

# Country Report Switzerland

Utrecht, September 20 to 22, 2005

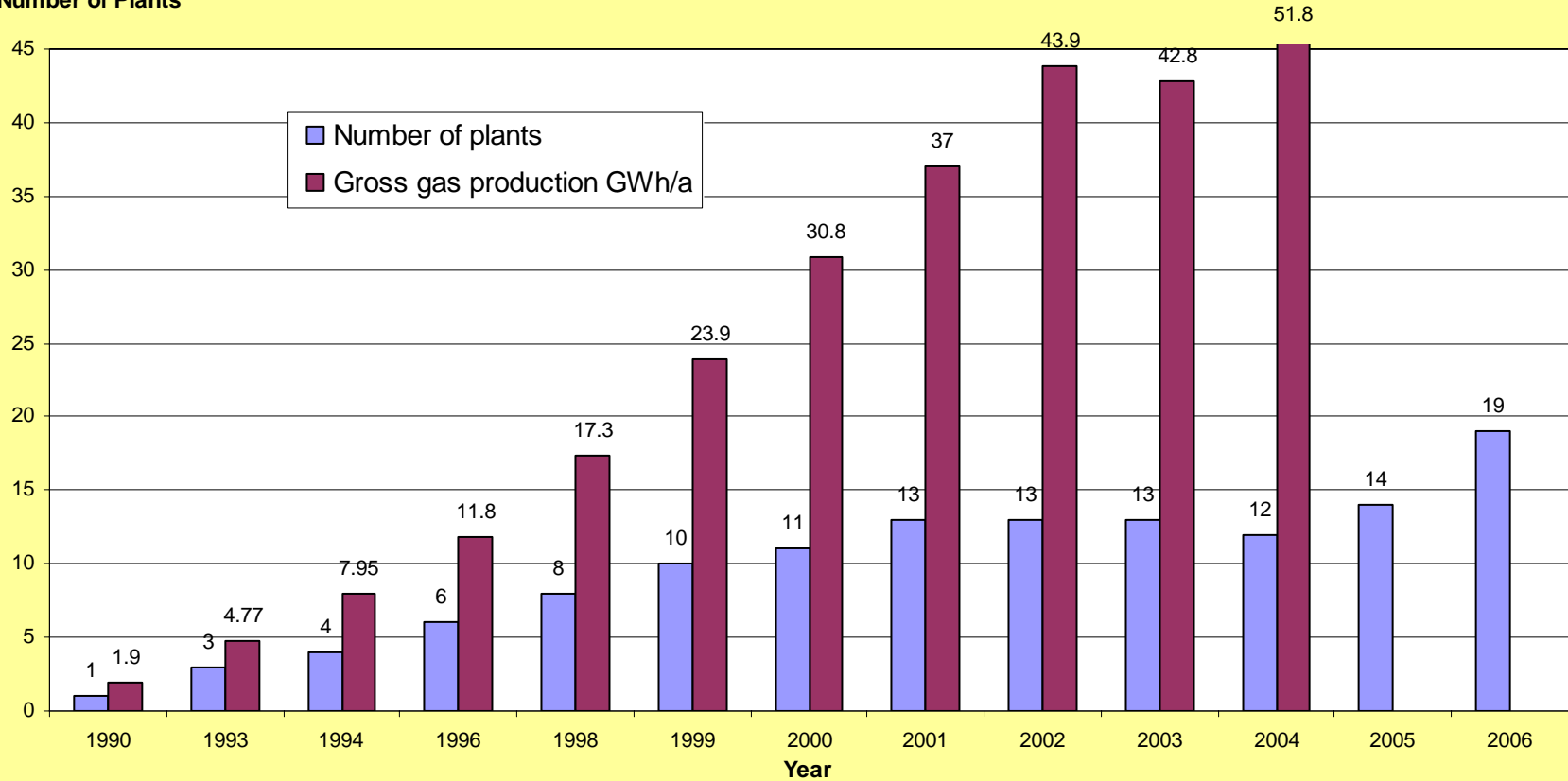
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Nova Energie Ltd.



# Green Waste: Nr of Plants & Energy Production

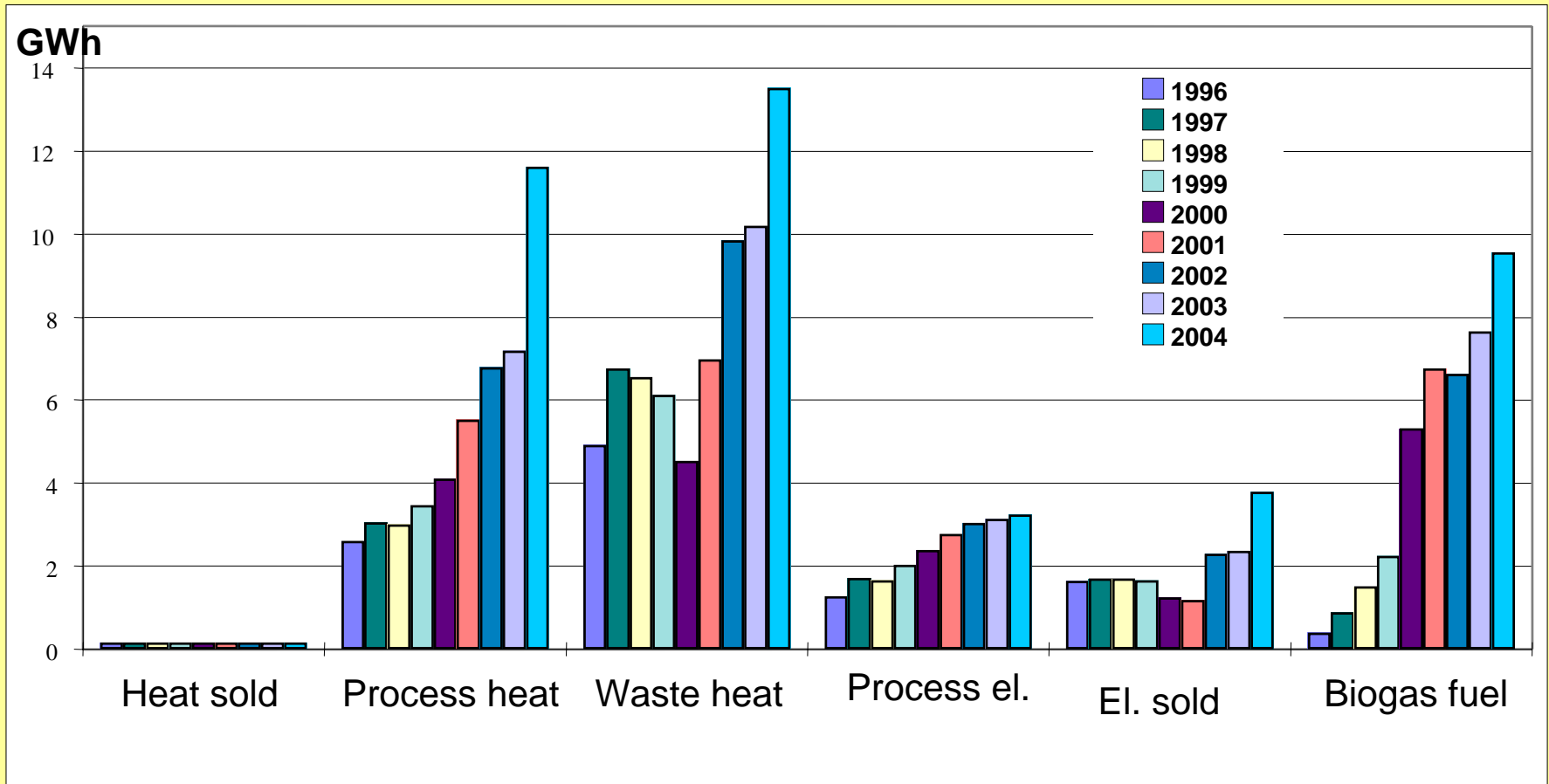
## Development of Plants Digesting Green Waste

Number of Plants



**NOVA** Energie

# Green Waste: Nr of Plants & Energy Production

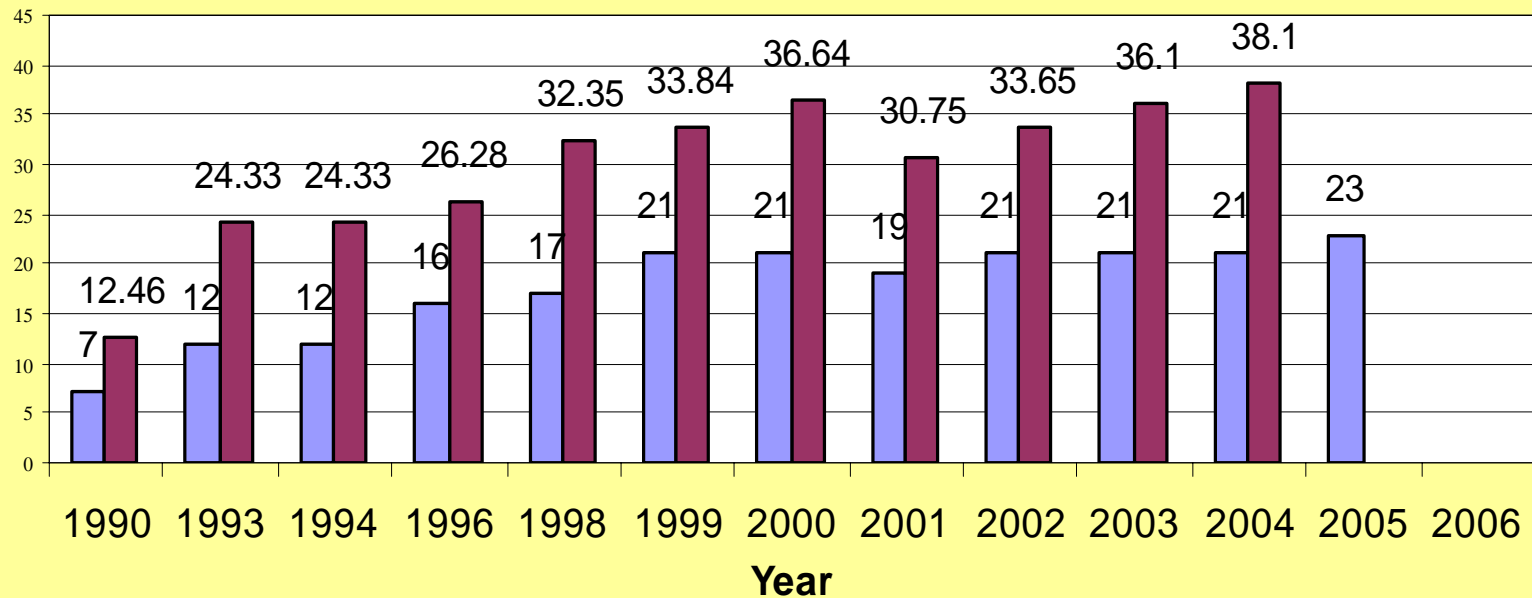


# Industrial Waste: No of Plants & Energy Production

## Development of Industrial Plants

■ Number of plants ■ Gross gas production GWh/a

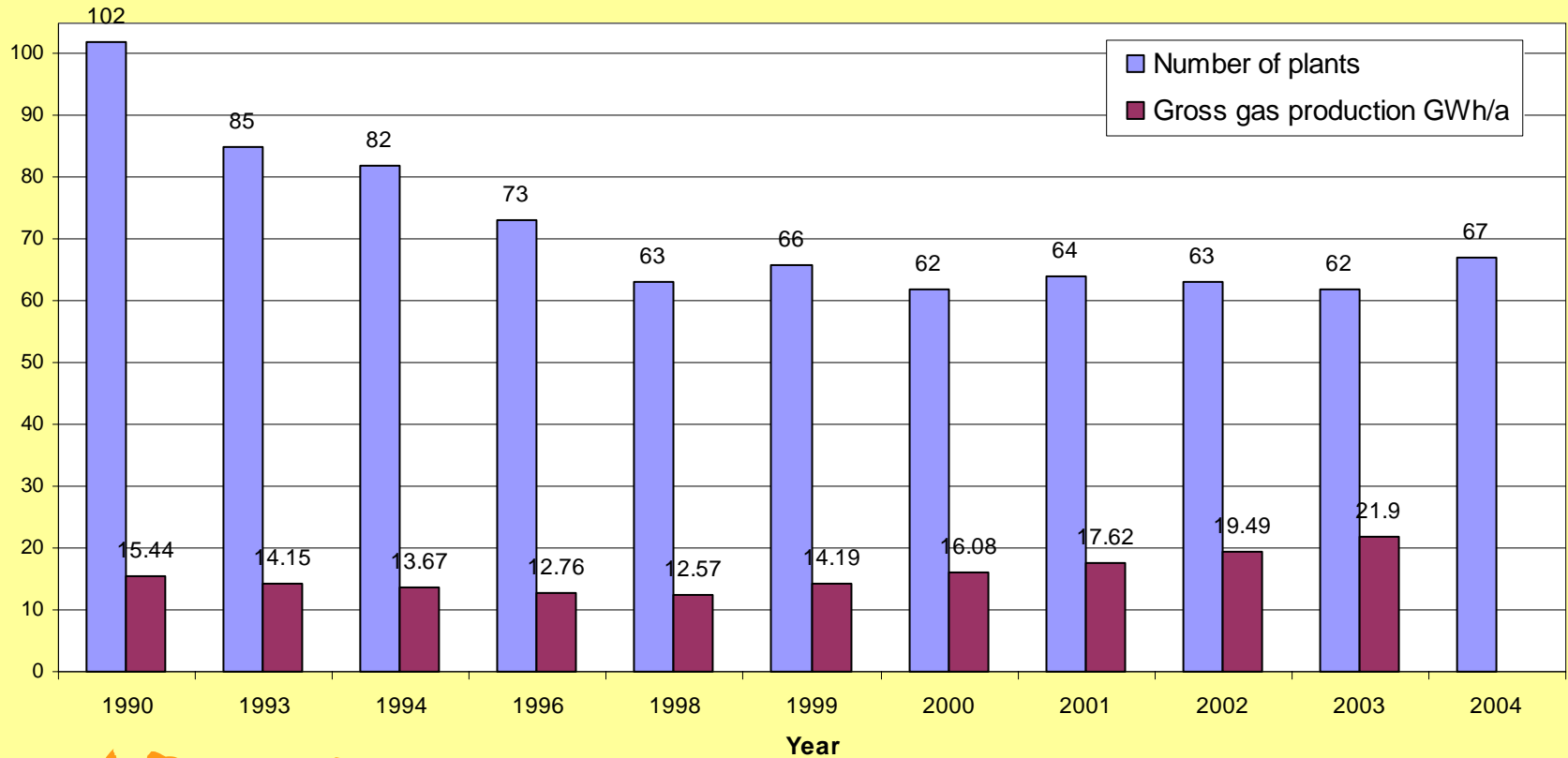
Number of Plants



# Agricultural Waste: Number of Plants & Energy Production

Agricultural Plants

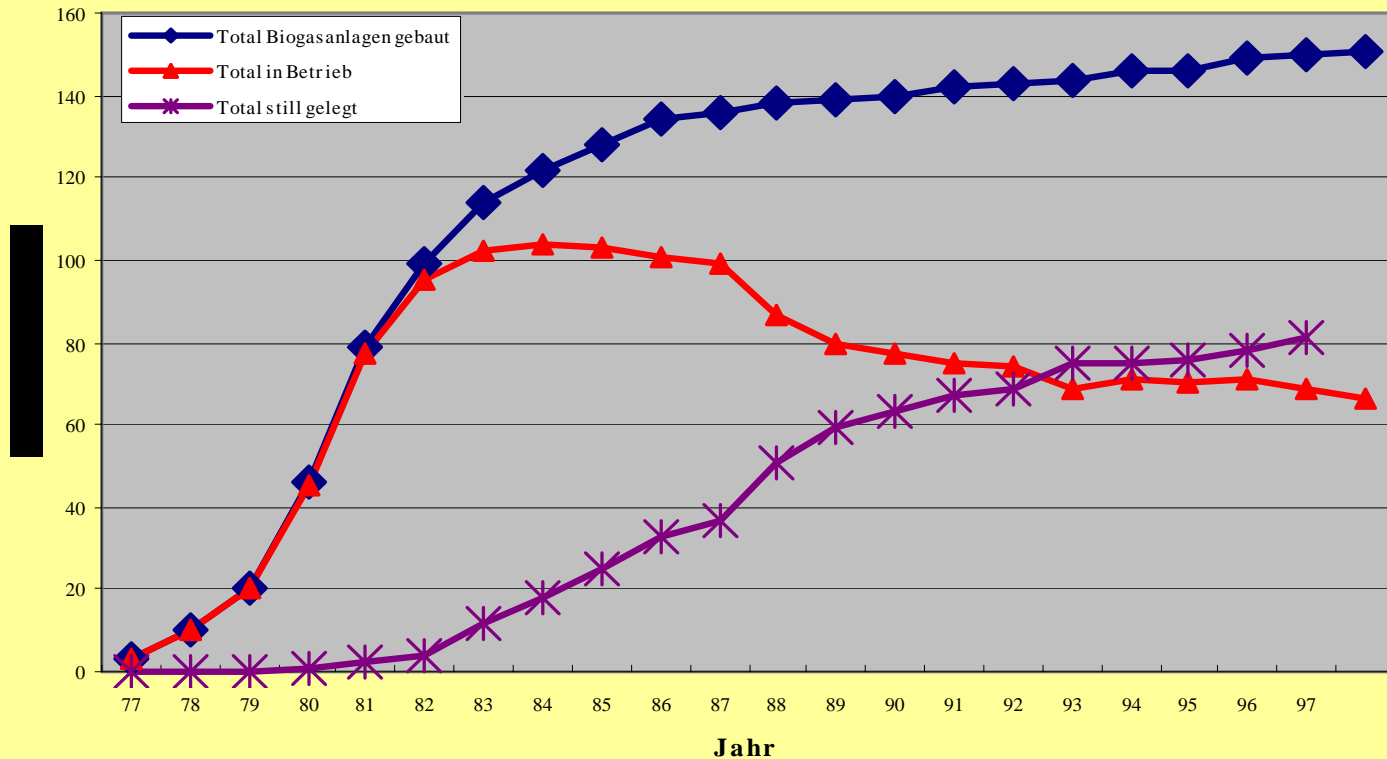
Number of plants



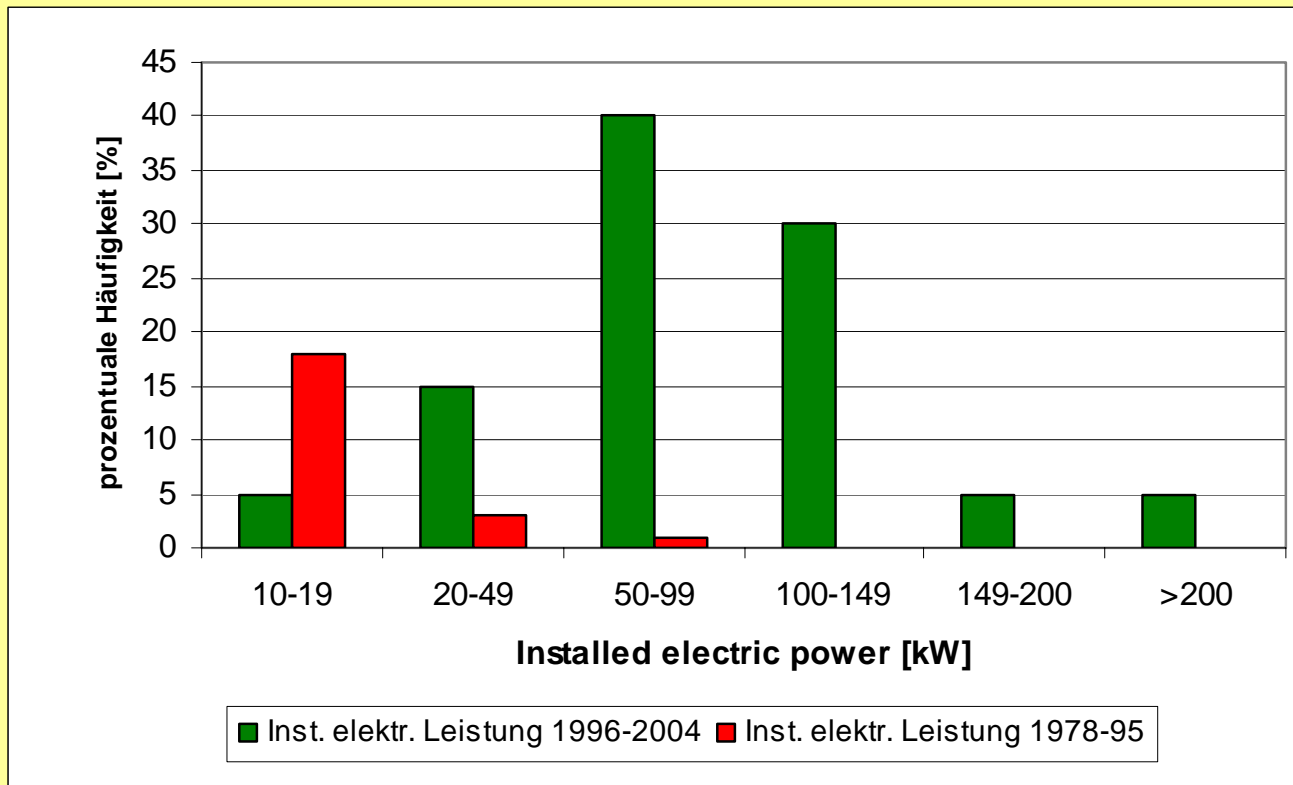
**NOVA** E n e r g i e

# Agricultural Waste: Development

## Landwirtschaftliche Biogasanlagen



# Agricultural Waste: Electric Power

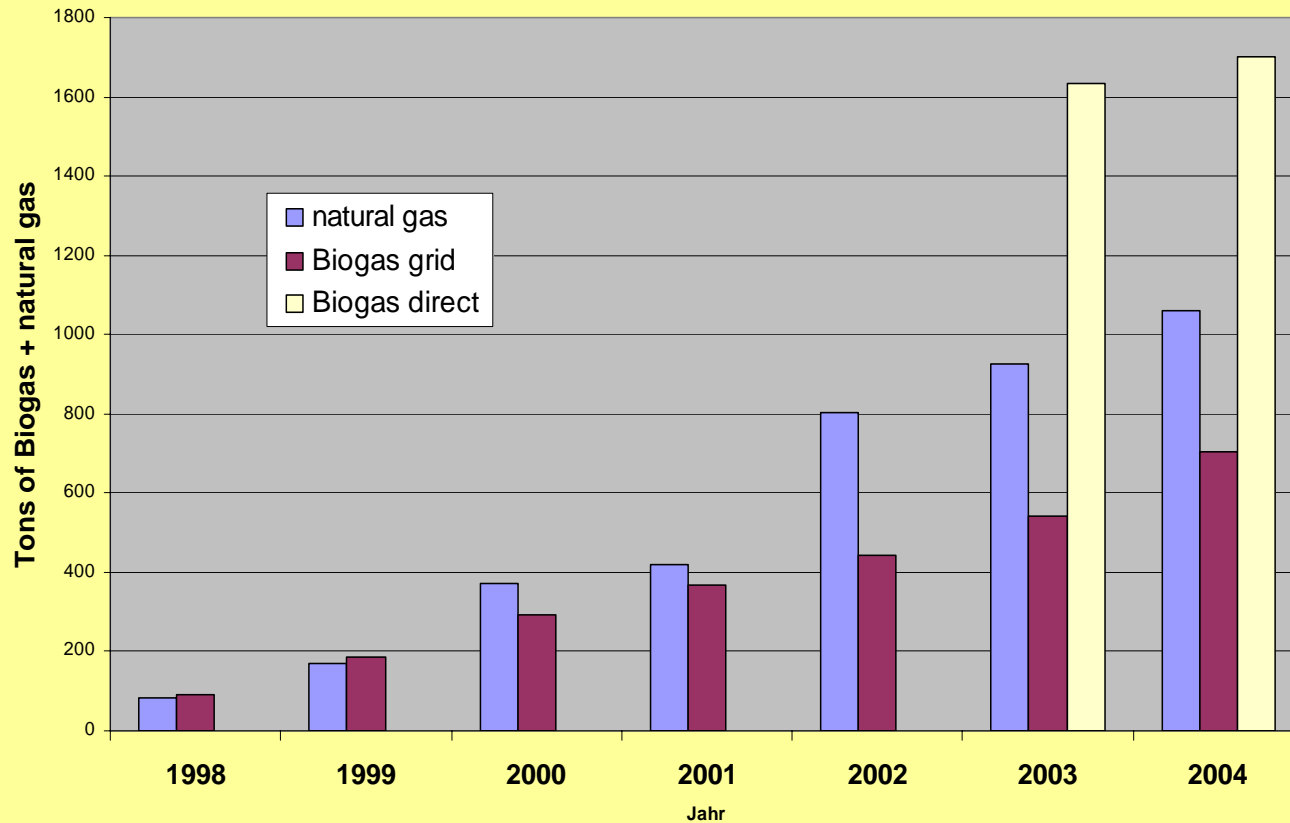


# Biogas fuel in Switzerland (2004/05)

	2004	2005
Number of gas vehicles	730	1400
No of upgrading plants	3	5
Number of fuelling stations	35	60
Share of biogas	45%	40%
Price at pump station	Biogas: 0.67 €/kg (0.56 €/l petrol equivalent) Natural gas: ca. 1.00 €/kg (0.64 €/l petrol equivalent)	



# Gas as fuel in Switzerland








Biogas covers 60% (resp. 40% in the grid) of the fuel gases

# The number of brands and models is increasing

	Passenger cars	Light transporters
	2	2
	4	2
	7	2
	3	1
	1	2
	1	1
	1	0
	3	0
		
		2

# Busses and Trucks

	Busses	Trucks
	4	2
	2	2
	2	1
	2	0
	0	2

# ADAC crash test



Opel Zafira CNG achieved 9 out of 16 points in a crash test which is comparable to a conventional petrol car (10 points).

The slight difference is due to the increased weight

# IKEA & Mobility



The largest IKEA shop in Switzerland has leased 3 Ford buses and has opened an own fueling station with Kompogas

# Research Projects

Completed research projects by mid 2005:

- Energy from whey : comparison of biogas and bioethanol (EREP)

Only two impacts have been considered: fossil fuel consumption and greenhouse effect. The following two cases were compared: i) replacement of fuel-oil by biogas for heat production and ii) replacement of conventional gasoline by “essEnce5”. There was no significant difference. The treatment of one cubic meter of cheese whey allows in either way saving more than 20 litres oil eq. of fossil fuel and 60 kg of CO<sub>2</sub> eq. emission.

# Research Projects (2)

Completed research projects by mid 2005:

- Separation of digestate from manure and co-substrates (EREP)

DATE	DIGESTAT					LIQUIDE					SOLIDE					SOLIDE STOCKE (10 JOURS)				
	MS [% MF]	MO [% MS]	C/N	NH <sub>4</sub> -N [kg/1MS]	P <sub>2</sub> O <sub>5</sub> [kg/1MS]	MS [% MF]	MO [% MS]	C/N	NH <sub>4</sub> -N [kg/1MS]	P <sub>2</sub> O <sub>5</sub> [kg/1MS]	MS [% MF]	MO [% MS]	C/N	NH <sub>4</sub> -N [kg/1MS]	P <sub>2</sub> O <sub>5</sub> [kg/1MS]	MS [% MF]	MO [% MS]	C/N	NH <sub>4</sub> -N [kg/1MS]	P <sub>2</sub> O <sub>5</sub> [kg/1MS]
11.09.03	10,3	80,6	22,9	0,93	22,5	—	—	—	—	—	26,7	87,5	36,7	0,95	18,7	23,5	84,5	29,9	1,37	22,6
08.12.03	*	*	*	*	*	4,9	67,3	—	53,0	30,4	27,5	87,8	—	0,95	15,2	27,2	46,4	—	0,8	14,1
29.07.04	—	—	—	—	—	6,1	69,9	5,0	48,9	26,7	25,8	86,8	35,5	1,16	14,6	37,9	84,5	28,1	1,27	16,7

(— : non déterminé ; \* : non représentatif)

# Research Projects (3)

Digestion of pig manure in a membrane reactor (Hersener)



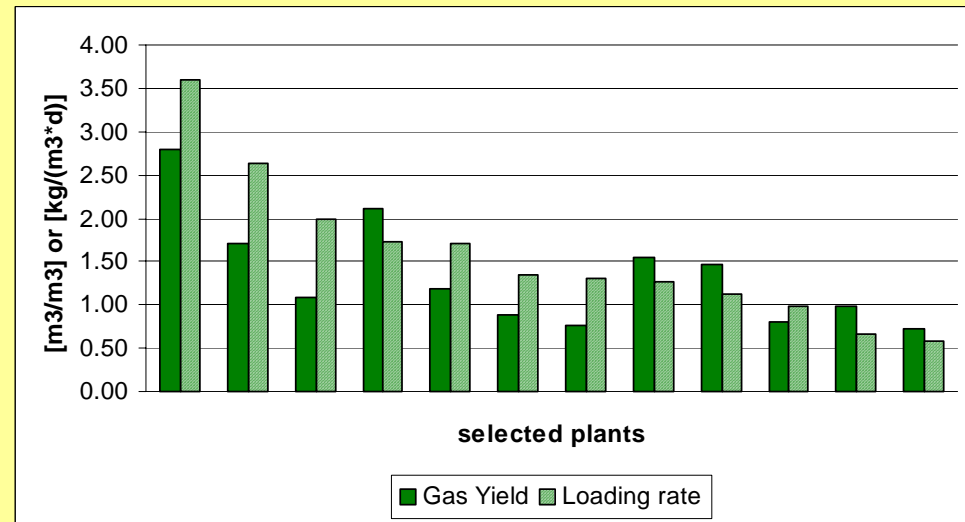
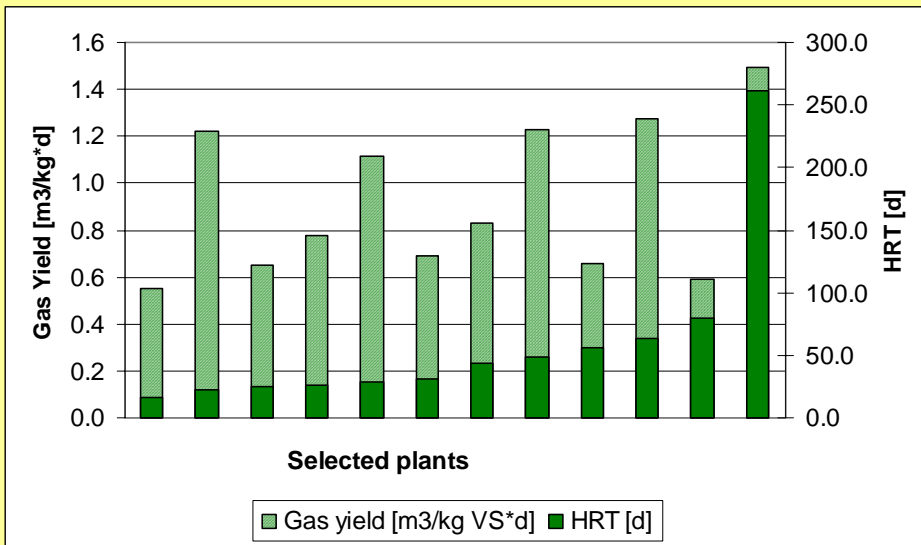
At a HRT of 10d and a SRT of 30d (LR 1.7kg/m<sup>3</sup>\*d) they achieved a gas yield of 310l/kg VS. Laboratory experiments showed an 20% improved yield with UF.

The full scale plant is under construction. It will treat 35'000 TPY of pig manure and co-substrates



# Research Projects (4)

## Evaluation of existing agricultural biogas plants (Genesys)



Preliminary conclusion: Farmers don't say or don't know what they are doing