



Institute for Biogas
 Waste Management & Energy
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 www.biogasundenergie.de



Technological developments for biogas production and use

Prof. Dr.-Ing. Frank Scholwin

www.exportinitiative.bmwi.de

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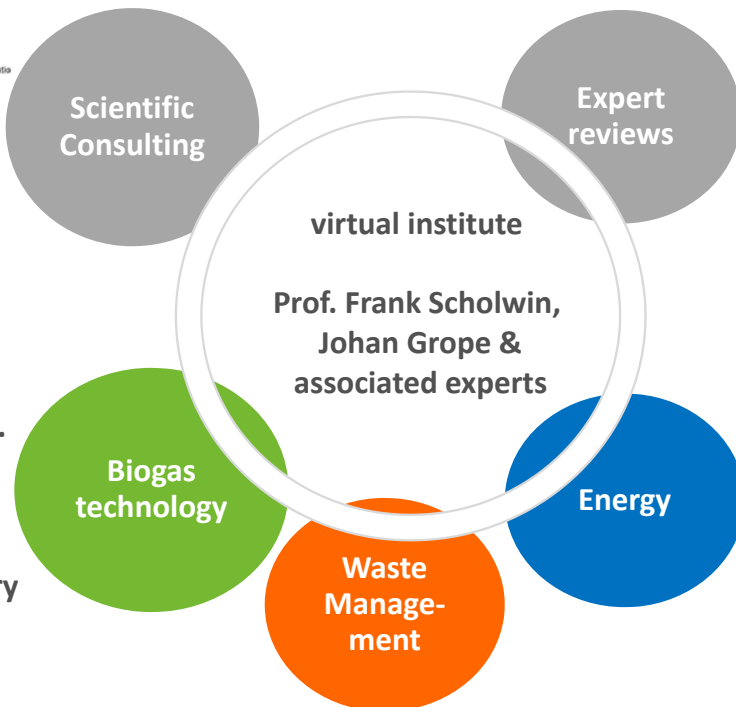
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Activities of the Institute for Biogas, Waste Management & Energy



Long term experiences in consulting and research.

National and international multidisciplinary network.



Services for systems integration.

Networking.

Knowledge Transfer.

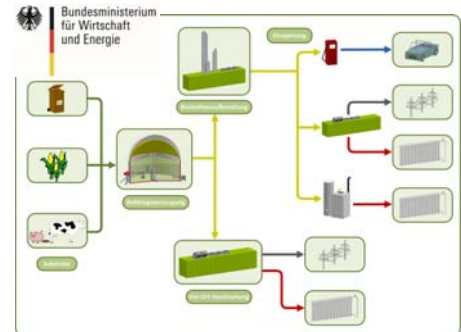
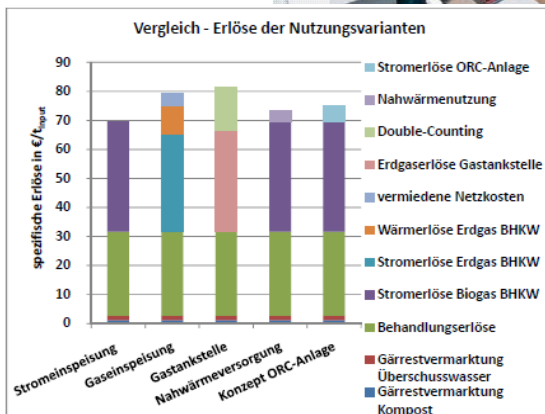
Publication.

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Exemplary running projects



Today's Challenges

- 9,000 existing biogas plants in Germany, mainly based on energy crops and electricity production
- Very active companies, expanding world wide
- Reduction in feed in tariffs for agricultural biogas plants and biomethane plants in Germany, changing framework in many countries
- No new investments
- Limited possibilities for expanding and improvements in existing biogas plants
- Low electricity marked prices



One focus: organic waste utilisation

- Anaerobic treatment in municipal and industrial integrated projects

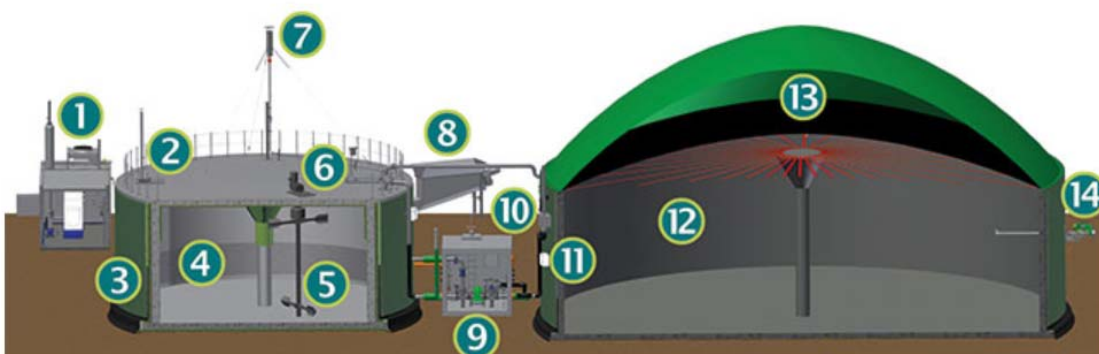


Picture: Viessmann Group



Another focus: small plants for excrements

- Standardised and prefabricated equipment
- Cost efficient construction
- Maintenance as low as possible

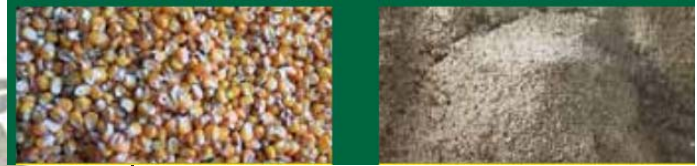


Picture: nq Anlagentechnik



Another focus: new substrates, pretreatment

- lignocellulosic substrates
- agricultural by products, landscape conservation
- Biological not easily degradable substrates
- Pretreatment – but evaluation is necessary!



picture: Huning

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Another focus: energy crops optimisation

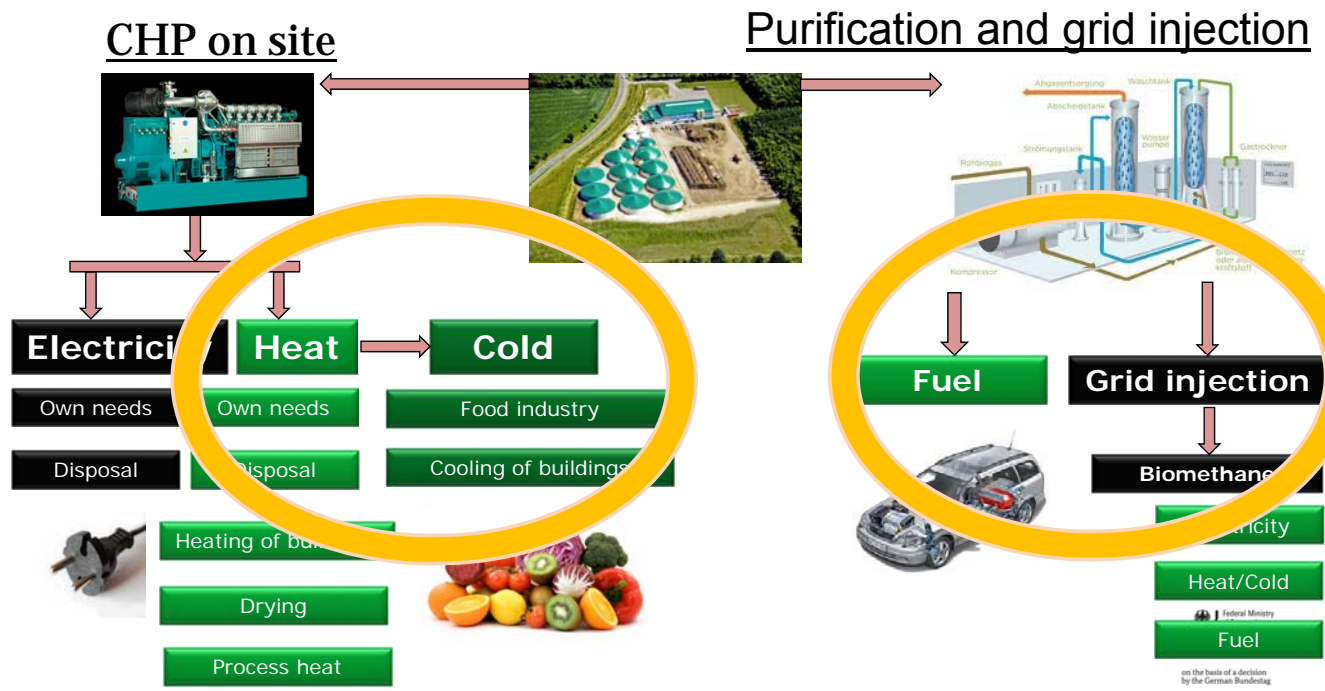
- Energy crops breeding (biomass maximisation)
- Cropping series development
- Energy crops combination with landscape conservation
- Second culture growing



Picture: LWK Niedersachsen

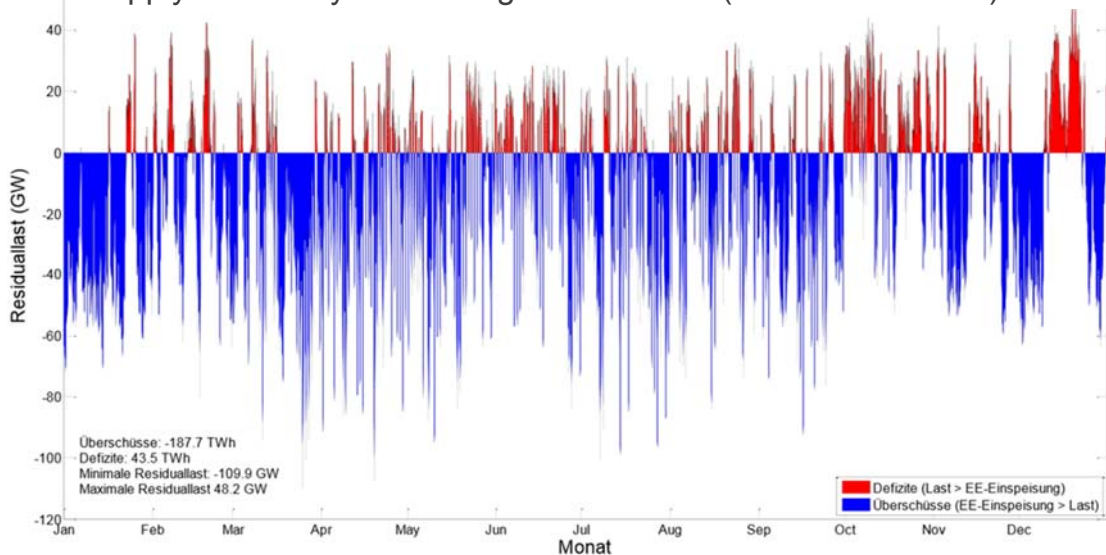


Options for the use of biogas



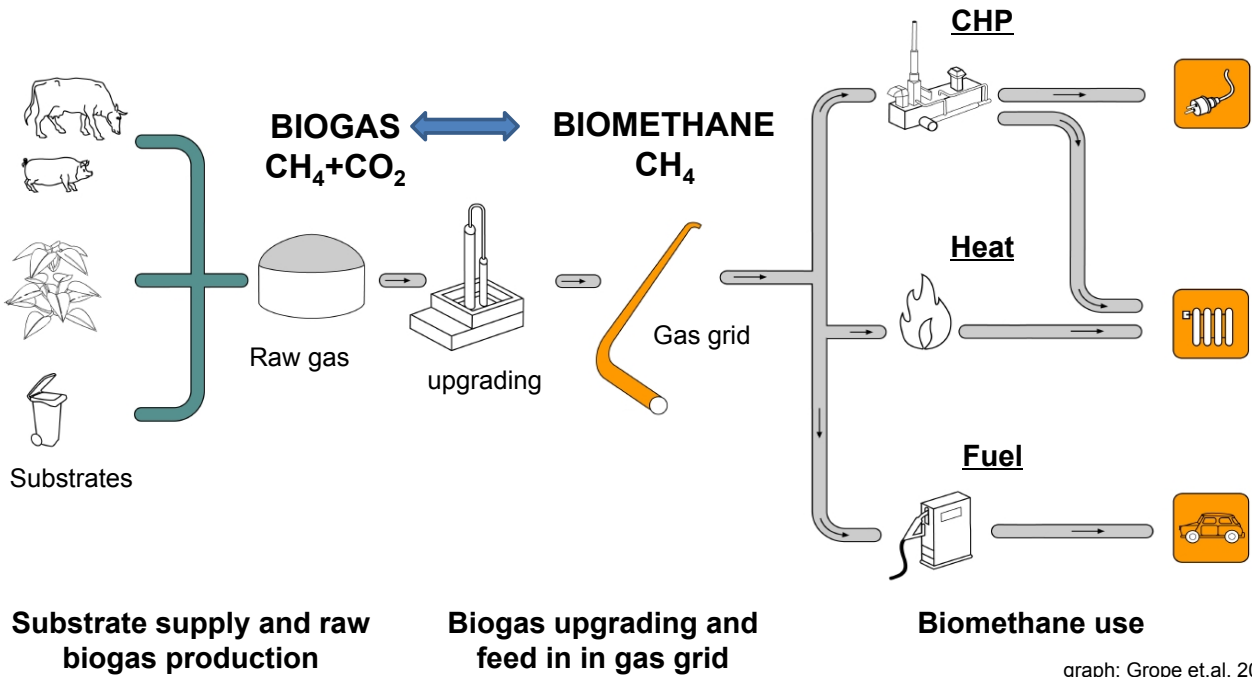
Trend: Flexibilisation of Electricity Production

Scenario for 2050: Residual capacities assuming a 100 % renewable electricity supply with today's technologies behaviour (Fraunhofer IWES)

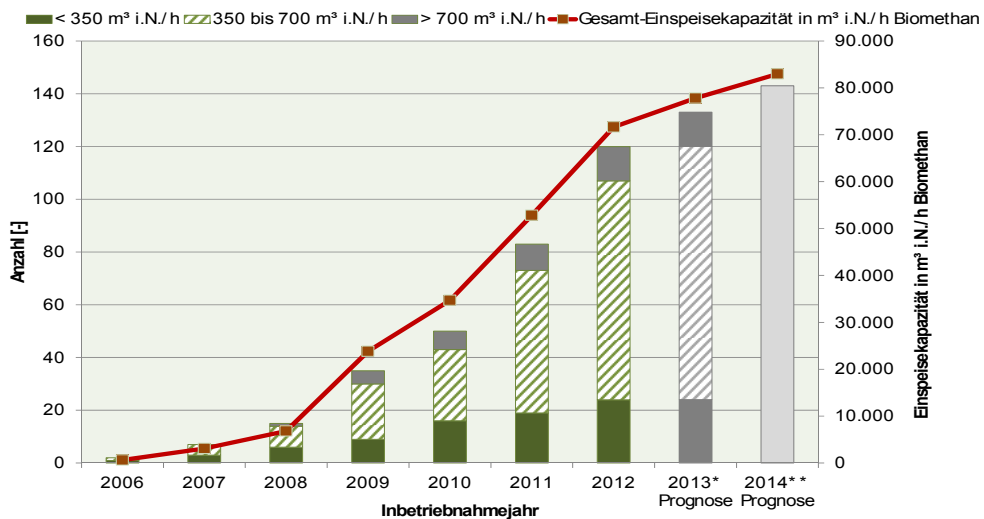




Upgrading of biogas to natural gas quality



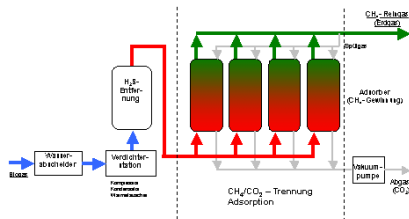
Upgrading of biogas to natural gas quality – now typical in Germany



- 150 Upgrading plants in operation – world leading
- Experiences: D, SE, USA, CH, N, NL, AUT; coming: UK, F, I, BRA...



Upgrading of biogas to natural gas quality - Technologies



Bildquelle: www.energy-21.de



- Technology choice: dependent on local situation and combinations with gas use (CHP, Fuel station...) modular, prefabricated, flexible

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Upgrading of biogas to natural gas quality – costs and efforts

- Gas cleaning (trace gases)
- Upgrading (CO₂-reduction)
- e.g. feed in in gas grid (local / natural gas) and grid transport
- e.g. compression and fuel station

- energy demand: ca 5 % of gas energy content

- minimum gas amount: ca. 300 m³ biogas per hour (20.000 t/a organic municipal waste, 4,000 cows, medium sized landfill, wastewater from 50.000 inhabitants)
- upgrading costs: **1,5 – 3 ct/kWh_{H₂}**

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Conclusion

- German market was the driver for many developments & experiences in the biogas sector
- Internationalisation takes place based on a mature market and transports knowledge & innovations
- Cooperations allow access to reliable solutions for local situations
- local adaption of each single biogas plant
- Knowledge of personnel at the plant site during construction and operation is essential!
- No end of innovation is visible – Application of national & EU grants will be possible for pilot installations

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- More regarding biogas upgrading:



2nd International Conference on
Renewable Energy Gas Technology
7-8 May 2015; Barcelona, Spain
www.regatec.org

- Partner network biogas:

Inter Baltic Biogas Arena IBBA
www.ibba.se



**Biogas – a key technology for nutrient
circulation & energy supply in future**

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