

Application of biomethane in private and public transport

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Advantages of biogas production

Anaerobic Digestion (AD) is the most promising method to

- upgrade waste water from household and industry
- stabilize sewage sludge
- improve fertilizer quality of animal waste
- digest energy crop to produce biogas
- treat the organic fraction of municipal solid waste

Advantages of biogas production

The environmental advantages are evident:

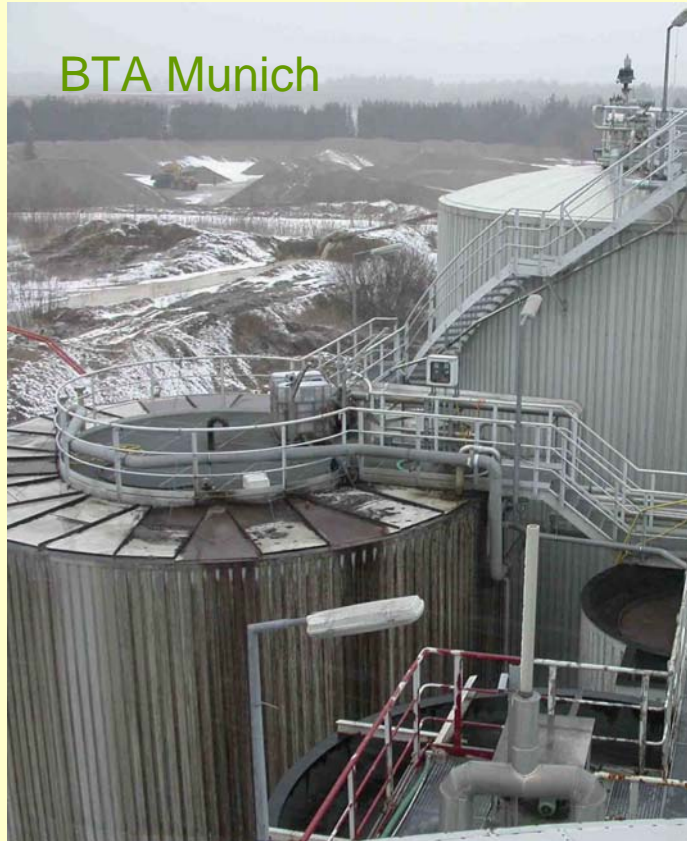
- Hygienisation of waste material (at 55°C)
- reduction of GHG emissions (in landfills)
- substitution of fossil fuels
- production of a valuable fertilizer

Dry fermentation systems



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Wet fermentation systems

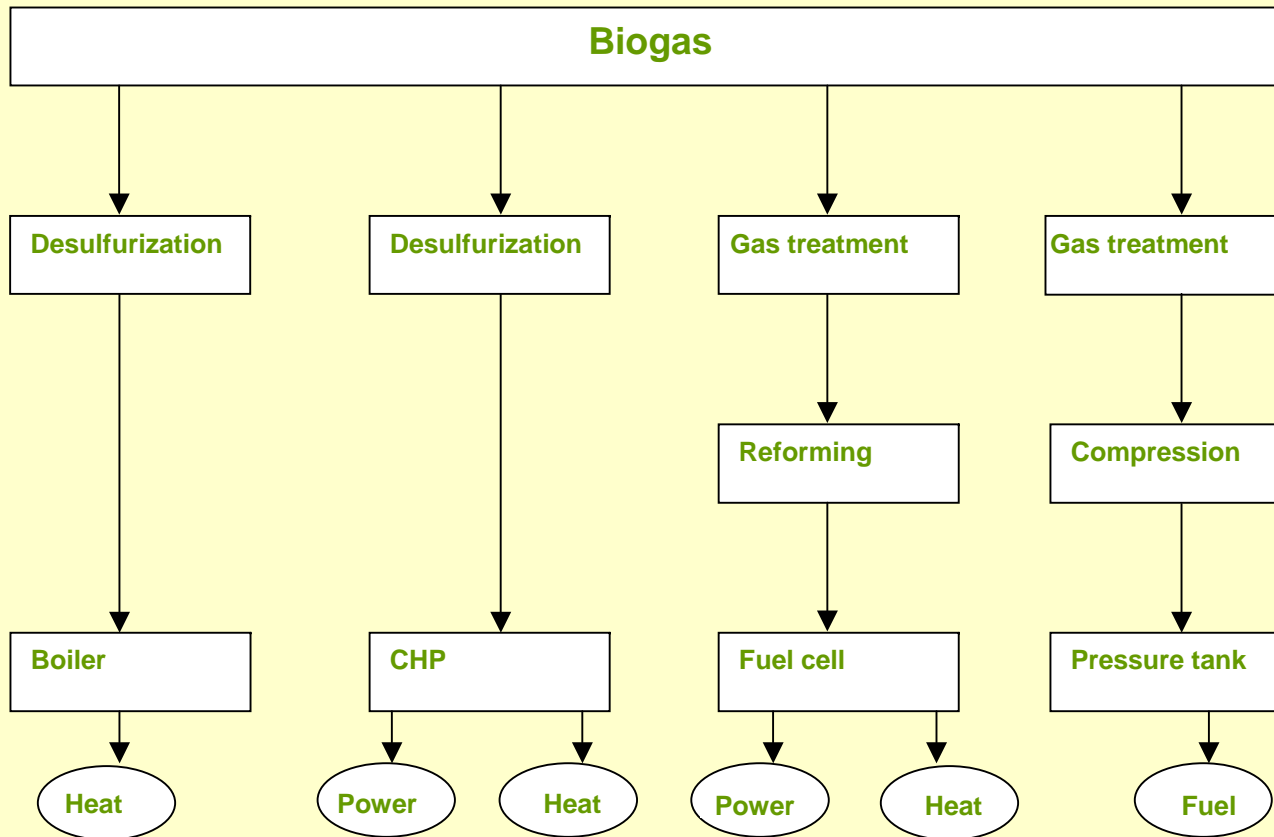


BTA Munich



Agricultural type digester

The opportunities for biogas utilisation



Upgraded biogas for vehicle fuel or grid injection is called **biomethane**

Electricity production



NOV E

Driving with biogas has a long tradition



Classic beetle

Citroen




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The choice of makes is increasing

Citroën (Werk)





C3 Berlingo First X

Fiat (Werk)






Doblò Multipla Panda



Grande Punto

Ford (Schweiz Retrofit)






S-Max Fusion C-Max





Focus Station Wagon Focus Limousine Focus ST







Mondeo Station Wagon Mondeo Limousine Galaxy



Kuga

Mercedes-Benz (Werk)

B170

Opel (Werk)






Zafira Combo Tour Zafira Turbo CNG

Peugeot (Schweiz Retrofit)










207 Limousine 207 Station Wagon 207 CC





807 308 Limousine

Volkswagen (Werk)

Touran Caddy Life Passat TSI



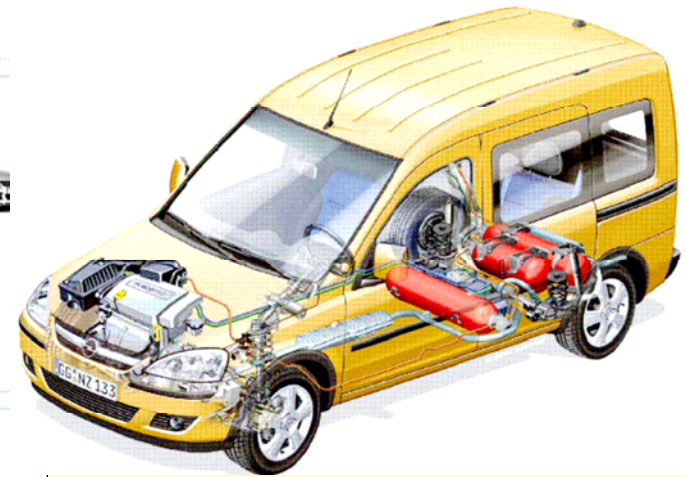
Passat Variant TSI

Volvo (Schweiz Retrofit)






V70 2.0 Multi-Fuel V50 Multi-Fuel V70 2.5 Turbo Multi-Fuel



Also the choice of HDV is increasing



IVECO



VOLVO



MAN




Mercedes-Benz



KENWORTH

GROWTH RATES 2006-2007

January 2008

	2006	2007	%
WORLD	4.6 Million	7.55 Million	64%
CHINA	97,200	200,873	107%
BRAZIL	1 Million	1.48 Million	48%
EUROPE	556,000	748,749	35%
UKRAINE	67,000	100,000	49%
ITALY	382,000	432,900	13%

Low noise – low emission

Reduction with biogas as compared to

	<u>petrol</u>	<u>diesel</u>
CO2	100%	100%
NOx	53%	95%
Soot	35%	99%
NMHC	75%	36%

Advantage of fuel price



- Biomethane is often freed of mineral oil tax
- Lowest cost vehicle fuel
- Often promoted by financial support of gas companies or government
- Incitation by a 20% reduction of liability insurance

Biofuels & Bioenergy



6 cities initiated a European project

- Lille (FR), Coordinator
- Region of Göteborg (Swe)
- Stockholm (Swe), incl. Västerås
- Berne (Swi)
- Rome (IT)
- Zielona Gora and Torun (Poland)

In total 28 partners are involved

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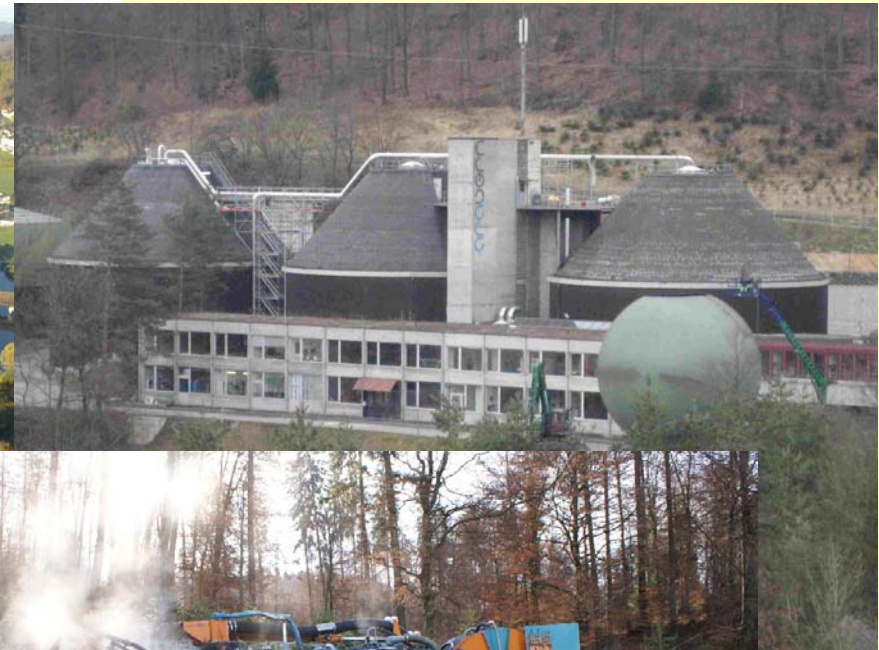


The two major objectives of the project are:

- Demonstration of large scale digestion and biogas upgrading units with waste material available in urban and close by rural areas
- Demonstrate and expand biogas fleets in public transport

The Bern project includes 3 partners:

BERNMOBIL



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y

Production targets of arabern

Goal: 2.6 Mio Nm³ Biomethane by 2011

Trend:

	Biogas mio Nm³/a	Increase since 2006 [%]	Biomethane mio Nm³/a
2006	4'702'728		
2007	5'239'398	11.4	
2008	5'700'510	21.2	ca. 1.8

BERNMOBIL



Energie Wasser Bern



	Personal cars	Busses
Target Biogasmax	Plus 100	70
Status end of 2006	334	32
Status end of 2007	647	45
Status end of 2008	950	45



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Biogasmax in Berne:
It's a great success!



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