

BIOMETHANE FICHE – Bulgaria (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 BULGARIA (DATA FROM 2021)

- Energy balances (Eurostat) record production of 0.1 bcm of biogases, without distinguishing the type.
- Biogases make 2.1% of gas supply.
- 0.1 bcm of biogases are dominantly used to produce electricity, either in electricity only or CHP plants (83%).
- Biogas use in transport is not recorded.
- There are no records on biomethane production in Bulgaria in 2021.
- Bulgaria has 119 out of 3,769 CNG filling stations in the EU27, but no records of biomethane use in transport.

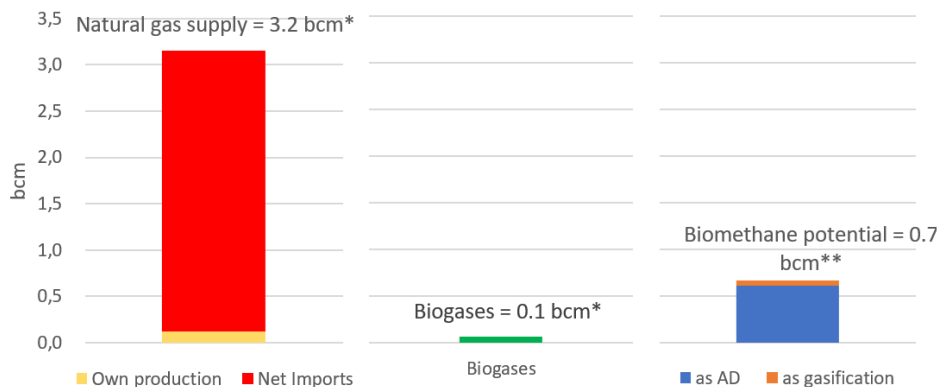


Figure 1 Comparison of current natural gas supply, biomethane production and potential in Bulgaria (2021) (sources: Eurostat: Energy Balances, 2022*; Guidehouse: Gas for Climate Report 2022**)

Biomethane has two production pathways:

- **Anaerobic digestion (AD)** produces biogas and digestate (fermented organic matter, like 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 AD¹
 - Digestate contains phosphorus (0.2-1.5 kg/t) that is on the list of critical raw materials for the EU².
- **Gasification** produces biogas and biochar (carbonized organic matter, like 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.

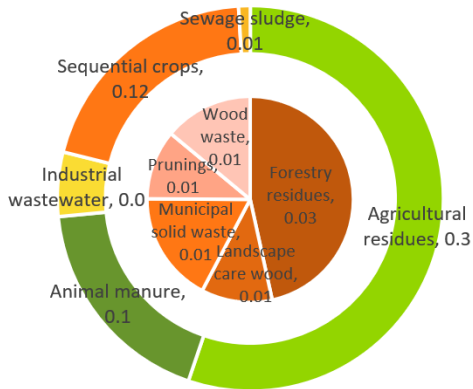


Figure 2 Biogas/biomethane potential in bcm, by feedstock for Bulgaria (inner pie gasification and outer circle AD) (source: Guidehouse: Gas for Climate Report, 2022)

Industry estimates Bulgaria’s potential as 0.7 bcm (0.6 bcm from AD and 0.1 from gasification) by 2030 (Figure 2).

By sustainable biomethane potential, Bulgaria could produce more biomethane than the current natural gas production.

Bulgaria consumes 364 kt and 34 kt of nitrogen and phosphorus fertiliser³ that could be partially replaced by digestate.

Electricity, gas, steam & air conditioning and Manufacturing are the 2 highest GHG emitting sources (62%) by economic activity (32 MtCO_{2eq})⁴ in Bulgaria, which can be tackled by boosting biomethane production, in addition to digestate use as a local source of nutrients and biogenic CO₂ in industry.

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.

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

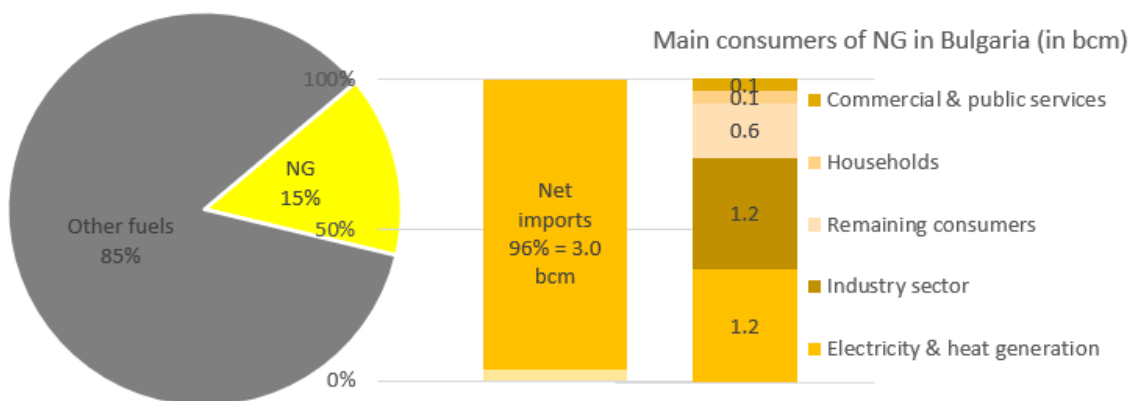


Figure 3 Natural gas share in total energy supply, origin and main consumers for Bulgaria (2021) (source: Eurostat: Energy Balances, 2022)

¹ 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.

² [EUR-Lex - 52023PC0160 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eur-lex.do?uri=CELEX:52023PC0160-EN)

³ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_mineral_fertiliser_consumption#Analysis_at_country_level

⁴ [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))

- NG makes 15% of the total energy supply (TES) of Bulgaria, out of which 96% (3 bcm) is imported.
- Roughly, NG is used 94% for energy purposes and 6% for non-energy purposes (synthetic fertilizers).
- The main NG consumption in Bulgaria is in production of electricity (37%), either in electricity only or CHP plants and final energy consumption (46%) with industry (33%) as the main consuming sector.

Key messages for biomethane in Bulgaria:

- Bulgaria has ability to replace about a quarter of current NG imports with biomethane which would be beneficial for both energy security and GHG emission reduction from energy sector.
- To have full effect of biomethane production on the green transition, biomethane production is to be linked with agri-food industry that is the largest employer (667k persons or 86.2%⁵) in the current bioeconomy and generates most of the feedstock for biomethane production. Short supply chains to reduce transportation costs and close to the end-user or NG gas pipeline.
- Bulgaria could additionally reduce NG import dependency by including the 2 major synthetic fertiliser production capacities in improvement and marketing of digestate, or extract of macro-nutrients for bio-fertilisers.
- Bulgaria has infrastructure to start supplying biomethane to transport in the existing 119 CNG filling stations.

⁵ <https://datam.irc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html>