

BIOMETHANE FICHE – Finland (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 FINLAND (DATA FROM 2021)

- Energy balances (Eurostat) record production of 0.2 bcm of biogases, without distinguishing the type.
- Biogases make 9.1% of gas supply.
- About half of the 0.2 bcm of biogases are used to produce electricity, either in electricity only or CHP plants (47%), and Final energy consumption (53%) with industry (40%) as the main consumer.
- European Biogas Association (EBA) reports¹ 0.09 bcm of biogas produced in 2021 (83% in 108 biogas plants and 17% in 23 biomethane plants). Finnish energy and climate strategies promote biomethane for transport fuel use.
- In 2021, almost all biomethane produced was used in the transport sector or 3% of the biogases produced.
- CNG Europe reports² 41 CNG stations for Finland, out of 3,769 in the EU27, in 2022.

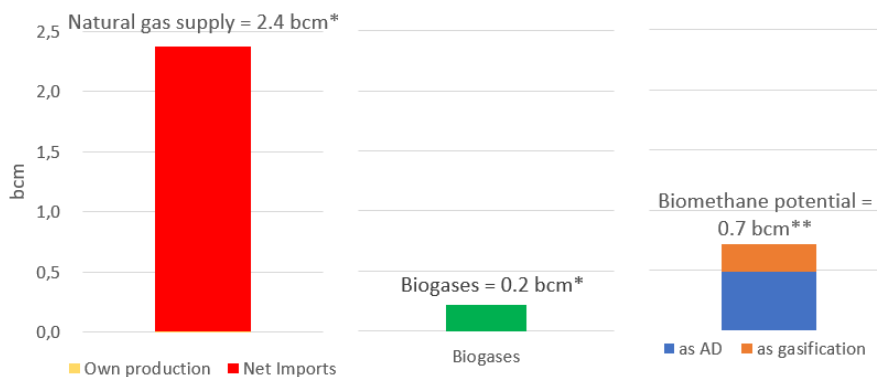


Figure 1 Comparison of current natural gas supply, biomethane production and potential in Finland (2021) (sources: Eurostat: Energy Balances, 2022*; Guidehouse: Gas for Climate Report 2022**)

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

² [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](#)

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.

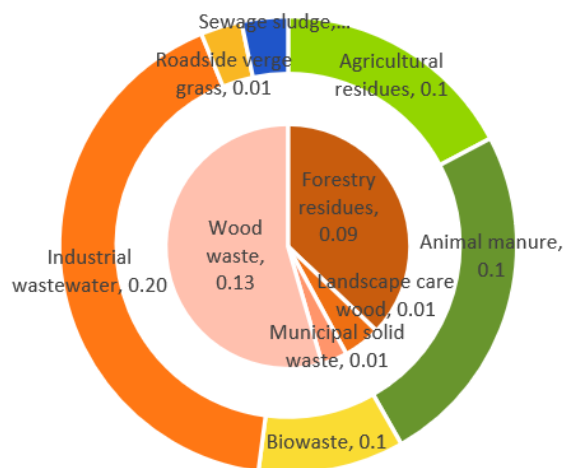


Figure 2 Biogas/biomethane potential in bcm, by feedstock for Finland (inner pie gasification and outer circle AD) (source: Guidehouse: Gas for Climate Report, 2022)

Industry estimates Finland's biomethane potential as 0.7 bcm (0.5 bcm from AD and 0.2 from gasification) by 2030 (Figure 2).

Finland represents a MS with a moderate sustainable biomethane potential in terms of contribution to the overall 2030 target but with strong national benefits from a developed biomethane market.

Finland consumes 139 kt and 12 kt of nitrogen and phosphorus fertiliser⁵ that could be partially replaced by digestate.

Manufacturing and Electricity, gas, steam & air conditioning supply are the 2 largest GHG emission sources by economic activity with 51% (22,5 MtCO_{2eq})⁶ in Finland, which can be tackled both by engaging industrial water in AD, and use of biomethane and biogenic CO₂ 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.

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 \(europa.eu\)](#)

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 \(europa.eu\)](#)

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

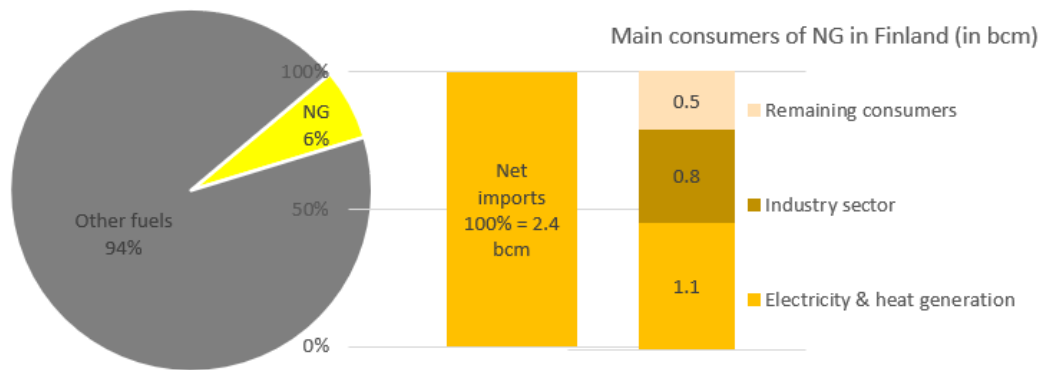


Figure 3 Natural gas share in total energy supply, origin and main consumers for Finland (2021) (source: Eurostat: Energy Balances, 2022)

- NG makes 6% of the total energy supply (TES) of Finland, out of which 100% (2.4 bcm) is imported.
- Roughly, NG is used 98% for energy purposes and 2% for non-energy purposes (synthetic fertilizers).
- The main NG consumption sectors in Finland are electricity production (54%), either in electricity only or CHP plants, and industry (32%).

Key messages for biomethane in Finland:

- Finland has ability to replace about 30% of the current NG consumption with biomethane.
- Together with other measures to phase out NG consumption, it is possible that Finland replaces 100% of NG with biomethane by 2030.
- To have full effect of biomethane production on the green transition, biomethane production support is to be linked with agri-food industry, especially construction on-site to the larger industrial wastewater treatment facilities to achieve short supply chains with renewable CO₂ and biomethane use in industry (ETS sector) or heavy duty vehicles linked to the industry operation (transport sector).
- Nutrient recovery from digestate, with thermal treatment when necessary or mixing with wood ash or compost, would replace non-energy use of NG and develop novel value chains in circular and sustainable bioeconomy.
- Finland has infrastructure to start supplying biomethane to transport in the existing 41 CNG filling stations.