

IEA Bioenergy Task 37, Berlin, Germany October 29-30,
2015

Country Report, Germany

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www.atb-potsdam.de



Mitglied der



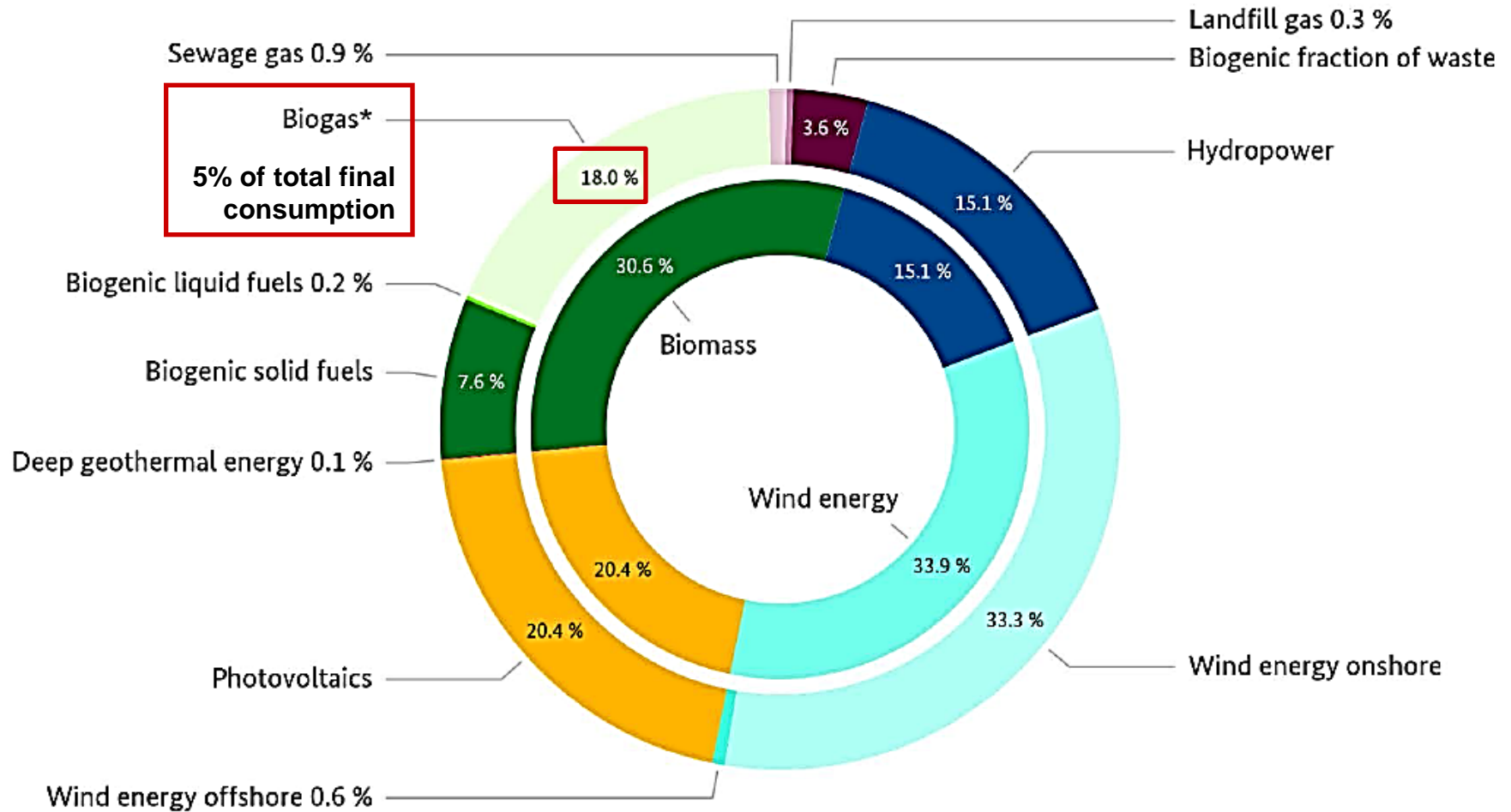
- Biogas Plant Inventory
- Biogas Trends
- Biogas Utilisation
- Digestate handling
- Financial Support Systems
- National Strategies
- Biogas Research



Biogas Plant Inventory

Renewables-based electricity generation in Germany 2013

Total: 152.4 billion kilowatt hours



* (incl. Biomethane); BMWi based on Working Group on Renewable Energy-Statistics (AGEE-Stat); as at January 2015; all figures provisional

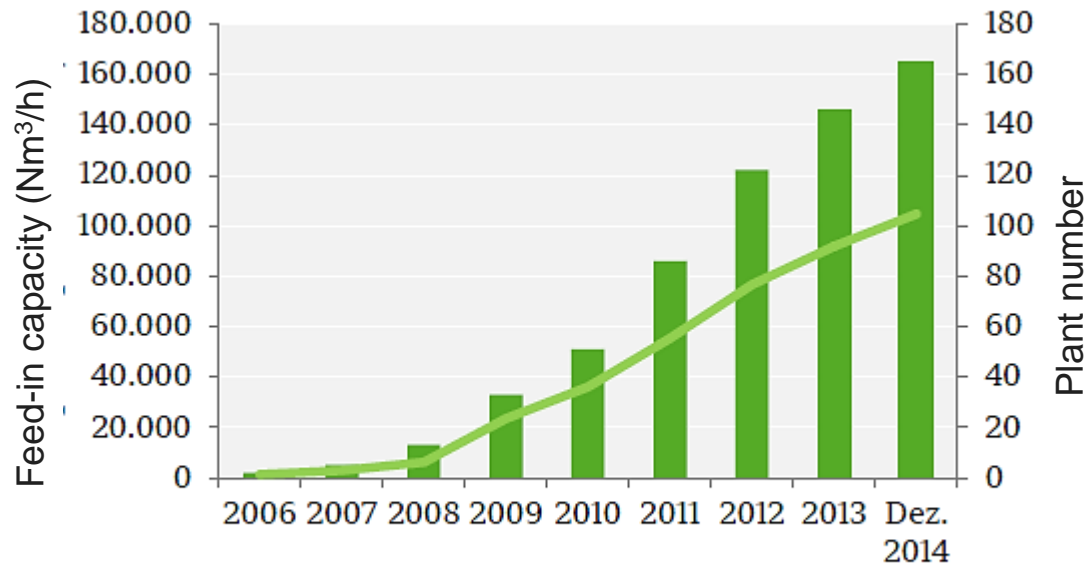
Biogas Plant Inventory

Substrate Plant type	Number of plants	Energy Production ¹⁾ (GWh/year)	
		Electricity	Heat
Sewage sludge	1400	1310	1740
Biowaste	180	850	360
Agriculture	8005*	25120	10550
Industrial	80	450	190
Landfills	400	540	90
Total	10,020	28,270	12,930

1) Fuel not included

Source: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2013); DWA (2014), German Biogas Association; (* trend 2015)

Biogas Upgrading current situation



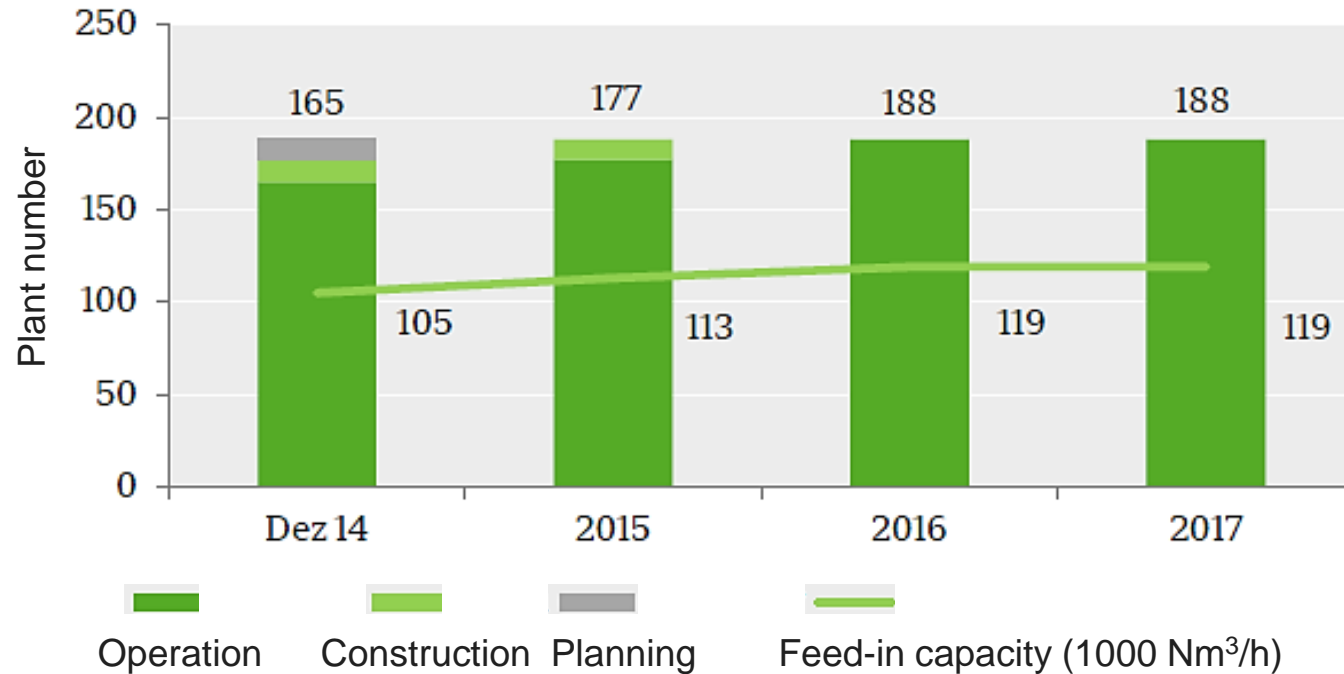
■ Plant number
 — Feed-in capacity (Nm³/h) = 0.95 billion m³/year

Dec. 2014 165 104 660

Source:



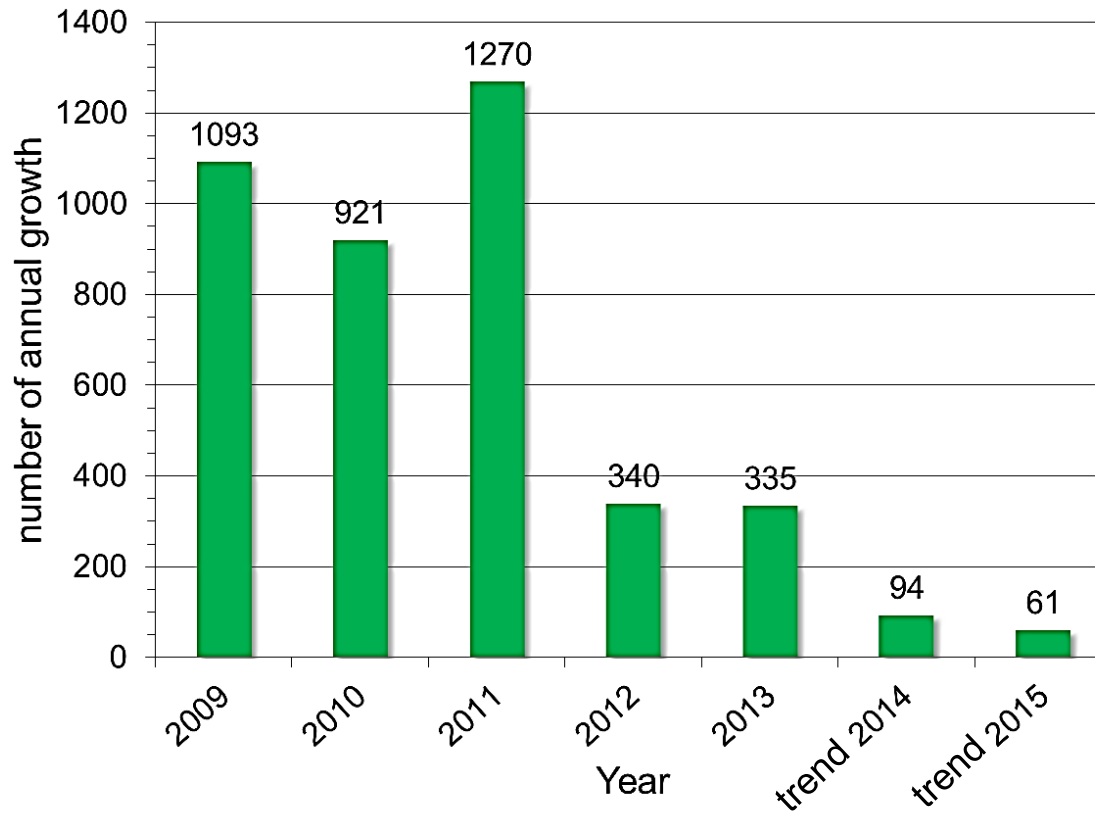
Biogas Upgrading plants trend



Source:



Biogas plant trend



Source: German Biogas Association (2014, adapted)

Biogas potential 2020 (Germany)

2014 Natural gas consumption 70.9 billion cubic metres

Substrate	Potential TWh/a ¹⁾
Industrial waste	0.5
Agricultural residues	0.5
Municipal waste	1.5-3.7
Sewage sludge	1
Animal waste	10
Biogas crops	22.9 - 45.8
Total	36.4 - 61.5

¹⁾ equal to billion cubic meters natural gas

Source: Scholwin, 2014, acting on behalf of the
German Federal Ministry of Economic Affairs and Energy

Biogas Utilisation

Utilization type	GWh	%
Electricity	28270	68
Heat	12930	31
Vehicle fuel	350	1
Flare	-	-

Source: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2013

CNG as a vehicle fuel: Total number 920 filling station, thereof

- In 2013 about **170 filling stations** with **100% biomethane**
- 350 GWh biomethane was sold, in concrete terms →
- **20% of 95,000** registered **gas vehicles** were filled up with **biomethane**

Source: Erdgas Mobil GmbH, 2013

Digestate hadling

Parameter	Agriculture	Biowaste
Mass of digestate (Mg a ⁻¹)	80 * 10 ⁶	2.4 * 10 ⁶
Total solid concentration (% fresh mass)	7,0	6,0

Source:  **Fraunhofer**
UMSICHT

Based on data from German Biogas Association, 2012
and Wizenhausen Institut, 2011

Agriculture

- Digestate is used as organic fertilizer,
- Solid liquid separation most applied treatment technology (75%),
- 7% use digestate drying (operator survey of DBFZ, 2013)

Biowaste

- solid/liquid separation
- Composting of solids, liquid organic fertilizer

Financial Support Systems

EEG: 21.07.2014

Substrate Category	Feed-in tariffs € cent/kWh	Electric power Up to
Biomass Ordinance ¹⁾	13.66 11.78 10.55 5.85	150 kW 500 kW 5 MW 20 MW
Biowaste ²⁾	15.26 13.38	500 kW 20 MW
Animal manure ³⁾	23.73	75 kW

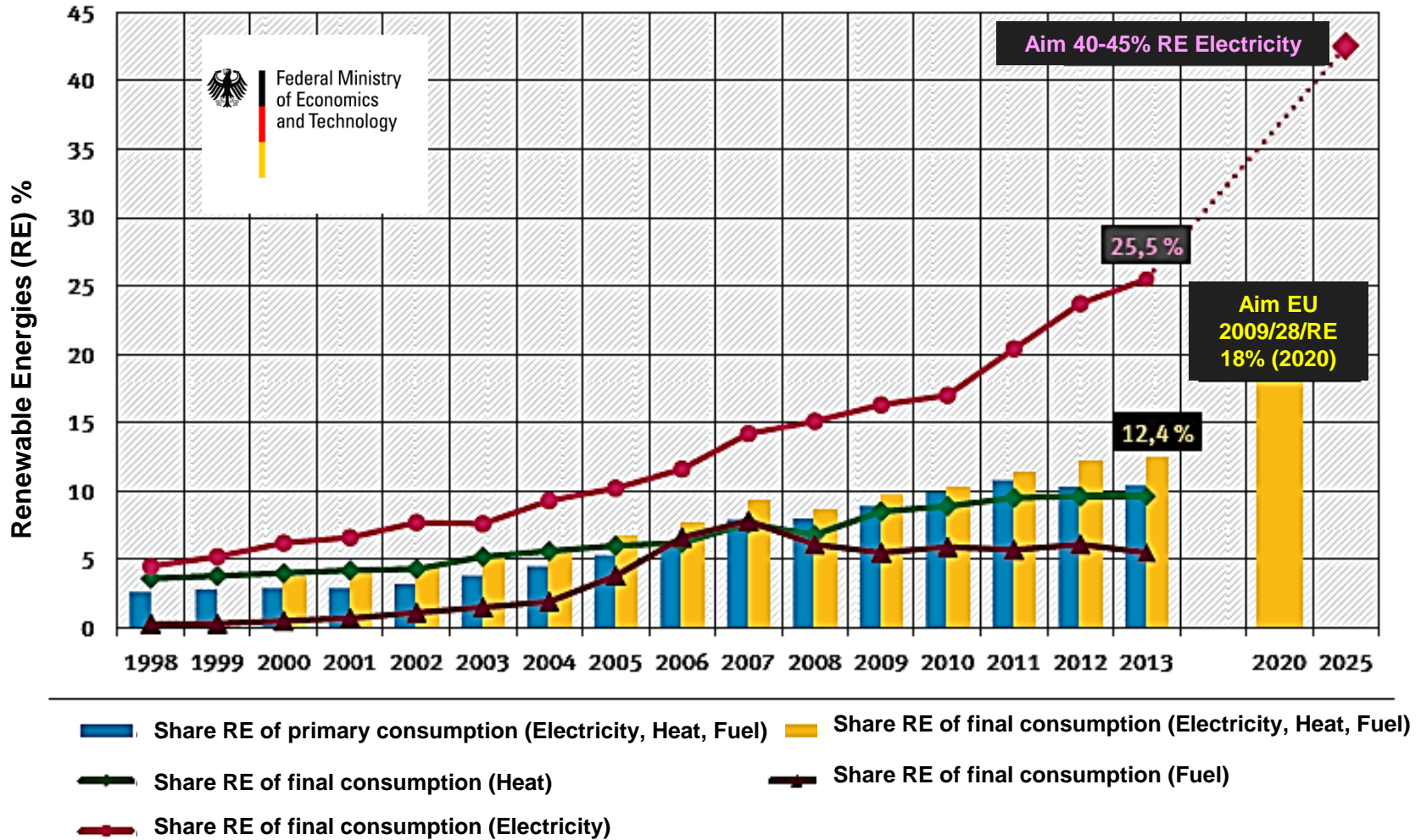
1) dated 21 June, 2001, amendment article 12, dated 21 July, 2014

2) 90% by weight biodegradable waste (waste entry 20 02 01), mixed municipal waste (waste entry 20 03 01) or market waste (waste entry 20 03 02)

3) at least 80% by weight, poultry manure excluded

Source: http://www.bgbl.de/banzxaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&start=//%255B@attr_id='bgbl114s1066.pdf%255D#__bgbl_%2F%2F%25B%40attr_id%3D'bgbl114s1066.pdf%5D__1411982762102

National Strategy



- Annual growth of biomass including biogas is limited to a maximum of 100 MW compared to 2500 MW for onshore wind and solar power
- From 2016 obligation to direct marketing for new plants more than 100 kWel



Research project "Energy Shift"

Testing of slurry based biogas plant, start up Sept. 2014



- Development of a **75 KW biogas plant** based on slurry and farmyard manure
- **Regional consumption** of electricity and heat
- Common treatment of manure from nearby farms and storage of biogas
- Generation of electricity at intervals of four hours each morning and evening for **demand based energy supply**
- Excess **thermal energy** is fed into the heat network of existing wood chip heating system
- **Supply** of the Almesbacher **buildings with heat**
- Collection of legal and organizational experience

www.lfl.bayern.de/lvz/almesbach/060368/index.php



Lehr-, Versuchs- und Fachzentrum
Almesbach



Research project "BIOGAS-MARKER"

Bioindicators of biogas fermentation

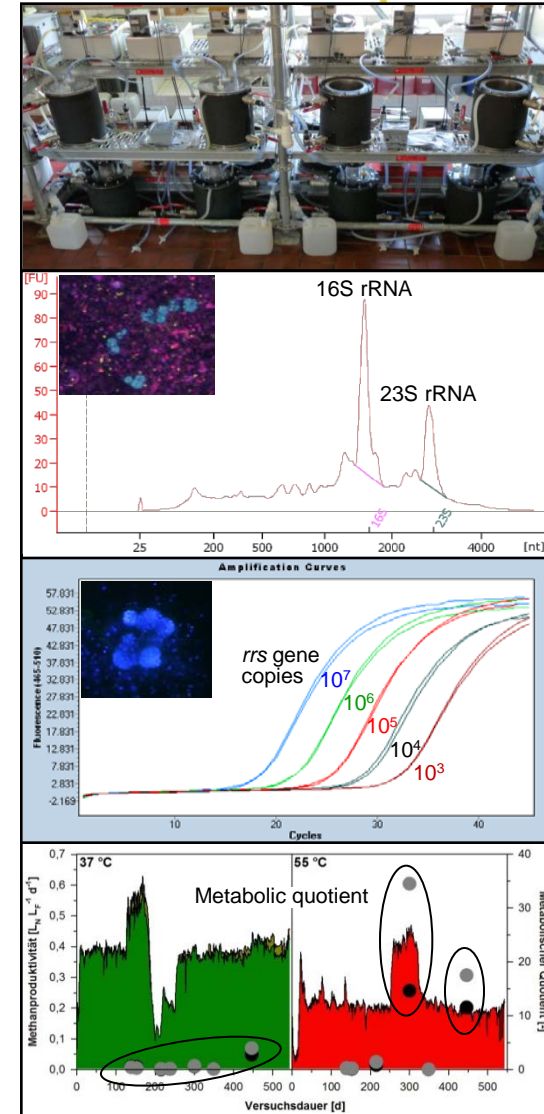
- **Aim:** Development of **molecular markers** and marker-based quantitative PCR assays for the monitoring of process-relevant microorganisms **as early warning system** for process disturbances
- **Tasks:** Meso- and thermophilic single- and two-staged model fermentations utilizing grass silage; standardisation of DNA- and RNA- isolation protocols; microbial metatranscriptome profiling; marker development and validation
- **Partners:** Leibniz-Institut für Agrartechnik Potsdam-Bornim e.V.; Bayerische Landesanstalt für Landwirtschaft; Universität Bielefeld; Technische Universität München; Beuth Hochschule für Technik Berlin



- **Duration:** 1.4.13 - 31.3.16

- **Reading:** Lebuhn et al. (2014): Towards molecular biomarkers for biogas production from lignocellulose-rich substrates. Anaerobe 29: 10-21; dx.doi.org /10.1016/ j.anaerobe. 2014.04.006

- **Contact:** mklocke@atb-potsdam.de



Thank you for your attention!

