



biogasmax

A DRIVING FORCE

SUSTAINABLE URBAN TRANSPORT

30TH AUGUST 2010

PŁOCK, POLAND



Gasbus Project in Bern Switzerland

Local Partnership For Turning Waste Into Fuel

Werner Künzler

ex. Director of Marketing & Sales

Energie Wasser Bern



- Project Overview
- Commercial / Economical Aspects
- Networking



- **Goal:**

Replace all diesel buses by biogas buses
in a defined time periode

- **3 Partners**

- Energie Wasser Bern (ewb)
- BERNMOBIL
- arabern



- **Energie Wasser Bern (ewb)**

Local energy supplier for the City of Bern

(Supplies electricity, natural gas, water and distant heating out of its incineration plant and operates the corresponding grids including bio methane grid injection)



■ **BERNMOBIL**

Public transportation in the City of Bern
and neighborhood

(Operates the Tramways and Bus lines)

www.bernmobil.ch/unternehmen/gasbus.php

Evaluationsbericht (Evaluation Report)

Erfahrungsbericht (Experience Report)



■ arabern

Local Waste Water Treatment Plant (WWTP)
for the City of Bern and agglomeration

(operates the WWTP, produces biogas and
up-grades it to bio methane)



■ 2 Bilateral Contracts

a) Between ewb and BERNMOBIL

b) Between ewb and arabern



a) Contract ewb / BERNMOBIL

- Most significant points:

- . ewb pays for all additional costs, i.e. for BERNMOBIL the change from diesel to gas is «**cost neutral**»
- . ewb builds and operates the gas filling station
- . ewb delivers biomethane for at least 30 buses
- . ewb becomes the only supplier for gas and electricity (whereby price for 1 kg gas is similar to 1 lt diesel, assuming the gas bus drives as far with 1 kg gas as a diesel bus with 1 lt diesel)



b) Contract ewb / arabern

- Most significant points:

- . ewb pays for the connecting pipe to the gas grid for biomethane injection
- . ewb payes 50% of the up-grading system and provides engineering support
- . ewb receives 13 million kWh p.a. for approx. 50% of the biomethane market price for 10 years (this is good enough for 30 gas busses)



- Main Additional Costs (BERNMOBIL)
 - Gas buses are 10 % more expensive in purchase and operation compared to similar Diesel buses
 - Need of fuelling station (including powerful back-up)
 - Interconnection with gas grid
 - In our case, adaptation of building infrastructure such as: gas sensors, automatic door and roof opening, ventilation, fire proof pillars and walls, “sparkle-free” electrical installations (lamps, switches, motors), etc.
 - Adaptation of garage tools
 - Training of engineers and drivers



- Main Additional Costs (arabern)
 - Engineering and purchase of up-grading system
 - Grid injection including
 - . Gas quality assurance
 - . Monitoring and measurement
 - Interconnection with gas grid



- Financing (rough figures)
 - BERNMOBILE Additional Costs
 - . Purchase of buses: 4.3 million Euro
 - . Fuelling stations: 7 million Euro
 - . Infrastructure up-grade: 3 million Euro
 - . Operation: 0.3 million Euro p.a.



- Financing (rough figures)
 - Financed by:
 - . Funds and sponsoring: 8.2 million Euro
 - . Funds: 150'000 Euro p.a.
 - . Sales of gas as fuel: 0.4 million Euro p.a.



- Financing (rough figures)

- arabern additional costs

- . Up-grading system (50%): 0.5 million Euro

- . Interconnecting pipe: 0.7 million Euro

- . Measurement Quality control: 0.3 million Euro

financed by:

- . Funds: 0.7 million Euro

- . Cheaper biomethane: 0.15 million Euro p.a.



■ Financing (calculations)

BERNMOBIL	Investments	Euro	Annual Cost
	Fuelling Stations	7'000'000	
	72 Buses	4'300'000	
	Infrastructure	3'000'000	
	Total Investment	14'300'000	
	./. Contributions (Funds, etc.)	8'250'000	
	Net to ewb	6'050'000	223'316
arabern	Investments		
	Up-grading System	500'000	
	Grid Connection	700'000	
	Engineering	300'000	
	Total Investment	1'500'000	
	./. Contributions (Funds, etc.)	600'000	
	Net to ewb	900'000	33'221
Total	Recurring Operation Cost p.a.	300'000	300'000
	Total recurring cost		556'537
Total	Recurring Income p.a.		
	Fund	150'000	
	Fuel	410'000	560'000
	Interest %	1.50	
	Amortisation / years	34	



- Who has an interest in such a project?
 - Government (City, Community, Country)
(CO2 reduction -> reputation)
 - Bus operator(s)
 - Gas supplier
 - Fuelling station supplier and operator
 - Bus supplier
 - WWTP and landfill operators
 - feedstock supplier (green goods, additional feedstock for WWTP for co-digestion)



- Who has an interest in such a project?
 - Supplier of biogas up-grading systems
 - NGOs (WWF)
 - Public (less noise, cleaner air, well feeling)

Try to create win-win situations.



**Thanks a lot and good luck for
your own projects!**

