Swiss country update
s‘Hertogenbosch, 02 November 2010

Arthur Wellinger
Nova Energie Ltd.
Biogas Plant Inventory

Development of installations

Year

Number of plants

Agriculture
Industrial waste water
Biowaste

NOVA Energie
Agricultural plants

Number of plants

Gross gas production

Year


Number of plants

Gross gas production

102 85 82 73 63 66 62 64 63 62 67 72 79 75 81 86

15.44 14.15 13.67 12.76 12.57 14.19 16.08 17.62 19.49 21.9 25.9 34.5 53.2 84.2 101.4 113.4
Industrial Waste Water

Development of Industrial WWT Plants

Number of plants
Gross gas production

Year

Number of plants/Production in GWh/a

Number of plants: 7, 12, 12, 12, 14, 18, 18, 20, 21, 22, 22, 22, 22, 22, 22, 22
Gross gas production: 12.5, 24.3, 24.3, 26.3, 32.4, 33.8, 36.6, 30.8, 33.7, 36.1, 38.1, 37.1, 38.1, 38.9, 41.6, 44.6
Biogas Upgrading Plants

Waste Water Treatment Plants

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<th>Year</th>
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<th>WWTP w/ digestion</th>
<th>Gas utilised</th>
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NOVA Energie
Biogas Plant Inventory

Total Biogas Production (incl. WWTP)

<table>
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<th>Year</th>
<th>Total number of plants</th>
<th>Total gas production GWh/a</th>
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<td>2009</td>
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Biogas Plant: Applications

Retribution of applications

Power (KW) of accepted applications

Total number of applications: 10’250
Total power accepted: 1.38 GW
New record: Millionaire

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

Tropical house Frutigen
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.

- **erdgas**: mit 5% Biogas
  - Aufpreis 0.5 Rp./kWh*

- **erdgas**: mit 20% Biogas
  - Aufpreis 1.9 Rp./kWh*

- **biogas**: 100% Biogas
  - Aufpreis 8.6 Rp./kWh*

* Exklusive MwSt.

Ort, Datum

Unterschrift

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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

[Diagram of a MBR reactor process]

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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
Research Project: Small Solid Waste Digestion
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.
International Conference

Algen ins Netz!
Tagung BiomassEnergie
Gemeinsam Visionen schaffen
www.biomassenergie.ch
24. und 25. November 2010

NOVA Energie