Fachverband BIOGAS
German Biogas Association
Association Allemande du Biogaz
Asociación Alemana de Biogás
www.biogas.org

Biomethane in Germany - Current Status and Ways ahead

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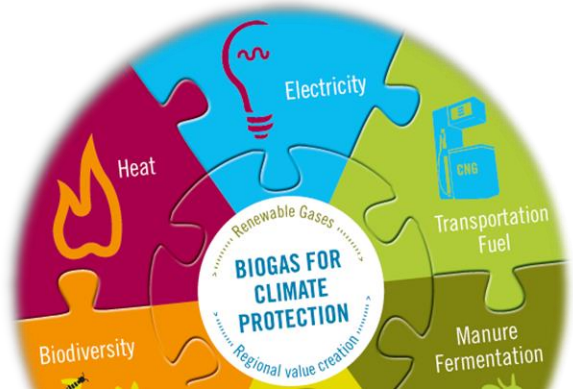

Agenda

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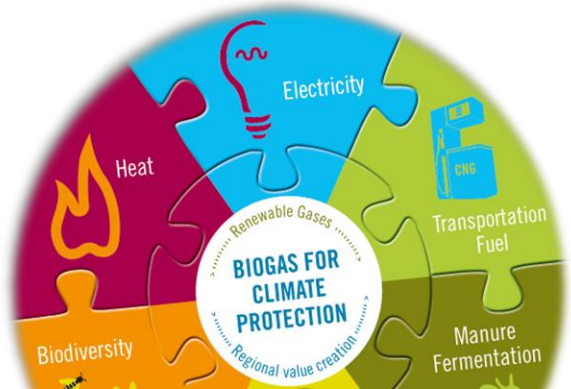
Who we are

Status quo of biomethane production and use in Germany

EU- and nationwide legal framework

Business examples

Summary and outlook



The German Biogas Association: Our profile

Fachverband BIOGAS

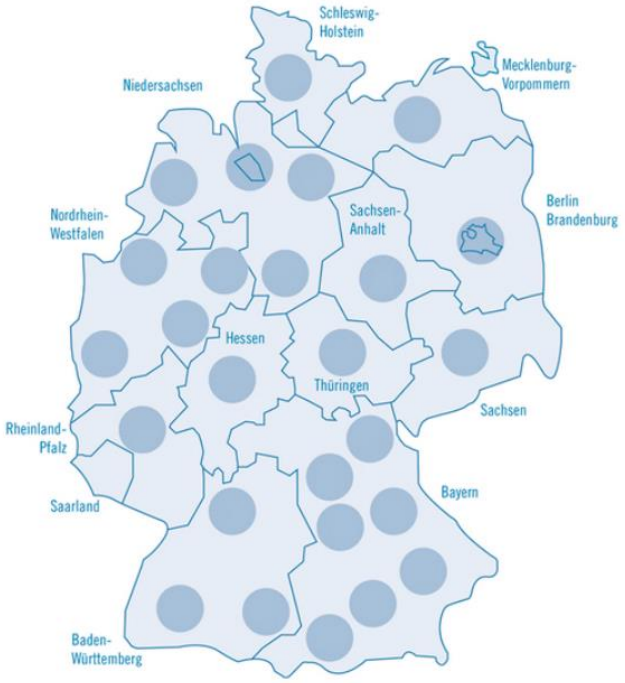
4,650+ members

- Plant operators
- Manufacturers
- Research institutes
- Public Authorities
- Consultants
- dedicated individuals
- … and you?

Member of

EBA European Biogas Association

WORLD BIOENERGY ASSOCIATION



40+ employees

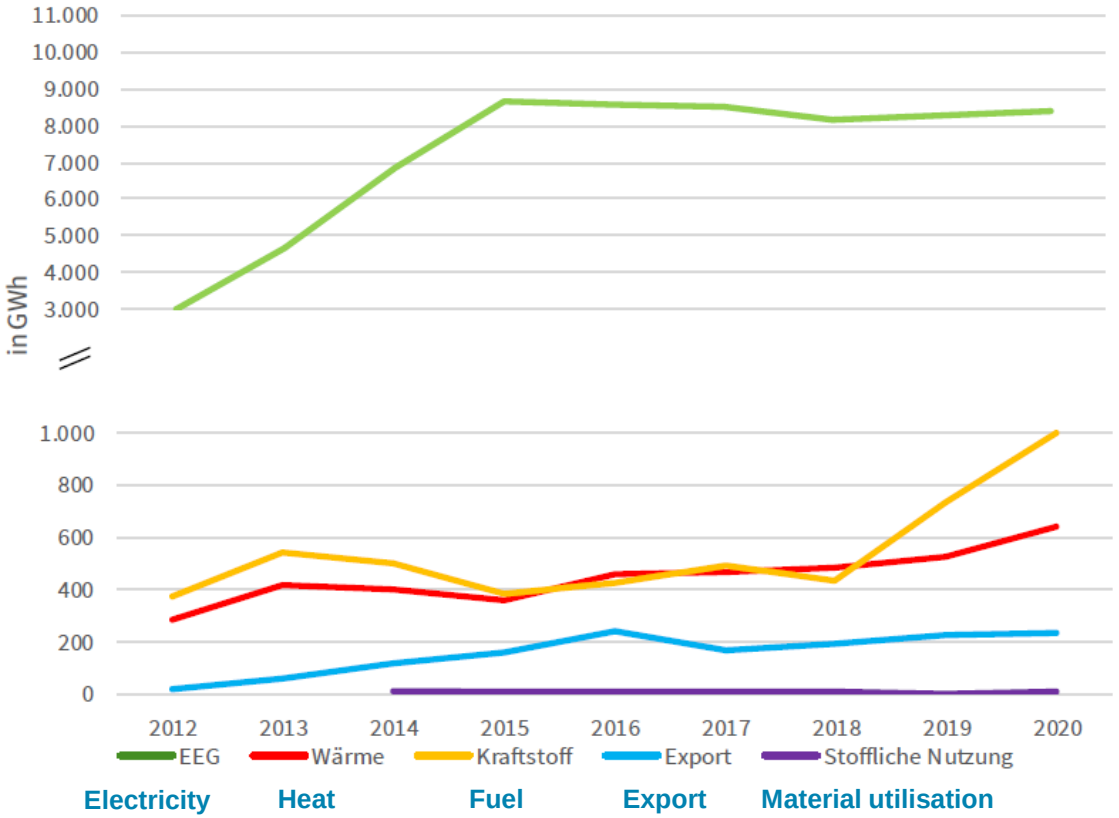
Our Goals:

Establishing biogas as an important component for climate protection

- Definition of legal frameworks and guidelines
- Information exchange, knowledge transfer
- Advocating on EU-, national and regional levels

How much biomethane ends up in Germany's transport sector?

Biomethane Commercialisation



Year	Biomethane Feed-in [GWh]	Thereof fuel utilisation [GWh]
2020	9,847	1,000
2019	9,823	700
2018	10,108	389
2017	9,893	380
2016	9,318	379

+40%

+70%

Source: dena Branchenbarometer Biomethan 2021

More capacity for biomethane fuel is available:
Biomethane injection into the national grid could reach 40 % by 2030 made alone of waste and manure

How is biomethane used in transport?

- **Bio-CNG**
  - Compressed Biomethane
  - For passenger cars and light vans

Possibly no market anymore by 2035:
Ban of all internal combustion engines in planning

- **Bio-LNG**
  - Liquefied Biomethane
  - primarily for heavy goods traffic and maritime or inland waterway traffic

- **Decision making criteria**
  - Local offtakers (own consumption, vehicle fleets, public access)
  - CAPEX & OPEX
  - Incentives, tax exceptions
  - Long-term outlook (legal framework)

Good chances of being recognised as a climate-neutral fuel

Legal Framework

- **Overall framework: “Fit for 55 Packet”**
  - Target: GHG emissions reduction by 55% until 2030, climate neutral by 2050
  - Presentation on 14.07.2021
  - Reformed or new directives and regulations of the European Commission relating to EU climate policy

Clean Energy GHG Emissions

- **RED II Revision (RED III)**
- Energy Efficiency Directive (EED)

CO_2/GHG Taxation

- ETD (Energy Taxation Directive)
- LULUCF (Land Use, Land Use Change and Forestry)
- ETS
- Effort Sharing Regulation
- Carbon Border Adjustment Mechanism

Transport

- DAFI (Revised Alternative Fuels Infrastructure Directive), **CVD**
- FuelEU Maritime Initiative
- ReFuelEU Aviation Initiative

RED II: Emissions from biomethane as fuel

Default values in RED II for GHG Emissions (fossil comparator 94 g $CO_{2äq}$/MJ)

Substrate	g CO_{2eq}/MJ
Manure	-100
Biogenic waste	14
80 % manure + 20 % maize	-12

Disaggregated values along the process chain

Disaggregated default values for biogas for the production of electricity

Biomass fuel production system		Technology	TYPICAL VALUE [g CO_2eq/MJ]					DEFAULT VALUE [g CO_2eq/MJ]				
			Cultivation	Processing	Non-CO_2 emissions from the fuel in use	Transport	Manure credits	Cultivation	Processing	Non-CO_2 emissions from the fuel in use	Transport	Manure credits
Wet manure (1)	case 1	Open digestate	0,0	69,6	8,9	0,8	– 107,3	0,0	97,4	12,5	0,8	– 107,3
		Close digestate	0,0	0,0	8,9	0,8	– 97,6	0,0	0,0	12,5	0,8	– 97,6
	case 2	Open digestate	0,0	74,1	8,9	0,8	– 107,3	0,0	103,7	12,5	0,8	– 107,3
		Close digestate	0,0	4,2	8,9	0,8	– 97,6	0,0	5,9	12,5	0,8	– 97,6
	case 3	Open digestate	0,0	83,2	8,9	0,9	– 120,7	0,0	116,4	12,5	0,9	– 120,7
		Close digestate	0,0	4,6	8,9	0,8	– 108,5	0,0	6,4	12,5	0,8	– 108,5

EUROPEAN UNION

THE EUROPEAN PARLIAMENT — THE COUNCIL

Brussels, 21 November 2018
(OR. en)

VTypical and default values for biomethane — 2016/0382 (COD) — PE-CONS 48/18

Biomethane production system	Technological option	Greenhouse gas emissions – typical value (g CO_2eq/MJ)	Greenhouse gas emissions – default value (g CO_2eq/MJ)
Biomethane from wet manure	Open digestate, no off-gas combustion[1]	-20	22
	Open digestate, off-gas combustion[2]	-35	1
	Close digestate, no off-gas combustion	-88	-79
	Close digestate, off-gas combustion	-103	-100
Biomethane from maize whole plant	Open digestate, no off-gas combustion	58	73
	Open digestate, off-gas combustion	43	52
	Close digestate, no off-gas combustion	41	51
	Close digestate, off-gas combustion	26	30
Biomethane from biowaste	Open digestate, no off-gas combustion	51	71
	Open digestate, off-gas combustion	36	50
	Close digestate, no off-gas combustion	25	35
	Close digestate, off-gas combustion	10	14

Relevance of the RED and the GHG balance in Germany's transport sector

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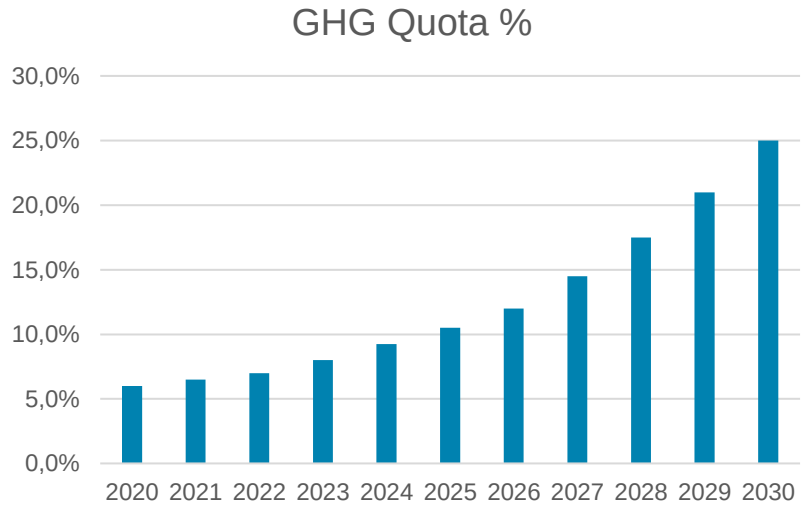
- GHG quota replaces energy quota since 2015
  - since 2015 : 3.5 % GHG reduction
  - since 2017 : 4.0 % GHG reduction
  - since 2020 : 6.0 % GHG reduction
- **Everyone who distributes fuel must prove quota fulfilment!**

Year	Minimum for energy purposes, double credit for amounts above the minimum	2022	2023	2024	2025	2026 2027	2028 2029	2030
Advanced biofuels quotas (RED II Annex IX Part A)		0.2 %	0.3 %	0.4 %	0.7 %	1.0 %	1.7 %	2.6 %



- The majority of quotas are fulfilled by blending
  - biodiesel (rapeseed / soy), UCO (used cooking oil) or HVO (palm oil phase-out by 2026)
  - Bioethanol
- Biomethane as fuel can be used to fulfill quotas
  - **Non-compliance is penalised: 0.47 €/kg CO_2 = 470 €/t CO_2 (raises to 600 €/t CO_2)**
  - Comparison stock exchange EEX: 150 €/t CO_2 interesting range!

Operator and business model concepts

- **Acceptance of raw biogas or biomethane by traders or distributors**
  - Low internal efforts
  - Market price dependence

- **Own yard gas station**
  - For internal and/or public use
  - Bio-LNG more expensive to produce
  - GHG Emissions trading possible for distributors to end-users

- **Feed-in to gas grid**
  - Moderate preparation effort
  - Purchase agreement with a dealer or gas station operator

    → In balance sheet terms, the operator extracts 100 % biomethane

- **Pooling of biogas/-methane plants**
  - Merger of several plant operators:
    - Central processing into bio-methane
    - Central processing to bio-C/LNG

Example Bio-CNG gas station grid

- **Biogas plant in Northern Germany**
  - Supplies 14 gas stations (partly self-owned)
  - Clients are logistics vehicle fleets, mobile care services, public transport, individuals – in a local context

- **Trade with THG quota**
  - Offtakers such as companies with a high CO_2 footprint
  - 2-3 times higher revenues as the earnings from the gas station itself

Bio-CNG gas station operator

Purchase Agreemant Price & Quantity

Additional earning (GHG trade)

Quota subjected company (e.g., mineral oil company)

H. Seide FvB

Example Bio-LNG gas station for transport fleet

- **Pilot project**
  - Shell
  - EDEKA Hannover-Minden (Lower Saxony)
  - IVECO

- **Goals**
  - Vehicle fleet conversion
  - 100 % Bio-LNG from 2023 onwards

Source: gas24.de (Shell, EDAKA Minden)

- **Key data tractor unit**
  - Two 540 l tanks

  → up to 1.600 km range

https://www.gas24.de/cms/603-0-edeka-stellt-mit-shell-und-iveco-auf-bio-lng-fuer-lkw-transporte-um.html?article_id=603&clang=0

Conclusion and outlook

- Implementation of RED II by 2021 offers opportunities for biogas/biomethane, especially for renewable gases from manure, biogenic waste, straw, etc.
- Revision of Fit for 55 package, RD II->III, CVD
- Further development also depends on the design of the political framework
  - Extension of toll exemption (CO_2 component expected)
  - Promotion of vehicles & fleet conversion
  - Energy tax and trade regulations, also EU-wide
- Biomethane is in direct competition with other options
  – hence the options need to be technology neutral and utilised where applicable now

  → Well to wheel vs tailpipe approach

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition

(45) LNG, including liquefied biomethane, might also offer a cost-efficient technology allowing heavy-duty vehicles to meet the stringent pollutant emission limits of Euro VI standards as referred to in Regulation (EC) No 595/2009 of the European Parliament and of the Council (3).

(48) An appropriate number of LNG and CNG refuelling points accessible to the public should be put in place by 31 December 2025, at least along the TEN-T Core Network existing at that date and, after that date, on the other parts of the TEN-T Core Network where these are made accessible to vehicles.

(58) In the application of this Directive, the Commission should consult relevant expert groups, including at least the European Expert Group on Future Transport Fuels, consisting of experts from industry and civil society, as well as the Joint Expert Group on Transport & Environment, which brings together experts from the Member States.

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Thank you for your attention!
Any questions or comments?