

Swiss country update

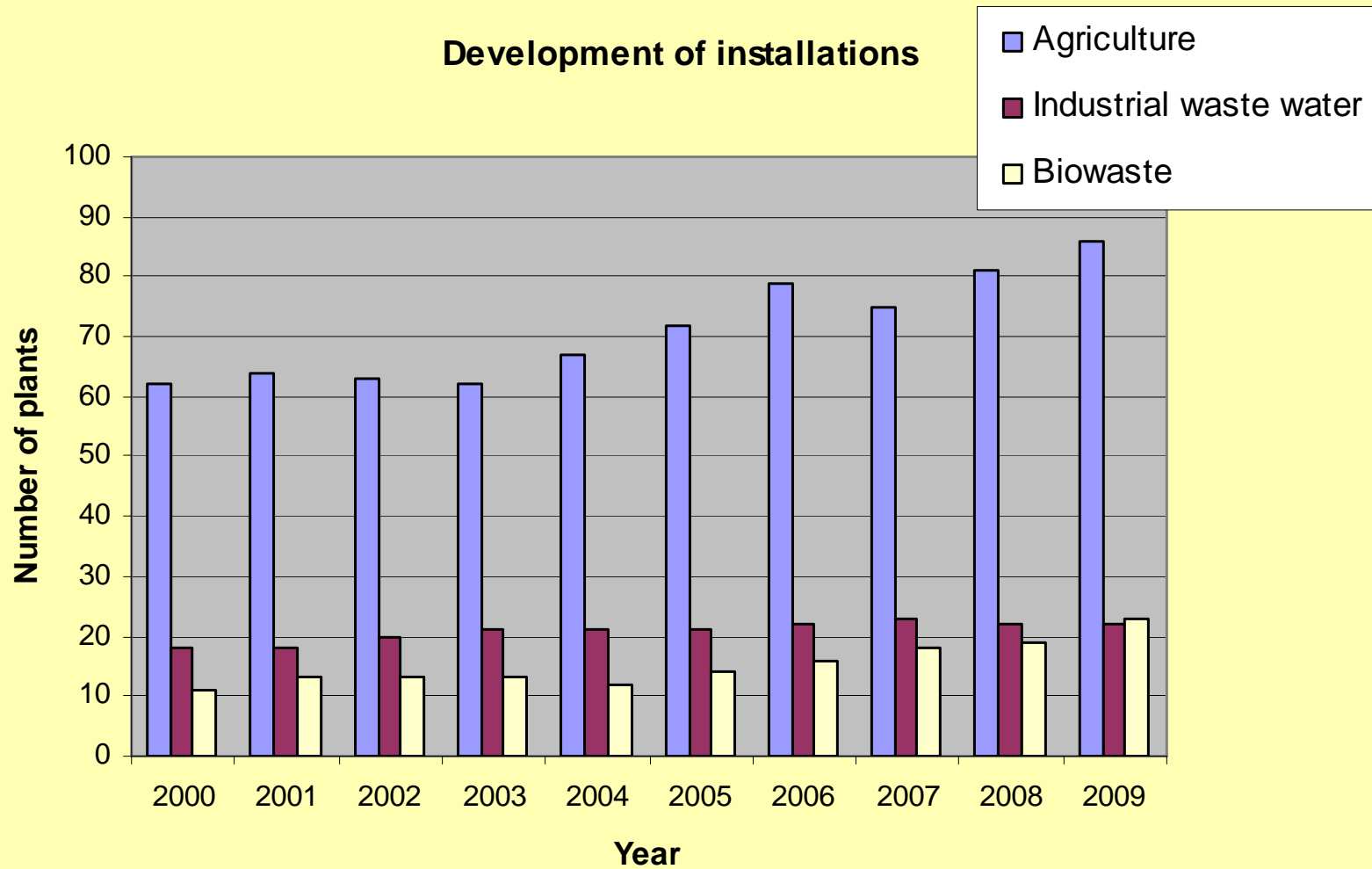
s'Hertogenbosch, 02 November 2010

Arthur Wellinger
Nova Energie Ltd.

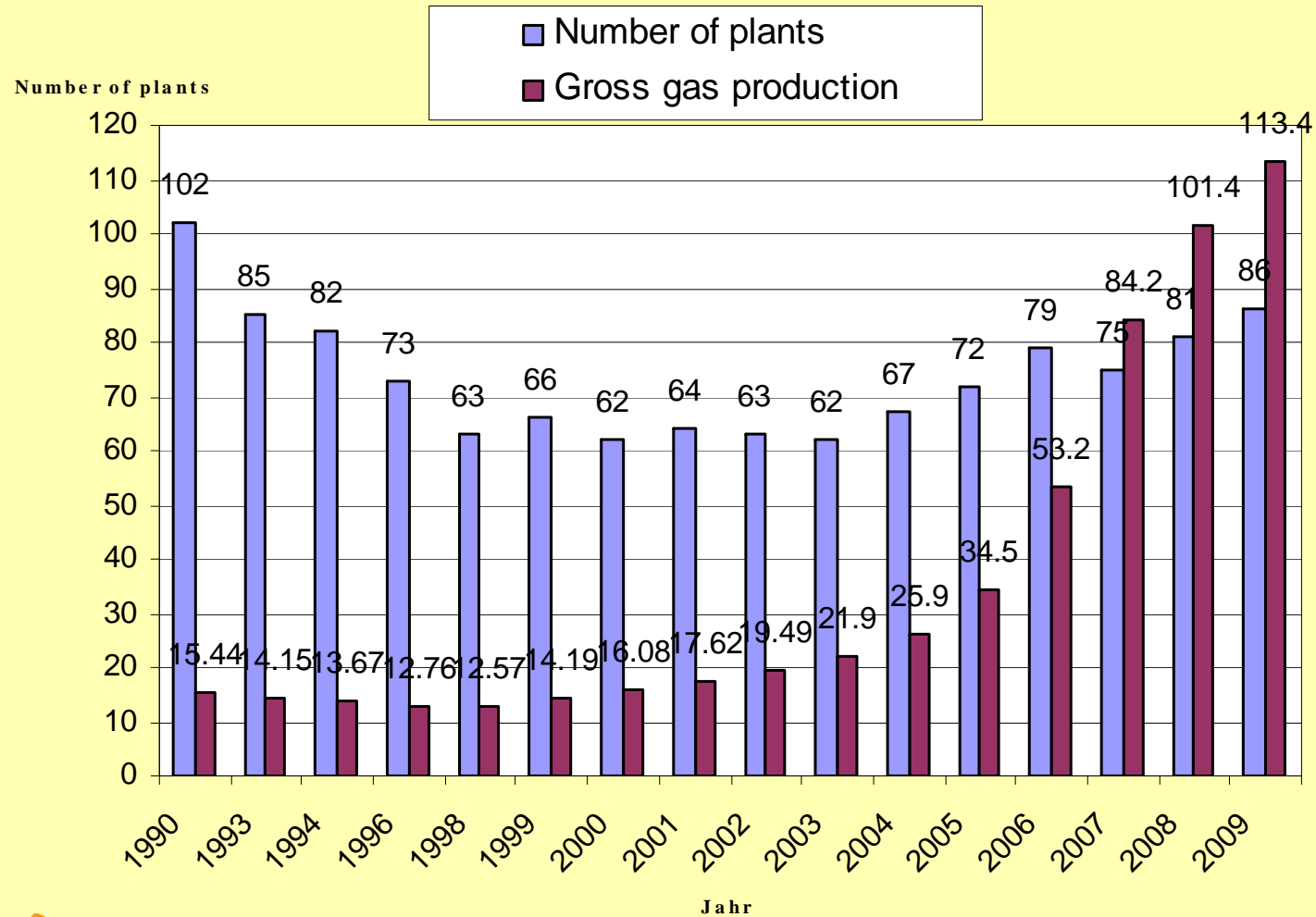
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Biogas Plant Inventory

Development of installations

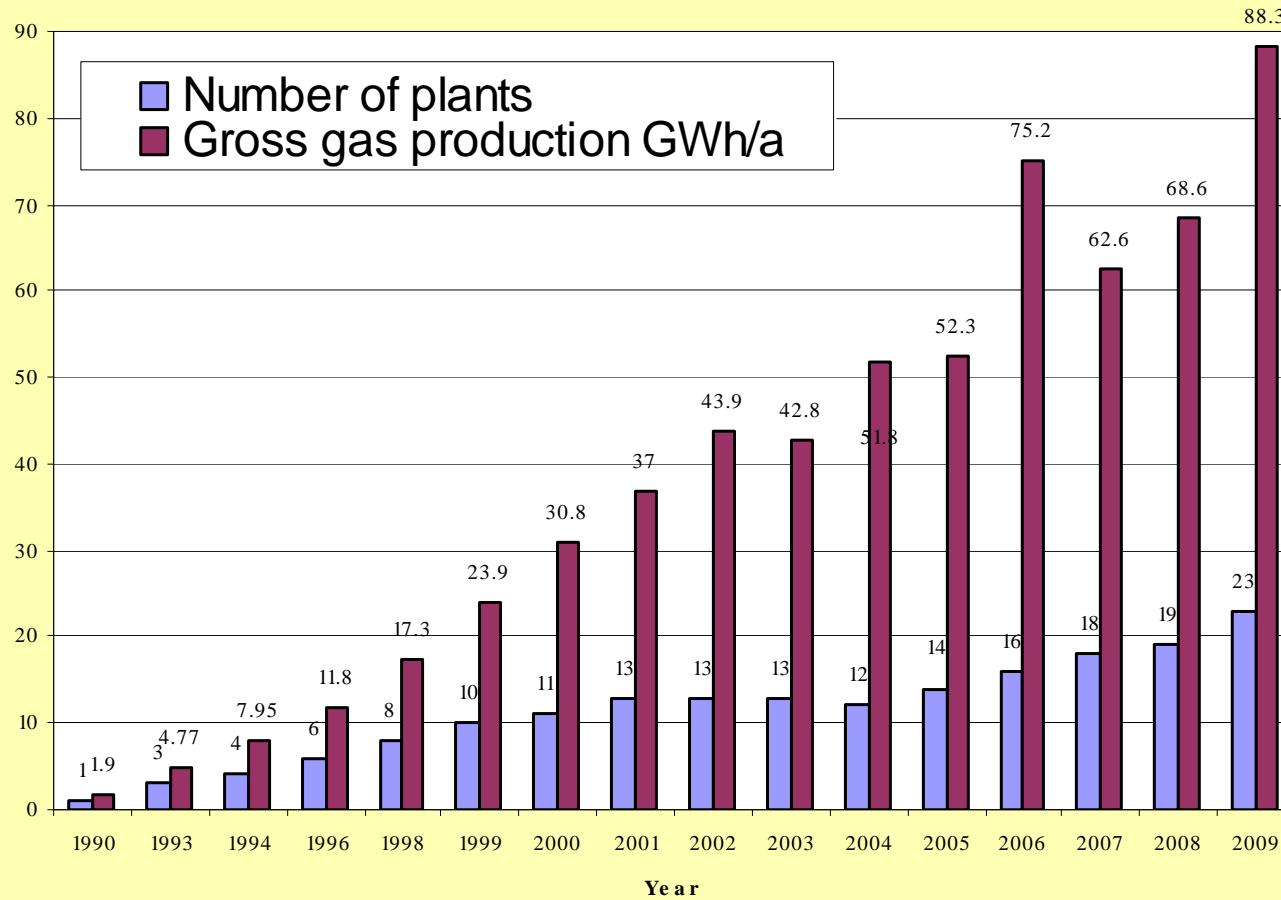


Agricultural plants



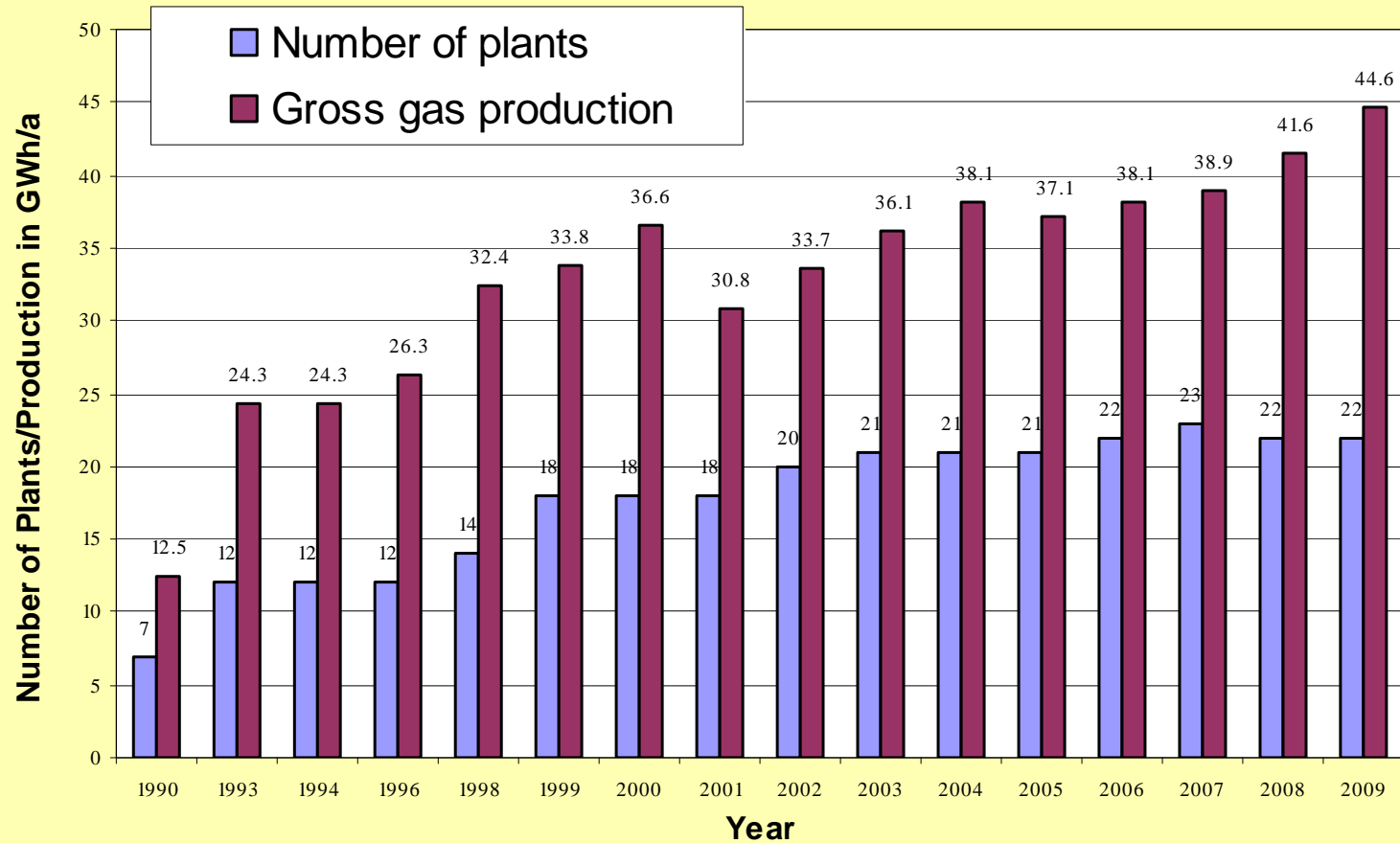
Biowaste

Number of plants

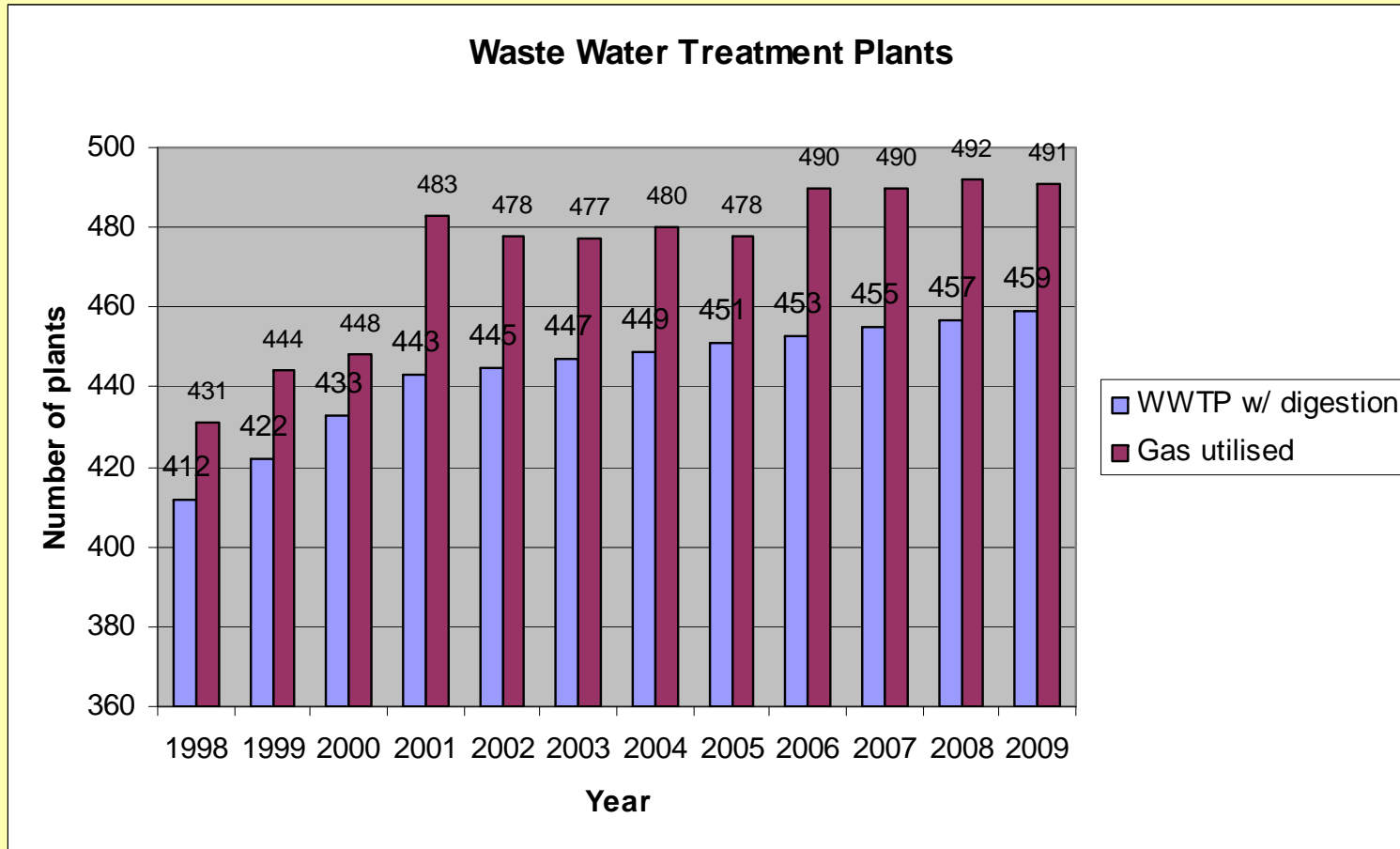


Industrial Waste Water

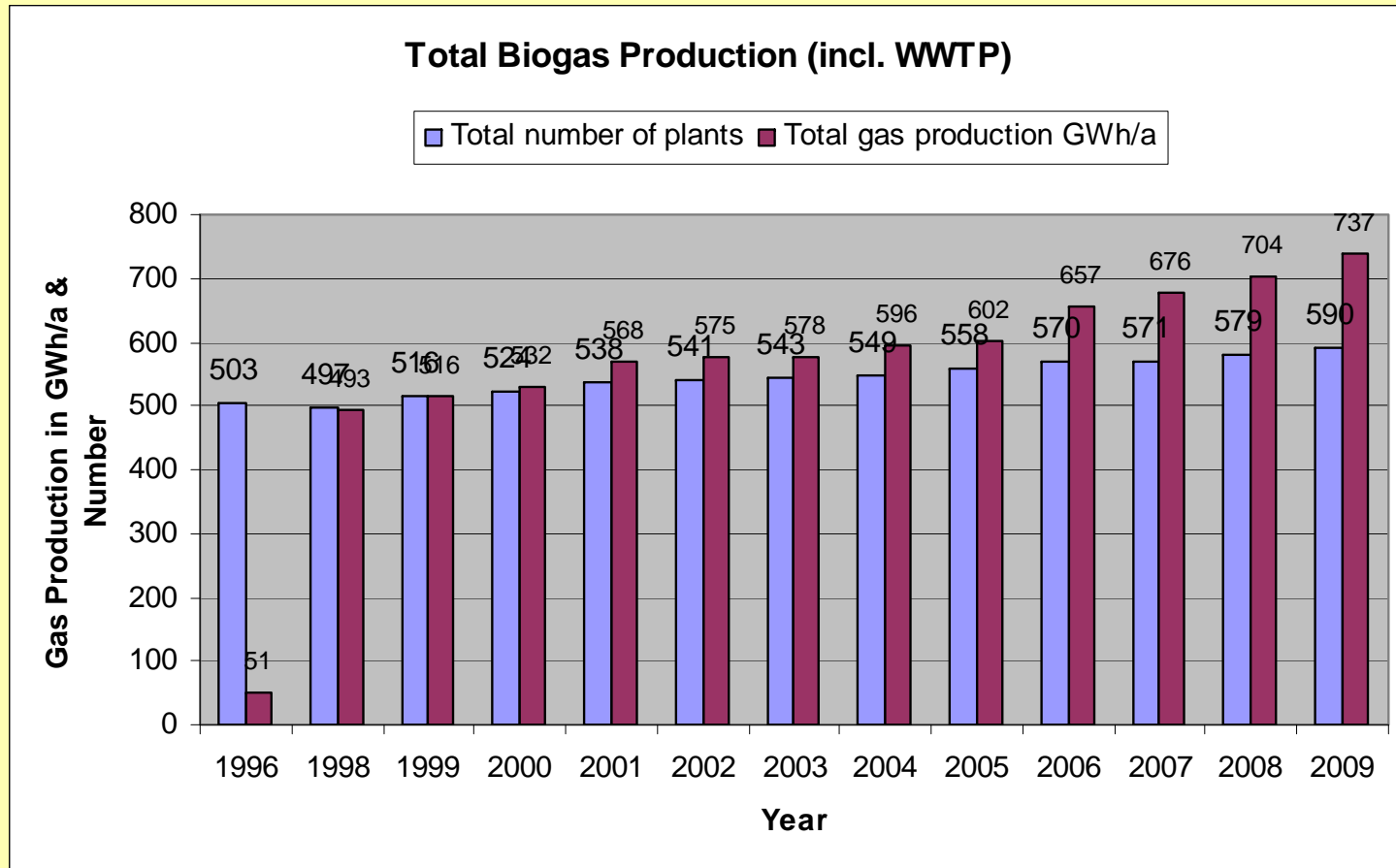
Development of Industrial WWT Plants



Biogas Upgrading Plants

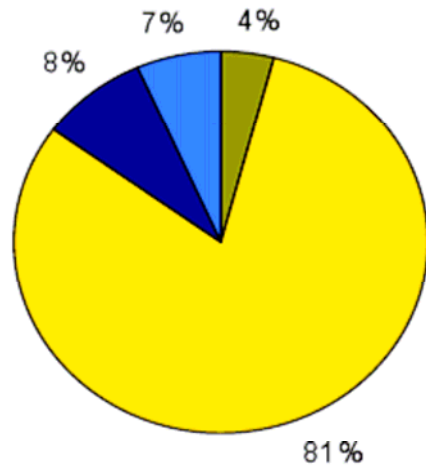


Biogas Plant Inventory



Biogas Plant: Applications

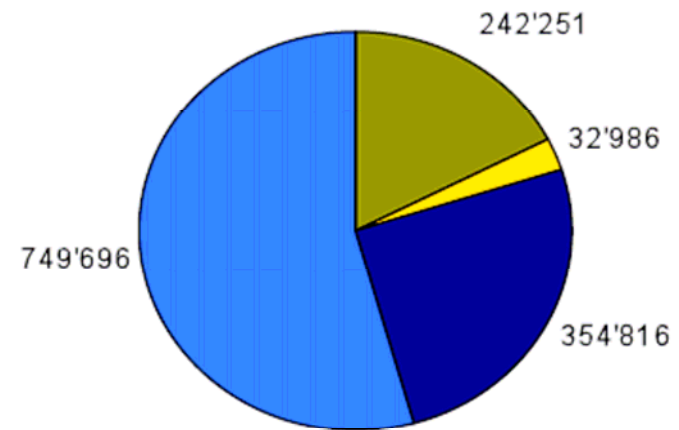
Retribution of applications



■ Biomasse ■ Photovoltaik ■ Wasserkraft ■ Wind

Total number of applications: 10'250

Power (KW) of accepted applications

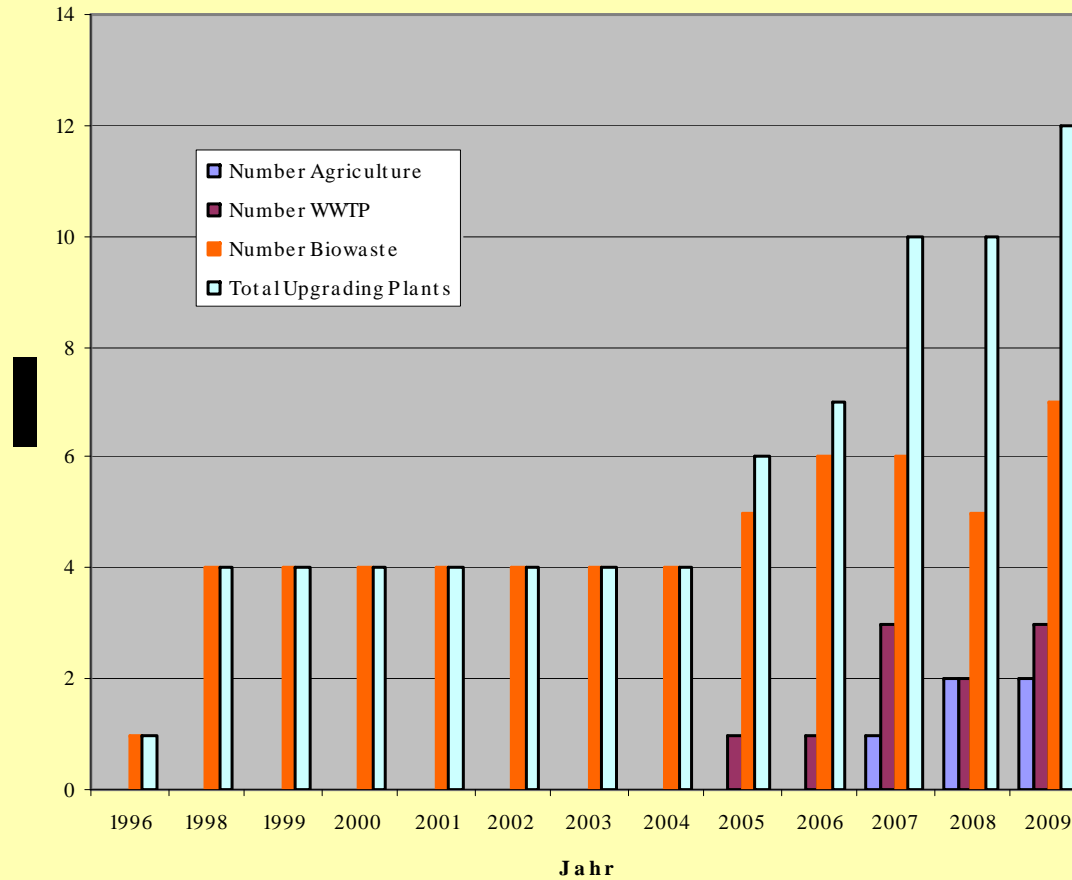


■ Biomasse ■ Photovoltaik ■ Wasserkraft ■ Wind

Total power accepted: 1.38 GW

Biogas Upgrading Plants

Biomethan Aufbereitungsanlagen



New record: Millionaire



The Peterbilt dual fuel truck (1995) transporting biowaste has passed the 1million km mark !

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New biogas plants under construction

- BEKON biowaste digester: Spiez 20,000 tpy
- Kompogas: Wauwil 16,000 tpy
Volketswil 20,000 tpy
- Eisenmann: Lisberg 10,000 tpy
- Agricultural plants: Bätterkinden
Cadenazzo (first in italian part)
Diesbach
Bure
Kaisten
Oberkirch

New Biogas Plants under construction

Schuler/Permastore biowaste/manure digesters



- Hünenberg
- Niederwil (25,000 tpy)
- Strickhof (Lindau)

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New Biogas Plants

Tropical house Frutigen



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Biogas Plants under plannification

**Zürich: Co-digestion in WWTP and
20,000 tpy for biowaste**

Winterthur: 20,000 tpy (Kompogas)

Bioggio: 15,000 tpy (Kompogas)

New Application

Digestion of old laying hens






In Switzerland 2.5m laying hens reach their end of live. As soup hens or broth only 0.5m can be used. The rest was turned into meal and incinerated. Since summer 2010 they are sterilized and digested at the arabern.

New Application

Utilisation of biomethane for heating and cooking

Wählen Sie Ihre gewünschte Variante!
Dann erhalten Sie ab sofort Ihr Biogas
mit einem Aufpreis auf Ihren Erdgas-Preis.

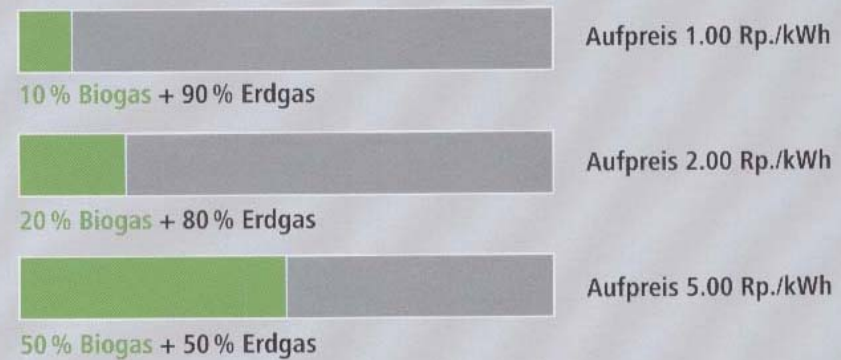
- | | | |
|--------------------------|---|-----------------------|
| <input type="checkbox"/> | erdgas 
mit 5% Biogas | Aufpreis 0.5 Rp./kWh* |
| <input type="checkbox"/> | erdgas 
mit 20% Biogas | Aufpreis 1.9 Rp./kWh* |
| <input type="checkbox"/> | biogas 
100% Biogas | Aufpreis 8.6 Rp./kWh* |

* Exklusive MwSt.

Ort, Datum

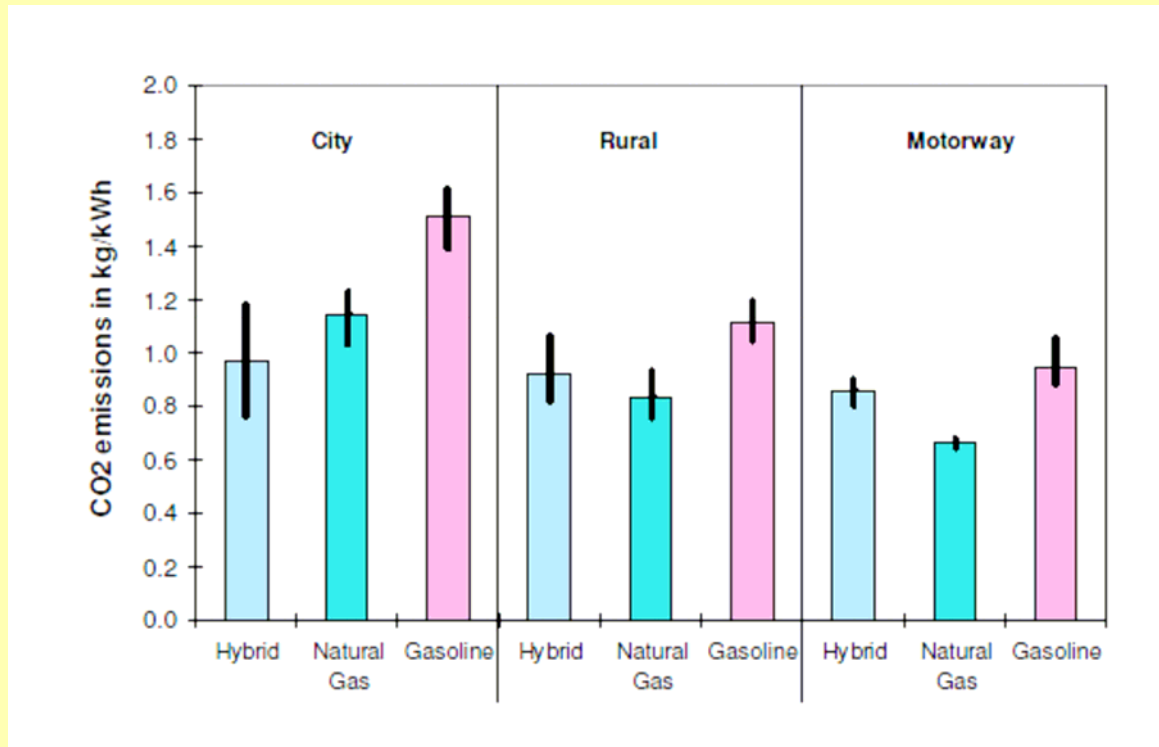
Unterschrift

Wählen Sie Ihren Anteil an Biogas!



NOVA E n e r g i e

Research: Emissions from vehicles



Source: EMPA, August 2010

- Repeated strong acceleration and braking phases combined with the modest speeds characteristic of urban “stop-and-go” driving particularly favor hybrid drive systems
- Biomethane driven cars are another 75% lower in CO2-emission than NGV

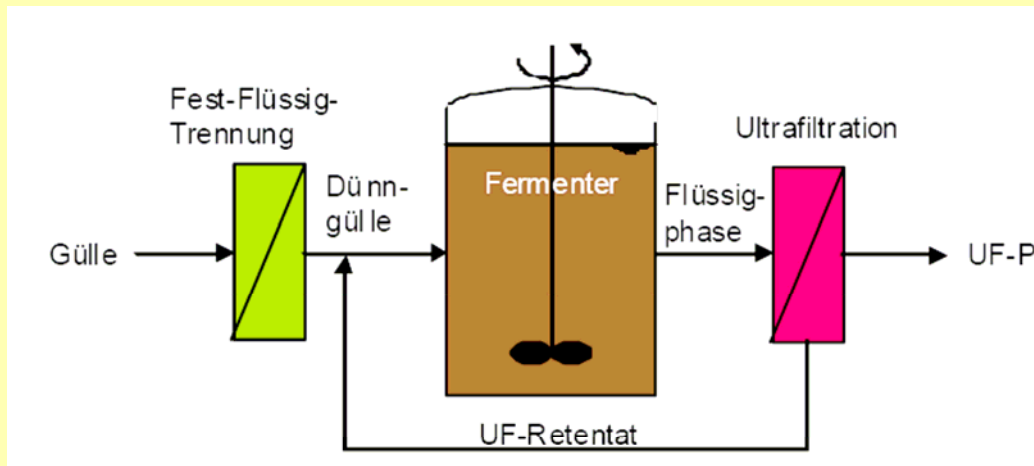
Research Projects: Emissions

- **Methane emissions:**
 - Leakage at „hot spots“ (CHP and upgrading)
 - Through EPDM membranes

- **Odour emissions:**
 - Influence of systems, operation and substrates
 - Development of a model

Research Projects: Optimisation

- Standardised gas potential measurement in batch digesters
 - How to overcome differences between batch and full-scale digestion
- Digestion of manure and co-substrates in a MBR reactor



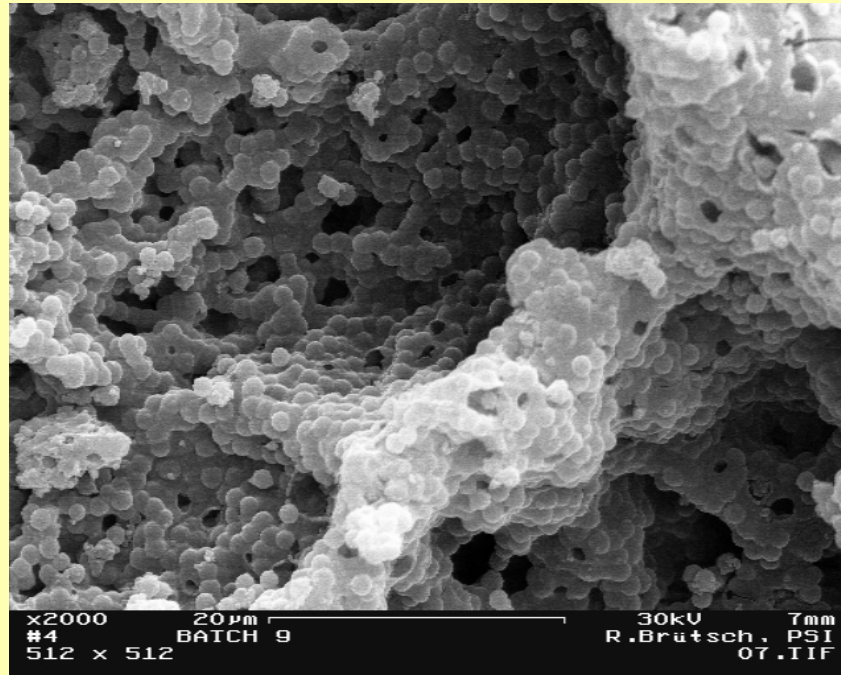
Source: Hersener&Meier



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Research Projects: HTC

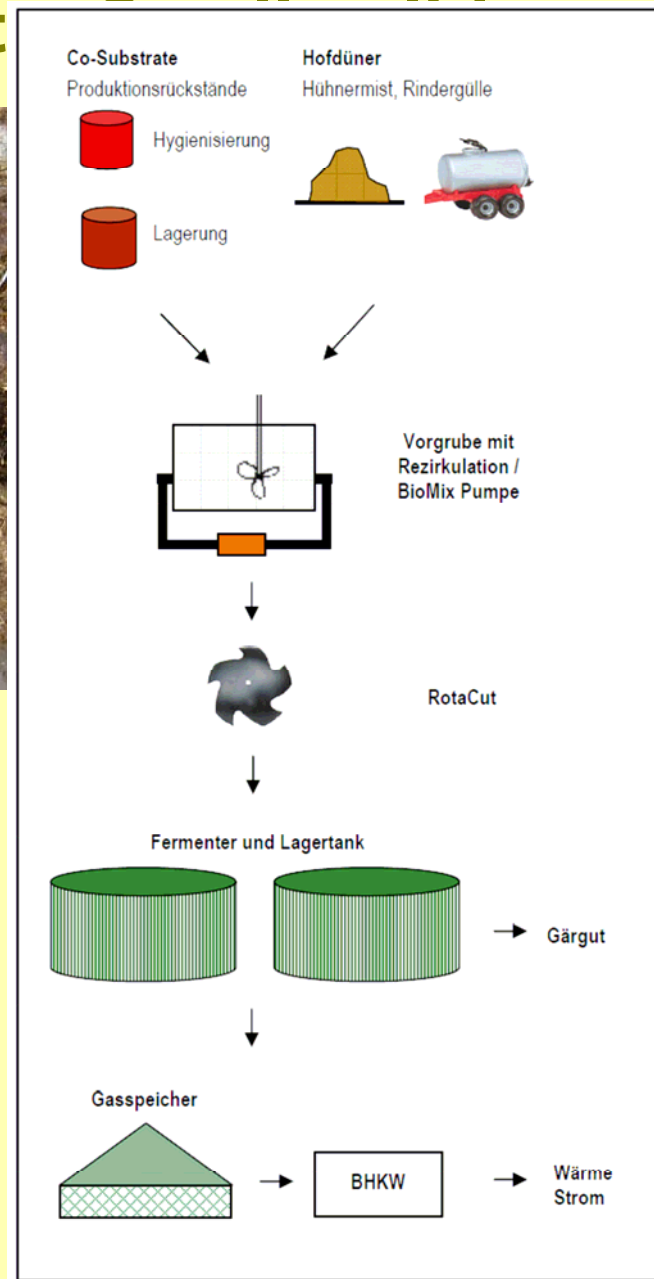
- Hydrothermal carbonization with supercritical water vapour
 - instead of AD
 - In addition to AD after separation of the liquid fraction
 - Reduction of coke formation
 - Enhanced removal of mineral nutrients



NOVA Energie

Research Project

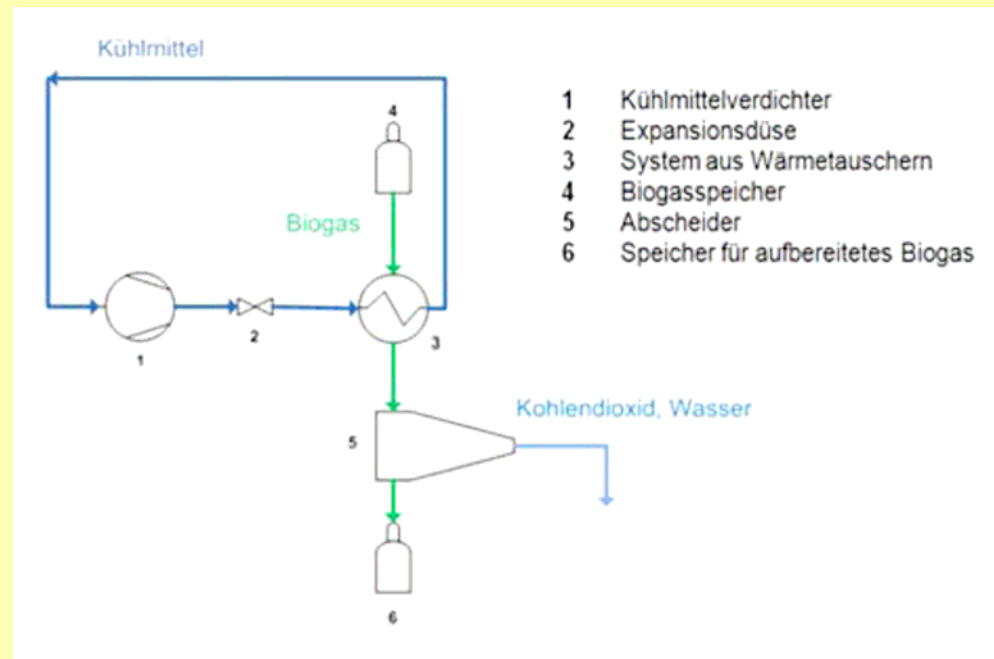
anaerobic digestion



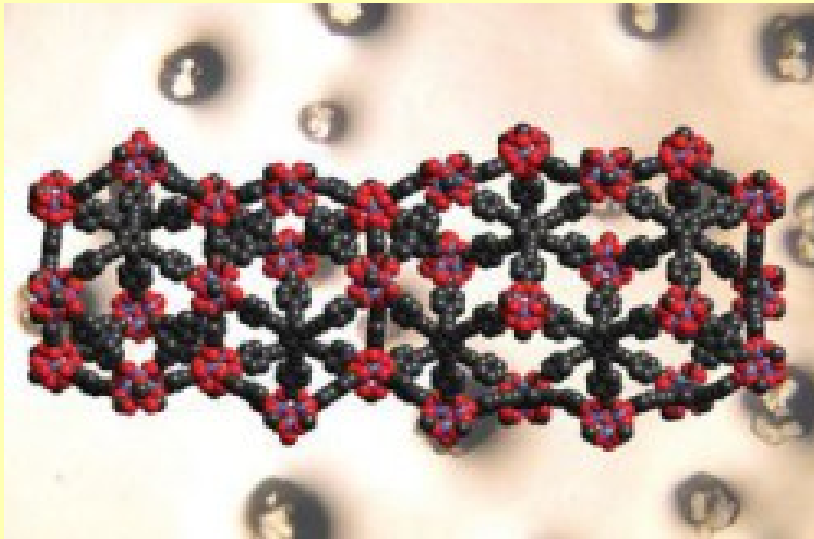
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Research Projects: Small scale gas upgrading

- Cryophilic gas separation
 - Methane concentration of 70 to 80%
 - Invest about 115,000 €
 - O&M 0.63 €cts./Nm³ or 0.55 €cts/L petrol eq.



MOFs (metal organic frameworks) – New Opportunities for Gas Storage for Alternative Propulsion Systems



Source: BASF 2010

Professor Yaghi (UCLA) succeeded in synthesizing MOF-210, a zinc carboxylate with a surface area of more than 10,000 m²/g of material

NOVA E n e r g i e

International Conference



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