

BIOMETHANE FICHE – Poland (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 POLAND (DATA FROM 2021)

- Energy balances (Eurostat) record production of 0.4 bcm of biogases, without distinguishing the type.
- Biogases make 1.8% of gas supply.
- 0.4 bcm of biogases are mainly used to produce electricity, either in electricity only or CHP plants (73%), whereas Final energy consumption (27%) has commercial & public services (19%) as the main consumer.
- Biomethane in transport is not recorded.
- European Biogas Association (EBA) reports¹ 0.32 bcm of biogas produced in 2021 (100% in 346 biogas plants). Several measures to support biomethane production are pending but not adopted.
- CNG Europe reports 23 CNG stations for Poland, out of 3,769 in the EU27, in 2022².
- In June 2023, Polish government launched a nationwide information campaign to promote biogas / biomethane production and related benefits among the local communities and local governments. Biomethane produced from the feedstocks indicated in Part A of Annex IX of RED II will play a crucial role in meeting the RES goals for transportation for so-called advanced biofuels (CNG, LNG and refinery production).

¹ [EBA Statistical Report 2022 | European Biogas Association](#)

² [CNG Europe | Map of Natural Gas Vehicle \(NVC\) Compressed natural gas \(CNG\) filling stations in Europe, Mappa Stazioni di rifornimento di metano, Landkarten Methantankstellen erdgastankstellen](#)

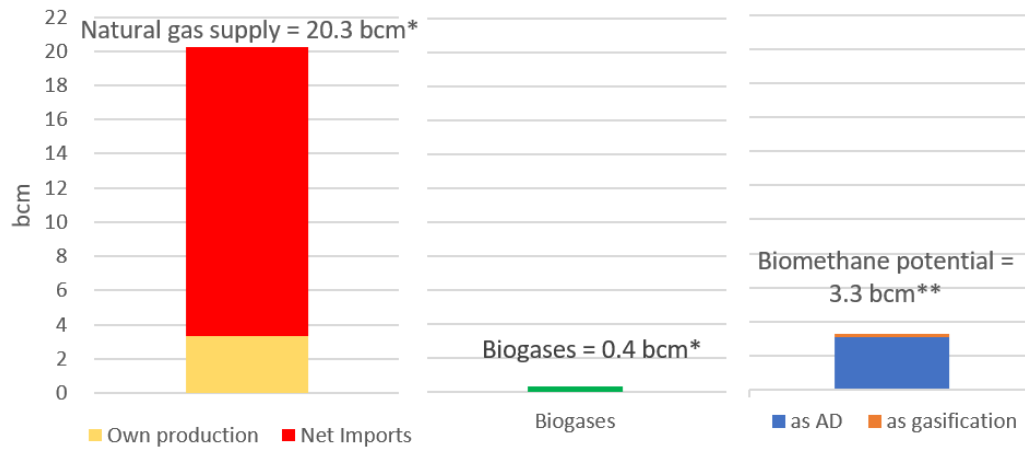
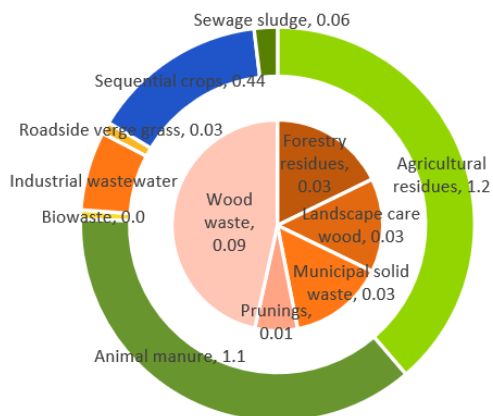


Figure 1 Comparison of current natural gas supply, biomethane production and potential in Poland (2021) (sources: Eurostat: Energy Balances, 2022*; Guidehouse: Gas for Climate Report 2022**)

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 AD³
 - Digestate contains phosphorus (0.2-1.5 kg/t) that is on the list of critical raw materials for the EU⁴.
- **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.



Industry estimates Poland's sustainable biomethane potential as 3.3 bcm (3.1 bcm from AD and 0.2 from gasification) by 2030 (Figure 2).

Considering the potential, Poland could be among the top 5 biomethane markets the EU27 with strong impact on the national market.

Poland consumes 994 kt and 150 kt of nitrogen and phosphorus fertiliser⁵ that could be partially replaced by digestate.

Electricity, gas, steam & air conditioning are the largest GHG emission source by economic activity with 39% (141.2 MtCO_{2eq})⁶, which can be tackled by boosting biomethane production, in addition to digestate use as a local source of nutrients and biogenic CO₂ in the industry.

Figure 2 Biogas/biomethane potential in bcm, by feedstock for Poland (inner pie gasification and outer circle AD) (source: Guidehouse: Gas for Climate Report, 2022)

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.

³ 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.

⁴ [EUR-Lex - 52023PC0160 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eur-lex-content/document/?uri=CELEX:52023PC0160-EN)

⁵ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_mineral_fertiliser_consumption#Analysis_at_country_level

⁶ [File:Greenhouse gas emissions by economic activity, 2021 \(thousand tonnes of CO2 equivalents\).png - Statistics Explained \(europa.eu\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Greenhouse_gas_emissions_by_economic_activity,_2021_(thousand_tonnes_of_CO2_equivalents).png_-_Statistics_Explained_(europa.eu))

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

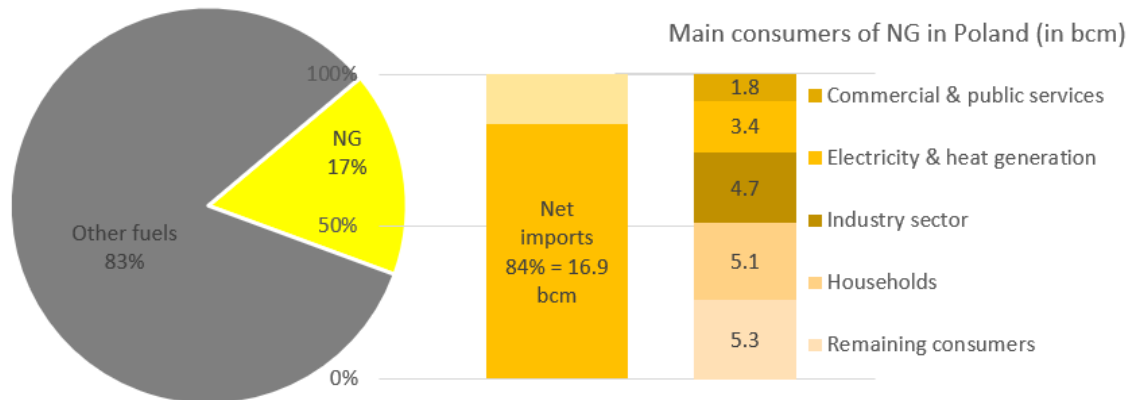


Figure 3 Natural gas share in total energy supply, origin and main consumers for Poland (2021) (source: Eurostat: Energy Balances, 2022)

- NG makes 17% of the total energy supply (TES) of Poland, out of which 84% (16.9 bcm) is imported.
- Roughly, NG is used 89% for energy purposes and 11% for non-energy purposes (synthetic fertilizers and chemicals).
- The main NG consumption sectors in Poland are households (25%) and industry (23%), followed by production of electricity (20%), either in electricity only or CHP plants.

Key messages for biomethane in Poland:

- Poland has ability to replace about 20% of current NG imports with biomethane which would be beneficial for both energy security and GHG emission reduction from energy sector.
- Poland has limited capacity to supply biomethane to transport with the existing 23 CNG filling stations.
- Current biogases production could be increased 8-9 times.
- To have full effect of biomethane production on the green transition, biomethane production support is to be linked with agri-food industry that is the largest employer (1,93M persons or 80%⁷) in the current bioeconomy and generates most of the feedstock for biomethane production. Short supply chains to reduce transportation costs of both feedstock and digestate use and close to the end-user or NG gas pipeline.
- A programme to repower biogas CHP plants to biomethane, either as a single upgrading point or a cluster with a centralised upgrading unit close to a NG pipeline injection, industry use (ETS sector) or heavy-duty vehicles linked to the industry operation (transport sector).
- Poland could additionally reduce NG import dependency by including the 6 major synthetic fertiliser production capacities in improvement and marketing of digestate, or extract of macro-nutrients for bio-fertilizers.

⁷ <https://datam.irc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html>