

## BIOMETHANE FICHE – Sweden (2021)

### BIOMETHANE PRODUCTION, POTENTIALS AND PATHWAYS

Biomethane is upgraded (purified) biogas to the quality of natural gas (methane). Currently, biogas is dominantly used to produce 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 SWEDEN (DATA FROM 2021)

- Energy balances (Eurostat) record production of 0.2 bcm of biogases, without distinguishing the type.
- Biogases make 17.1% of gas supply.
- 0.2 bcm of biogases are mainly used in transport (41%), followed by industry (19%) in Final energy consumption. 20% of biogases is used to produce electricity, either in electricity only or CHP plants.
- European Biogas Association (EBA) reports<sup>1</sup> 0.2 bcm of biogas produced in 2021 (33.5% in 207 biogas plants and 66.5% in 72 biomethane plants). A long-term production support scheme for biomethane has been in place since 1st July 2022. The support scheme is intended to help Sweden achieve a biomethane production of 10 TWh by 2030. 73% of the biomethane produced in Sweden is used in the transport sector, with tax exemption as a support tool.
- CNG Europe reports 178 CNG stations for Sweden, out of 3,769 in the EU27, in 2022<sup>2</sup>.
- Sweden is the leading country in supplying 95% biomethane as a transport fuel.

<sup>1</sup> [EBA Statistical Report 2022 | European Biogas Association](#)

<sup>2</sup> [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](#)

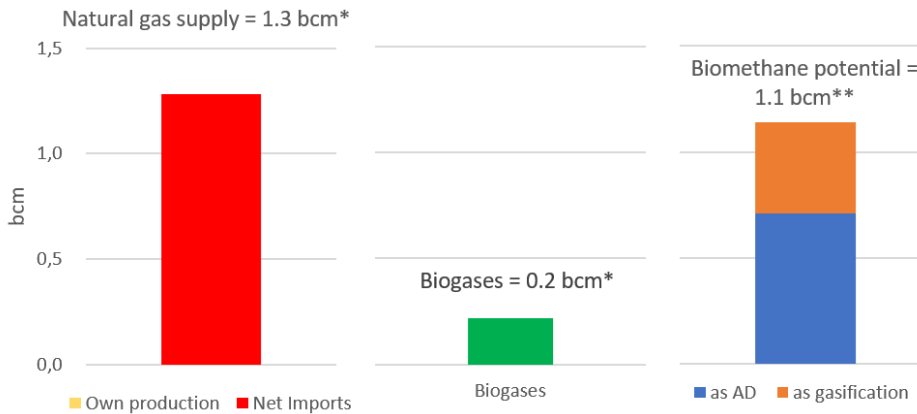


Figure 1 Comparison of current natural gas supply, biomethane production and potential in Sweden (2021) (sources: Eurostat: Energy Balances, 2022\*; Guidehouse: Gas for Climate Report 2022\*\*)

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 AD<sup>3</sup>
  - Digestate contains phosphorus (0.2-1.5 kg/t) that is on the list of critical raw materials for the EU<sup>4</sup>.
- **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.

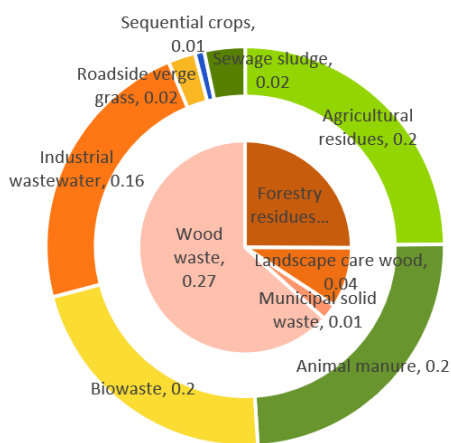


Figure 2 Biogas/biomethane potential in bcm, by feedstock for Sweden (inner pie gasification and outer circle AD) (source: Guidehouse: Gas for Climate Report, 2022)

Industry estimates Sweden's sustainable biomethane potential as 1.1 bcm (0.7 bcm from AD and 0.4 from gasification) by 2030 (Figure 2).

Considering the potential, Sweden could be a middle sized EU27 biomethane market but with a great national benefit.

Sweden consumes 215 kt and 17 kt of nitrogen and phosphorus fertiliser<sup>5</sup> that could be partially replaced by digestate.

Manufacture and Agriculture, forestry & fisheries are the 2 main GHG emission sources by economic activity with 55% (22.3 MtCO<sub>2eq</sub>)<sup>6</sup> in Sweden, which can be tackled both by manure management in anaerobic digestion and application of digestate on soil (land management) and linking industry with biomethane production and use, with biogenic CO<sub>2</sub> use.

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.

<sup>3</sup> 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.

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

<sup>5</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental\\_indicator\\_-\\_mineral\\_fertiliser\\_consumption#Analysis\\_at\\_country\\_level](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_mineral_fertiliser_consumption#Analysis_at_country_level)

<sup>6</sup> [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 SWEDEN (2021)

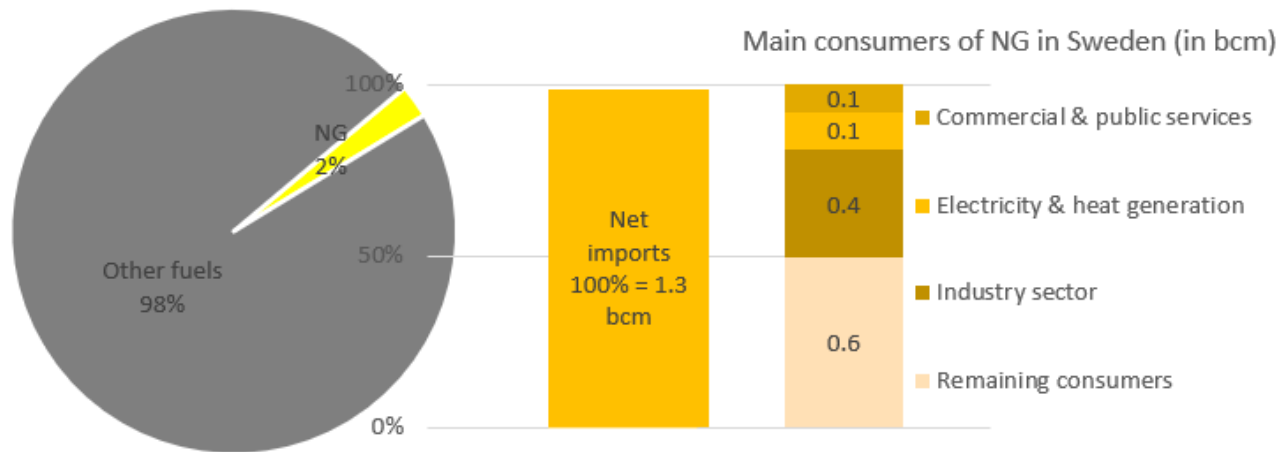


Figure 3 Natural gas share in total energy supply, origin and main consumers for Sweden (2021) (source: Eurostat: Energy Balances, 2022)

- NG makes 2% of the total energy supply (TES) of Sweden, out of which 100% (1.3 bcm) is imported.
- Roughly, NG is used 86% for energy purposes and 14% for non-energy purposes (synthetic fertilizers and chemicals).
- The NG consumption is well diversified, with main consumers in transport (41%) and industry (31%) in the Final energy consumption. Only 11% of NG is used for production of electricity, either in electricity only or CHP plants.

### Key messages for biomethane in Sweden:

- Sweden has ability to replace about 85% of current NG consumption (imports) with biomethane.
- Sweden is a good practice example in implementing biomethane in transport (heavy -duty vehicles).
- Given the feedstock profile, a ripple effect would be created by pairing biomethane production with:
  - the industrial wastewater treatment facilities to achieve short supply chains with biogenic CO<sub>2</sub> and biomethane use in industry (ETS sector) or heavy-duty vehicles linked to the industry operation (transport sector).
  - Municipal waste companies to utilize biowaste for fueling the municipal vehicle fleet or industry.
  - Agri-food industry for biomethane and digestate use along the value chain.
- Sweden shows strong potential in biogas from gasification which could produce biochar, a recognized land-based carbon removal options by IPCC<sup>7</sup>.

<sup>7</sup> [SR15 Chapter 3 LR.pdf \(ipcc.ch\)](#)