# EBA's BIOMETHANE fact sheet

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| **What is biomethane?** | Biomethane can be either upgraded biogas from anaerobic digestion or cleaned syngas from gasification of biomass, being 100% renewable. Also the methane of the Power-to-Gas process is included if the applied electric power is generated from renewable sources and the hydrogen is biologically converted to methane with the $CO_2$ in the digester. |
| **From what and how is biogas produced?** | Biogas has high substrate flexibility as it can be sourced from all biogenic wastes such as, agricultural residues (straw, catch crops, manure etc.), energy crops, sewage sludge, separated household waste and organic industrial waste.<br>Biogas is produced by bacteria through anaerobic digestion (AD) of organic substrates in the absence of oxygen. The chemical composition of raw biogas includes 50%-75% methane ($CH_4$), 25%-50% carbon dioxide ($CO_2$); the rest is composed of water vapour ($H_2O$), and traces of oxygen ($O_2$), nitrogen ($N_2$) and hydrogen sulphide ($H_2S$). Raw biogas can be freed of water and hydrogen sulphide. Most often it is used for combined heat and power production (CHP).<br>It is to emphasise that biogas/biomethane is an advanced biofuel as a large part of hemicelluloses and celluloses are naturally degraded. With corresponding pre-treatment, the degradation is increased substantially. |
| **Upgrading of biogas to biomethane** | To allow injection of biogas into the natural gas grid or the use as a vehicle fuel, it must be upgraded which means that carbon dioxide is removed whereas the share of methane is increased to usually above 96% so that it meets the quality standards for natural gas. |
| **How can it be used?** | As the chemical composition and energy content of biomethane are close to natural gas, it can likewise be used in the same way:<br>• Gas grid injection and used as a natural gas substitute in any blend proportion<br>• Vehicle fuel |
| **How sustainable is biomethane?** | As biomethane production from anaerobic digestion can use a wide range of feedstocks, also its environmental credentials vary, but are notably lower than for the case of fossil energy sources (see the chart below). |

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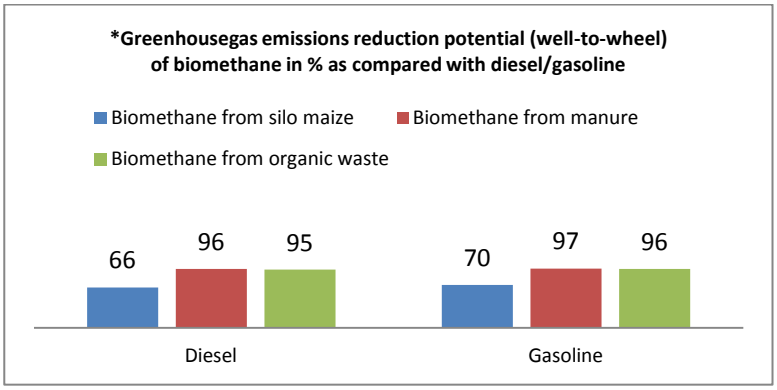


Source: Environment Agency Austria

*The data do not include the avoided emissions of raw manure storage, landfilled organic waste and benefits of the produced digestate, able to replace mineral fertiliser.

Also the emission savings through the fertilising effect of digestate, the by-product of biogas production, should be taken into account when the sustainability of biomethane is measured:
With the use of digestate as an organic fertiliser for crops and soil improver, costs and emissions of artificial fertilisers can be saved and mitigated. Evaluations have shown [i] that 13 kg $CO_2$eq/tonne can be saved when digestate replaces mineral fertiliser.

**Where in Europe is it produced and used?**

Currently biomethane is produced in 15 European countries[1] and injected into the natural gas grid in most of them[2]. Altogether there are over 200 upgrading plants in Europe [ii]. The produced biomethane is mostly fed into a gas grid and used for heat & power (CHP) purposes but also its application as a transport fuel is becoming more popular: in Sweden biomethane as a fuel has already overtaken CNG (Compressed Natural Gas) with a market share of 57% [iii] and in Germany the share more than doubled only within one year (2012) from 6 to more than 15% [iv].

**What is the potential of biomethane?**

Currently the total biogas production in Europe corresponds to about 14 billion $m^3$ in natural gas equivalent. The level of biogas production foreseen for 2020 in the National Renewable Energy Action Plans is about 28 billion $m^3$ in natural gas equivalent. EBA expects that substantially higher volumes of biogas will be produced in 2020 without any negative impact on food and feed production on cultivated land. In fact, crop rotation and recycling of the nutrients and organic matter through digestate even improve the overall productivity of farms. The consumption of natural gas as vehicle fuel is currently at around 2-3 billion $m^3$ level. NGVA predicts this to be increased to 10-15 billion m3 by 2020 (reaching 5% market share in the transport sector). If only 3.5-

[1] AT, CH, DE, DK, ES, FI, FR, HU, IS, IT, LU, NL, NO, SE, UK
[2] AT, CH, DE, ES, FI, FR, LU, NL, NO, UK

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| | 5.4% of biogas would be upgraded to motor fuel quality in 2020, this volume would be enough for reaching 10% renewable share in CNG/LNG vehicle fuel consumption or 0.5% share in total transport energy consumption. |
| **What are the advantages and opportunities?** | Biomethane is a commercially viable fuel under condition that it is exempt of tax and/or granted with other financial incentives: it can rely on existing natural gas infrastructure and the upgrading technology is mature and proven. The green gas provides Europe with several advantages: it contributes to the European climate targets by reduced $CO_{2\ eq}$ emissions and improved air quality (while fossil fuels are replaced, particulate (≤ PM10) and NOx emissions are massively reduced), and it advances security of supply and European energy independency from (unstable) third countries. Furthermore, the use of digestate as a fertiliser closes the nutrient cycle in regional ecosystems and saves the CO2 emissions that would be released by the production of mineral fertilisers. Biogas and biomethane production also generates green jobs through increased regional and agricultural employment [v]. Biomethane is moreover the most energy efficient biofuel [vi] and already now the first broadly available second generation biofuel. |
| **What are the challenges (and solutions)?** | EBA is substantially engaged in removing some of the major hurdles hindering the full deployment of biomethane:<br>• Insufficient financial incentives: The current national support schemes, set up for renewable energies, tend to be limited to green electricity while green gas is often left outside these systems. Moreover, taxation schemes across Europe should offer similar incentives for biomethane as for liquid biofuels (on energy unit basis). The future Directive on Energy Taxation as well as support schemes should acknowledge the important role that biomethane plays in decarbonising the European energy sector.<br>• Lack of cross-border cooperation: different technical standards and certification schemes as well as reluctance of Member States to benefit from the EU's cooperation mechanisms (laid down in Renewable Energy Directive) hamper the development of cross-border trade. Within the EU project GreenGasGrids, EBA contributes to the creation of a platform for the national biomethane registries to help removing cross-border barriers. The EU should support by all available means cross-border cooperation which would also foster the internal energy market.<br>• Lack of a common European gas quality standard for the gas grid access: All countries injecting biomethane into the grid have developed national quality standards. Unfortunately, they differ considerably among each other. The CEN working group (TC408) which was mandated by the European Commission in 2010 and |

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advised by EBA, is working on the development of EU standards for both grid injection and vehicle fuel use.

- Insufficient CNG/LNG vehicle fuel infrastructure: the network of gas filling stations and the amount of gas driven vehicles are not sufficient in most parts of Europe. EBA welcomes the measures introduced in the European Commission's Clean Power for Transport Package which aims at fostering the European gas infrastructure.
- Lack of political recognition: At national levels, only a few Member States have set explicit targets for biomethane. Also at the European level, biomethane is seldom explicitly mentioned in policy and legislative papers; it is usually included in the terms of natural gas or biofuels and even ignored in modelling work and impact assessments. The lack of political recognition is to a large extent a result of insufficient knowledge: EBA together with its partners constantly continue informing policy-makers of the production and use of biomethane.

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[i] Börjesson et al. (2010): Livscykelanalys av svenska biodrivmedel, Rapport nr 70, p. 64.
[ii] GreenGasGrids (2013): Biomethane Guide for Decision Makers – Policy Guide on biogas injection into the natural gas grid: http://www.greengasgrids.eu/sites/default/files/files/130430_GGG_D_2_3_Guide_for_decision_makers_FINAL.pdf
[iii] Mattias Svensson (2013): Production and potential of biomethane as a vehicle fuel: http://www.greengasgrids.eu/sites/default/files/files/Production%20and%20potential%20of%20biomethane%20as%20a%20vehicle%20fuel%20-%20Mattias%20Svensson.pdf
[iv] Deutsche Energie-Agentur –dena (2013): Biomethan auf der überholspur: http://www.erdgasmobilitaet.info/service-und-aktuelles/aktuelles-und-presse/meldung/datum/2013/03/27/biomethan-auf-der-ueberholspur.html
[v] Fachverband Biogas (2011): Biogas can do it – Facts, arguments and potentials: http://www.european-biogas.eu/images/stories/broschre_2011_en_versandversion.pdf
[vi] Smyth et al. (2009) What is the energy balance of grass biomethane in Ireland and other temperate northern European climates? Renewable and Sustainable Energy Reviews 13(9): 2349-60

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