and 365 biomethane plants injecting in natural gas grid.

France is one of the countries among the EU27 with the fastest growing biomethane market: 151 biomethane plants built in 2021 and 149 in 2022. According to the SDES, there are 876 projects at various stages of development, with a combined biomethane production capacity of 1.58 bcm.

- CNG Europe reports 79 CNG stations for France, out of 3,769 in the EU27, in 2022³.

¹ <https://www.statistiques.developpement-durable.gouv.fr/publicationweb/433>

² <https://www.statistiques.developpement-durable.gouv.fr/publicationweb/434>

³ CNG Europe | Map of Natural Gas Vehicle (NVG) Compressed natural gas (CNG) filling stations in Europe, Mappa Stazioni di rifornimento di metano, Landkarten Methantankstellen erdgastankstellen

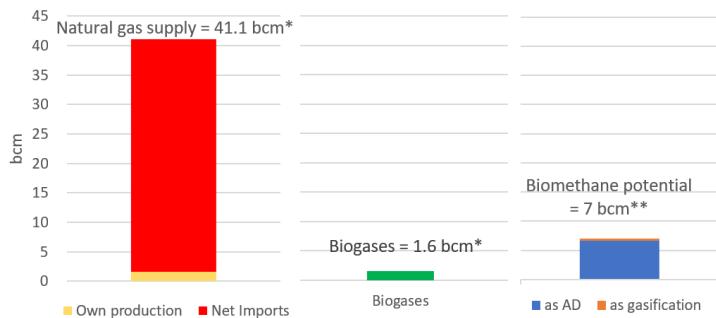


Figure 1a Comparison of 2021 natural gas supply, 2021 biogases production and 2030 potential in France (sources: Eurostat: Energy Balances, 2022*; Guidehouse: Gas for Climate Report 2022**)

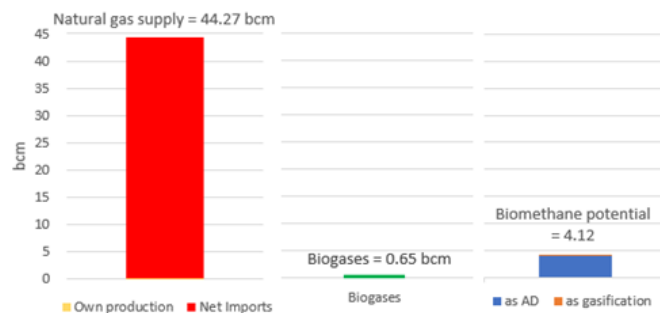


Figure 1b Comparison of 2021 natural gas supply, 2021 biogases production and 2030 potential in France (sources: SDES, national statistics 2021; national biomethane potential estimate)

Biomethane has two production pathways:

- **Anaerobic digestion (AD)** produces biogas and digestate (fermented organic matter, similar to slurry) as a local source of nutrients and GHG emission mitigation option for land management.
 - Macro and micro nutrient composition of digestate depends on the feedstock used for AD⁴
 - Digestate contains phosphorus (0.2-1.5 kg/t) that is on the list of critical raw materials for the EU⁵.
- **Gasification** produces biogas and biochar (carbonized organic matter, similar to charcoal) as a land-based carbon removal option (IPCC, 2019) and soil amendment.

To maximize the multisectoral value of biomethane, byproducts must be recognized and valorized.

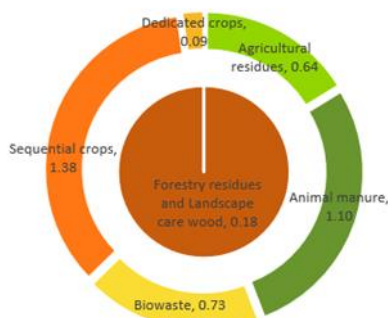


Figure 2 Biomethane potential (outer circle: AD, inner circle: gasification)

France's biomethane potential is ~4 bcm (Figure 2) and national potential assessment considering the interplay between biomethane production and agriculture and transport sectors. Industry estimates sustainable biomethane potential as 7 bcm (6.7 bcm from AD and 0.3 from gasification) by 2030.

France records important sustainable biomethane potential among the EU27.

France consumes 2,078 kt and 198 kt of nitrogen and phosphorus fertiliser that could be partially replaced by digestate.

In France, Manufacturing and Agriculture, forestry & fisheries are the main GHG emission sources by economic activity with 56% (171 MtCO₂eq), which can be tackled both by manure management in AD and application of digestate on soil (land management) with biomethane and biogenic CO₂ use in industry (ETS sector).

About 4% (~15.8 bcm) of the total natural gas supply in EU was used for non-energy purposes, dominantly for synthesizing nitrogen-based fertilizers, in addition to the energy input needed to support the production process. Combining biomethane production with a strong support of using digestate as a local source of nutrients would have multiple benefits for the reduction of natural gas imports.

⁴ As a rule of thumb, 1 ton of digestate contains 2.3-4.2 kg of N; 0.2-1.5 kg of P and 1.3-5.2 kg of K.

⁵ [EUR-Lex - 52023PC0160 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/lexuri/cs/l/fr/uri/LexUriServ.do?uri=CELEX:52023PC0160-EN)

NATURAL GAS (NG) SUPPLY AND CONSUMPTION OF FRANCE (2021)

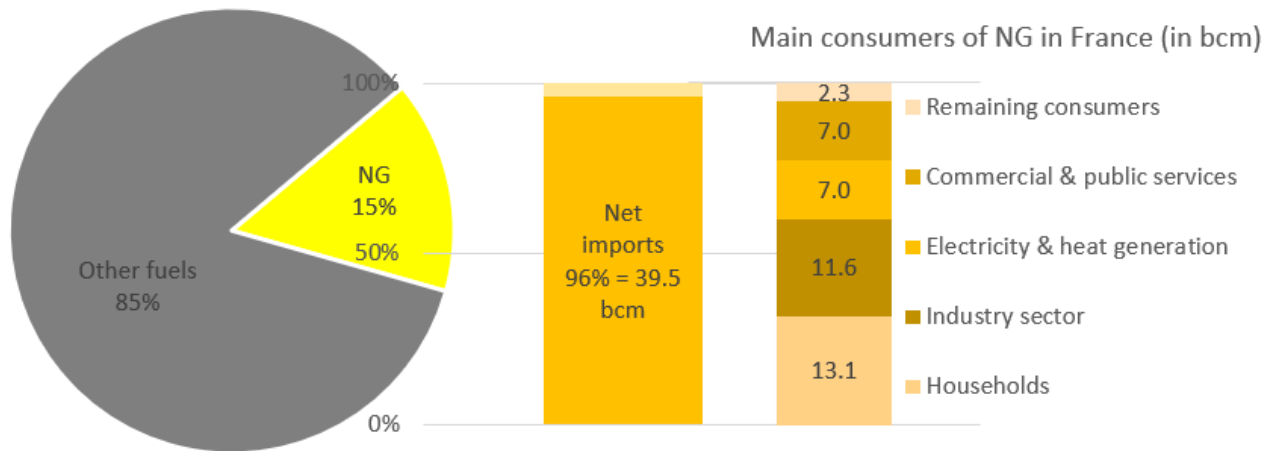


Figure 3 Natural gas share in total energy supply, origin and main consumers for France (2021) (source: Eurostat: Energy Balances, 2022)

- NG makes 15% of the total energy supply (TES) of France, out of which 96% (39.5 bcm) is imported.
- NG is used 97% for energy purposes and 3% for non-energy purposes (synthetic fertilizers, chemical industry).
- For France, the main NG consumption sectors are in final energy consumption (79%): households (32%), industry (28%) and commercial & public services (17%), whereas electricity production from NG is minor (17%).

Given the information provided above, the key messages for biomethane market development in France would be:

- According to the national estimations, France has the potential to replace ~10% of the current NG imports with biomethane.
- Proposing a programme for repowering biogas CHP plants upon contract expiration, without grid balancing function, to biomethane, either as a single upgrading point or a cluster with a centralised upgrading unit close to the grid injection or industry consumer.
- The ongoing transition from food & feed feedstock to sequential cropping and digestate use would increase the impact on greenhouse gas emission savings and green transition of already operational biogas and biomethane plants.
- Provide a positive investment environment to produce biomethane from wastewater treatment plants and industrial waste waters, with further utilisation of sludge in a wider bioeconomy.
- Good practice examples for biomethane from waste water treatment plants.
- France could expand its infrastructure to supply biomethane to transport beyond the existing 79 CNG filling stations.