

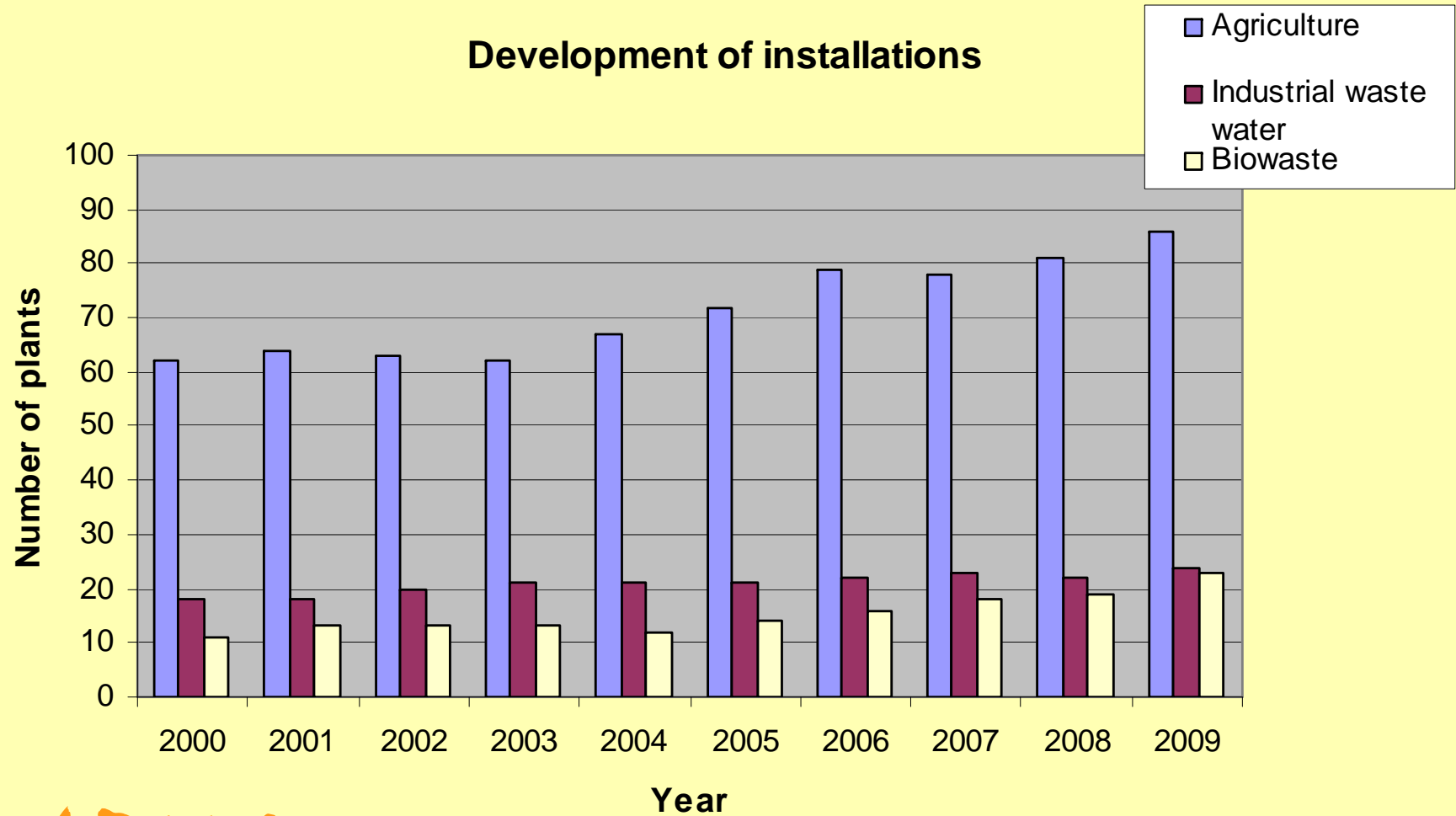
# Swiss country update

Kopenhagen, 26 – 28 May 2010

Arthur Wellinger  
Nova Energie Ltd.



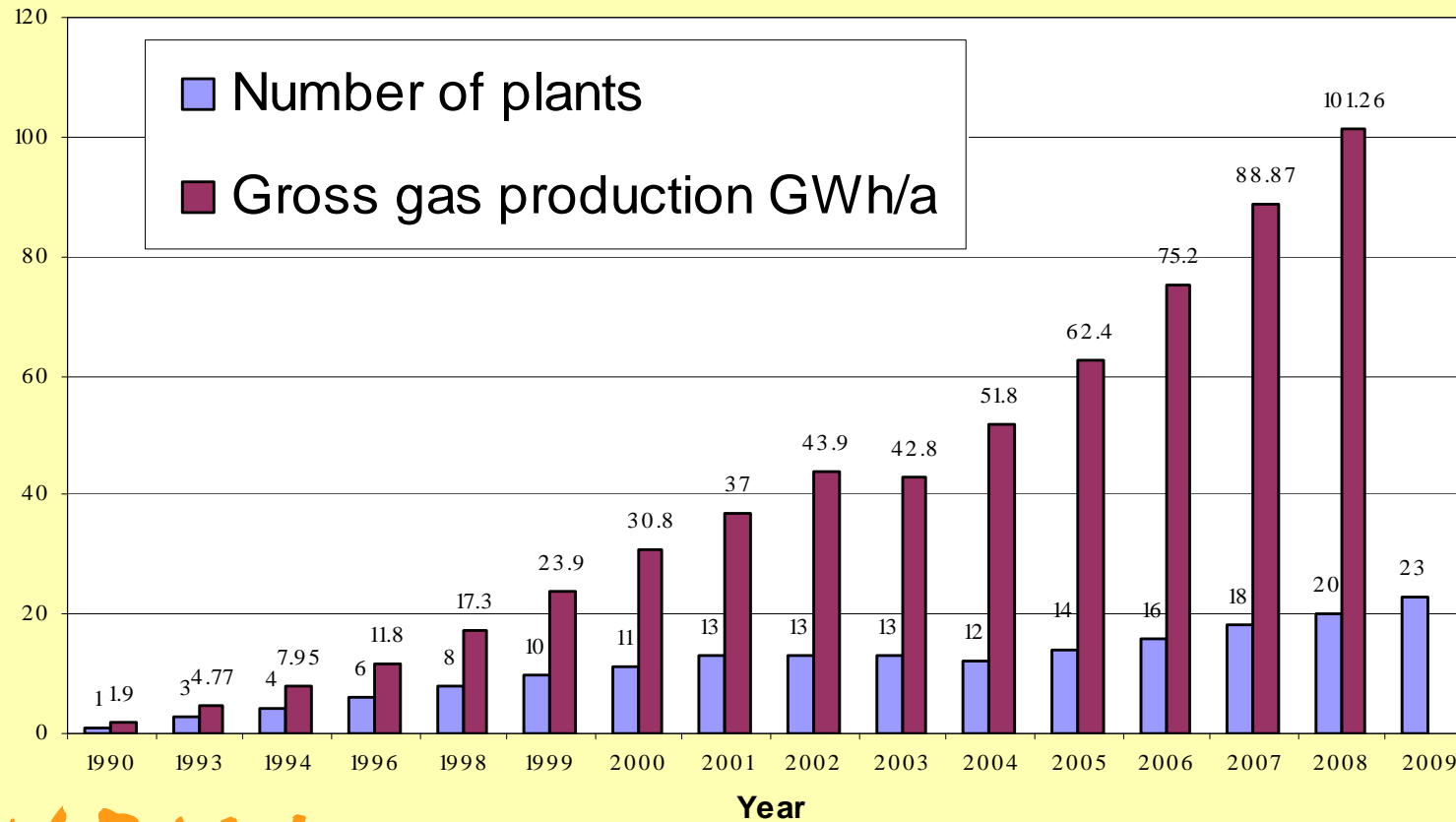
# Biogas Plant Inventory



# Biogas Plant Inventory

## Biowaste digesters

Number of plants



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

# Biogas Plant Inventory

BEKON biowaste digester



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

# Biogas Plant Inventory

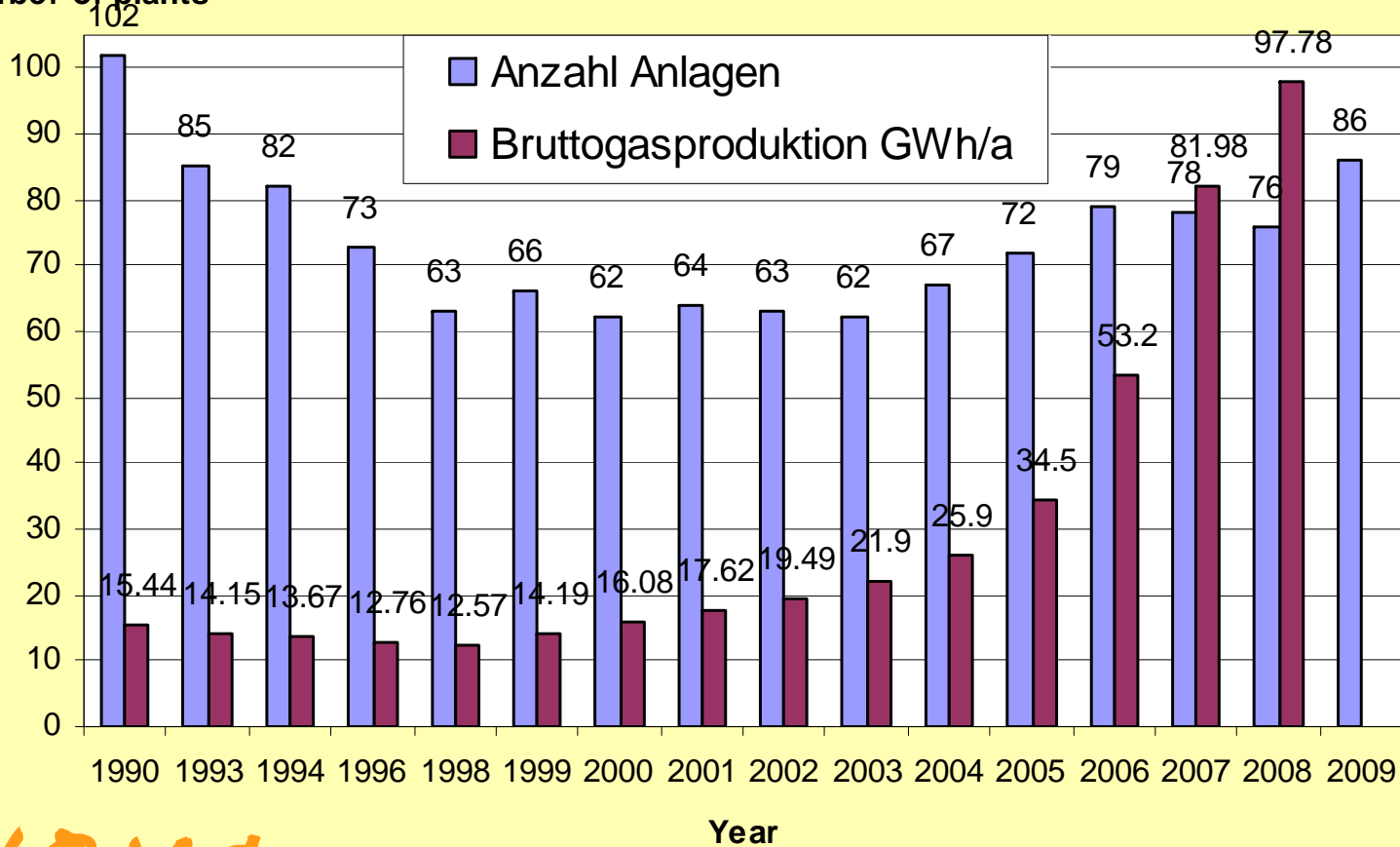
BEKON biowaste digester



# Biogas Plant Inventory

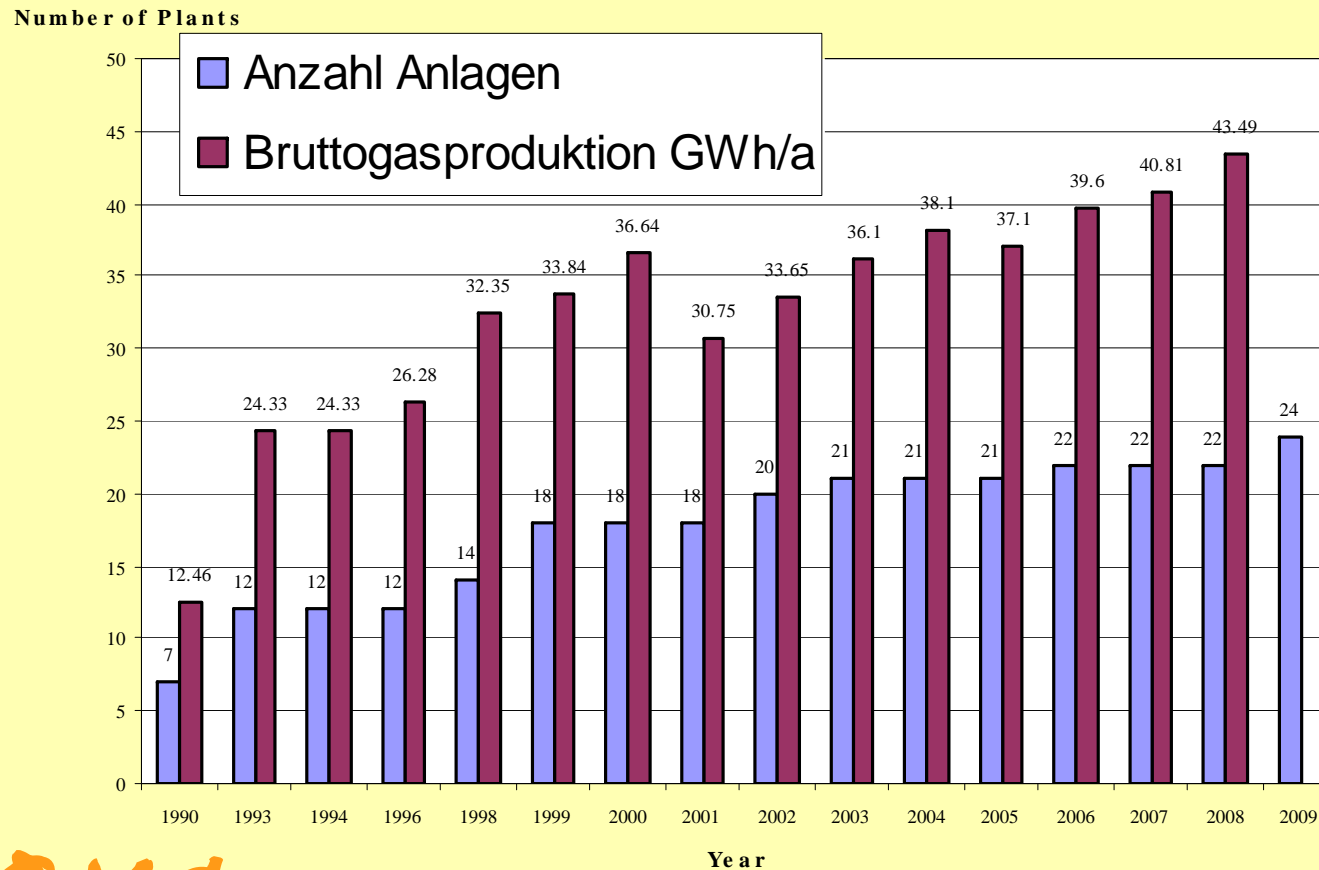
## Agricultural Plants

Number of plants



# Biogas Plant Inventory

## Development of Industrial WWT Plants



# Biogas Plant Inventory

## Waste water treatment plants

In total	454 plants with AD
With co-digestion	approx. 60
With gas injection	6

# arabern Co-Substrates



# Co-Substrates (2009)

Co-Substrates	Origin	Quantity
Yeast cell walls	Cellulosefabrik	29.3 tpy
Coffey press water	Production of Néscaffé	15.5 tpy
Food waste	Community kitchen	13.4 tpy
Fat removal	Sewer cleaning	6.7 tpy
Fat	Chicken slaughterhouse	4.3 tpy
Milk serum, whey	Cheese dairy	2.9 tpy
De-icing water	Aeroporto	2.6 tpy
EtOH-water mix	Chem. Industry 40% EtOH	0.9 tpy
Waste drinks	Fruit juice	0.8 tpy
Edible oil	Oil mill	0.1 tpy
		<b>TOTAL 76.6 tpy</b>



# Production targets

Year	Unit	2006	2007	2008	2009
Total Biogas production	Bm <sup>3</sup>	4'702'728	5'239'398	6'348'434	6'332'497
Increase of gross Biogas production	%		11.4%	35.0%	34.7%
Biomethane injected	Nm <sup>3</sup>			1'034'592	1'096'065



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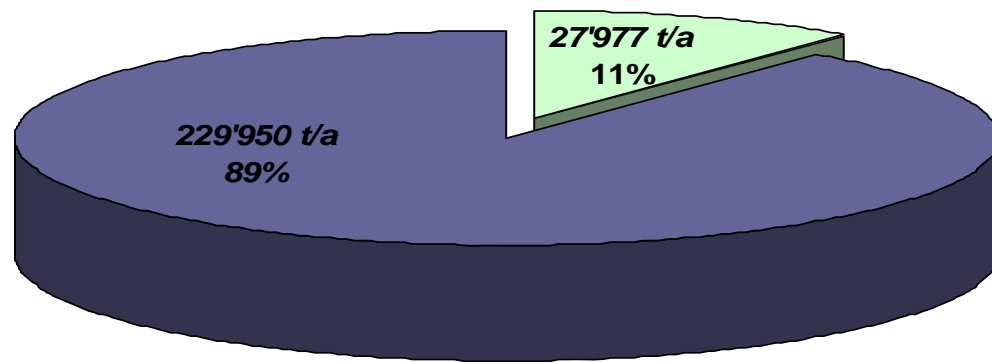
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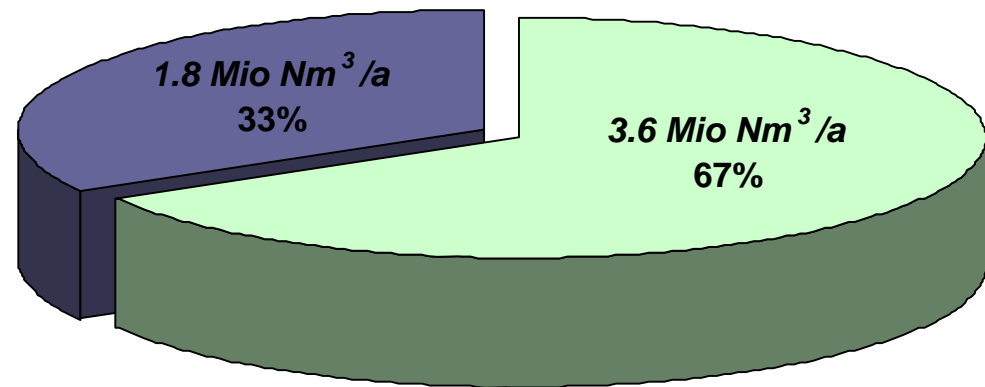


# arabern Production targets

Input: Frischsubstanz



Output: Biogasproduktion



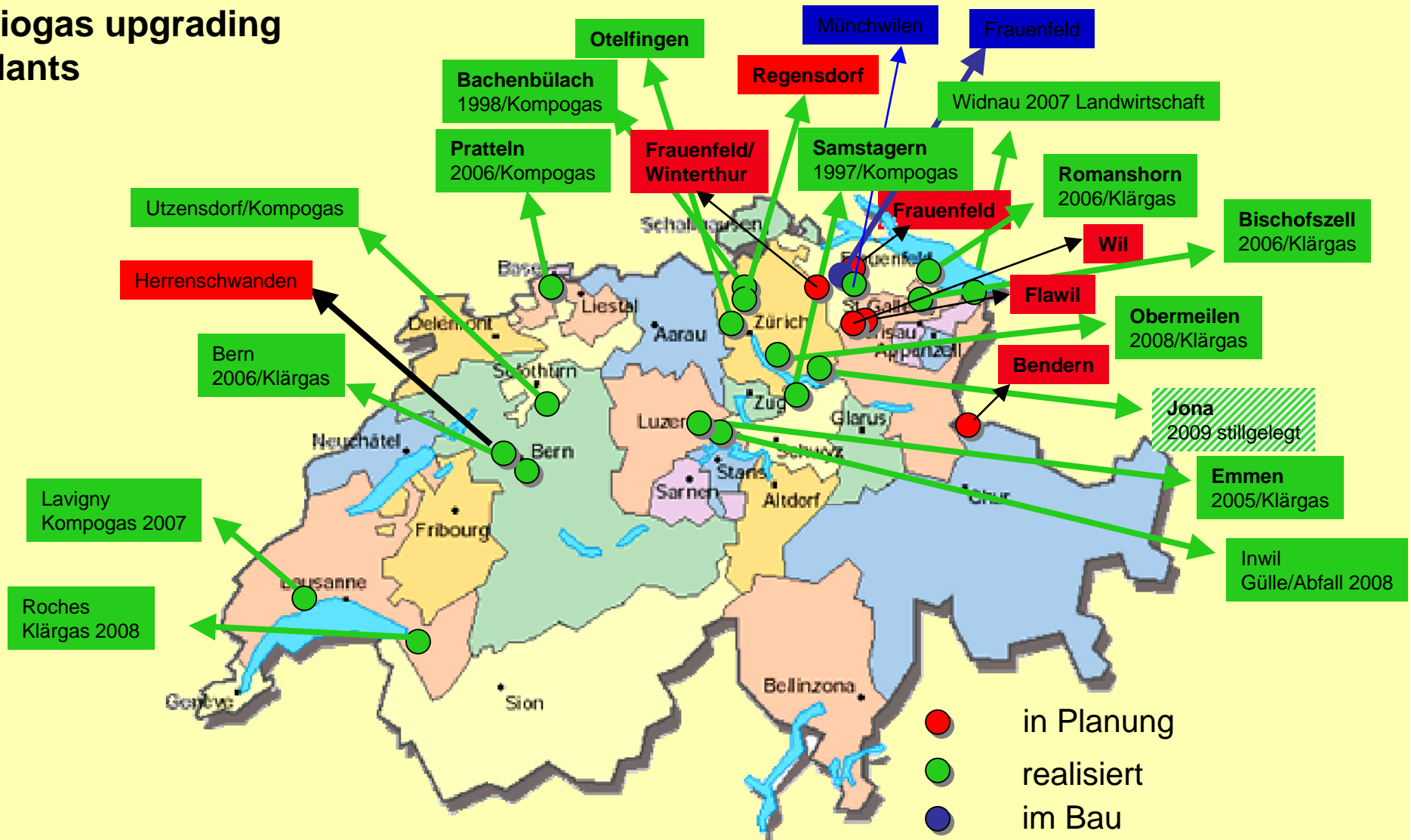
■ Sewage sludge

■ Co-Substrate

2008

# Biogas Plant Inventory

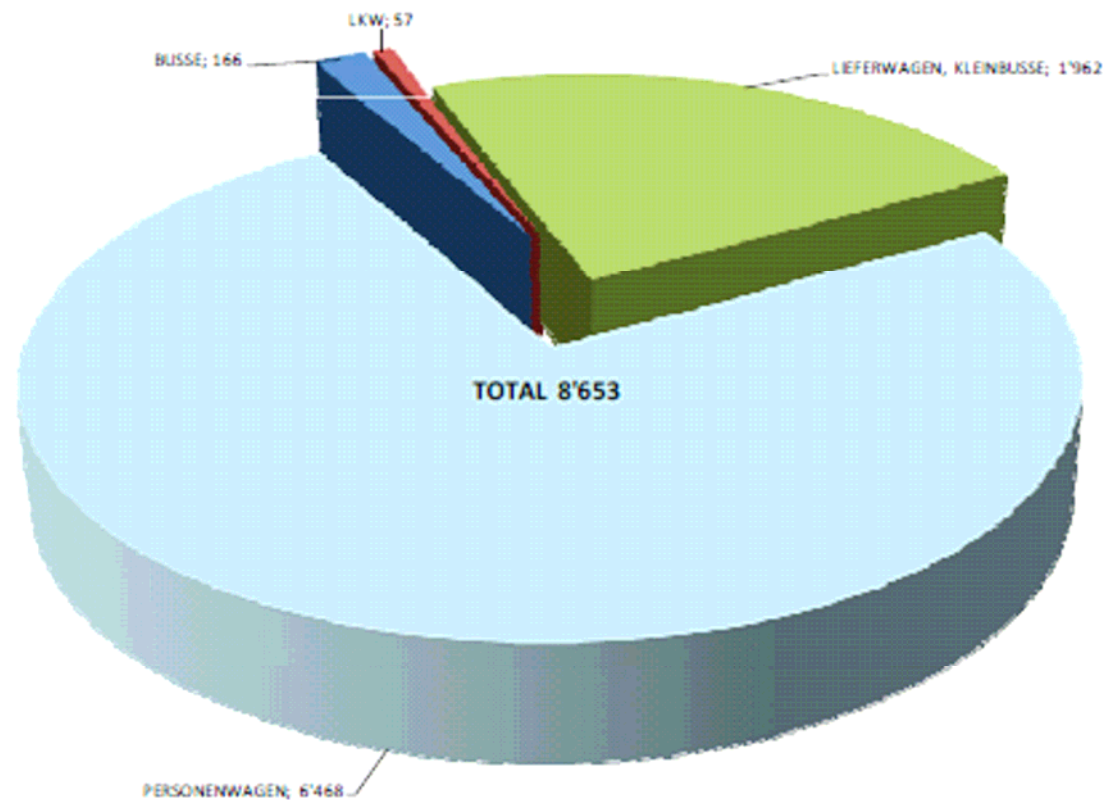
## Biogas upgrading plants



# Biogas Plant Inventory

## BESTAND FAHRZEUGE ERDGAS/BIOGAS PKW & LNFZ PER DEZ. 2009

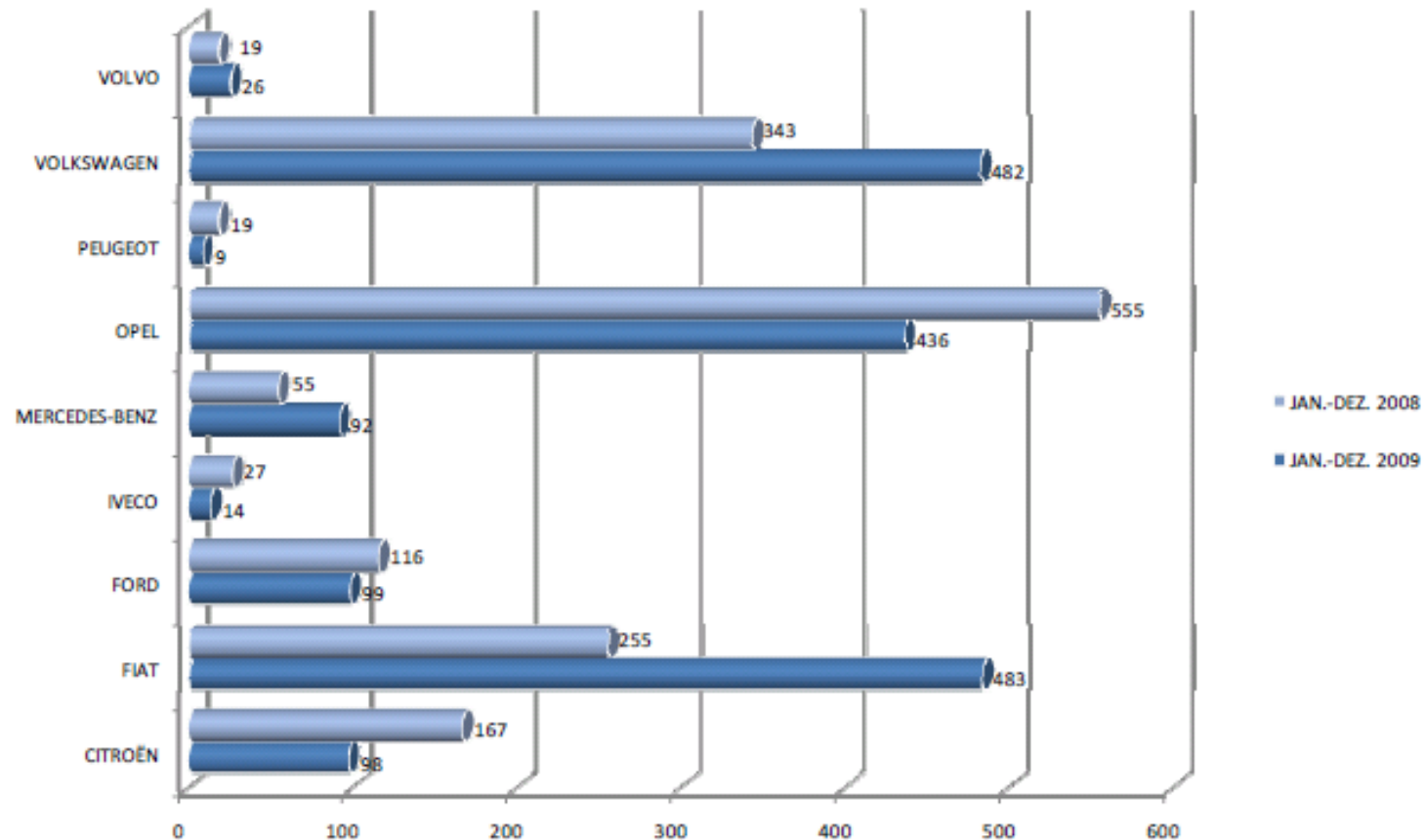
Quelle: ASTRA/MOFIS, gasmobil ag



# Biogas Plant Inventory

## VERKAUF FAHRZEUGE ERDGAS/BIOGAS PKW & LNFZ NACH MARKEN 2009

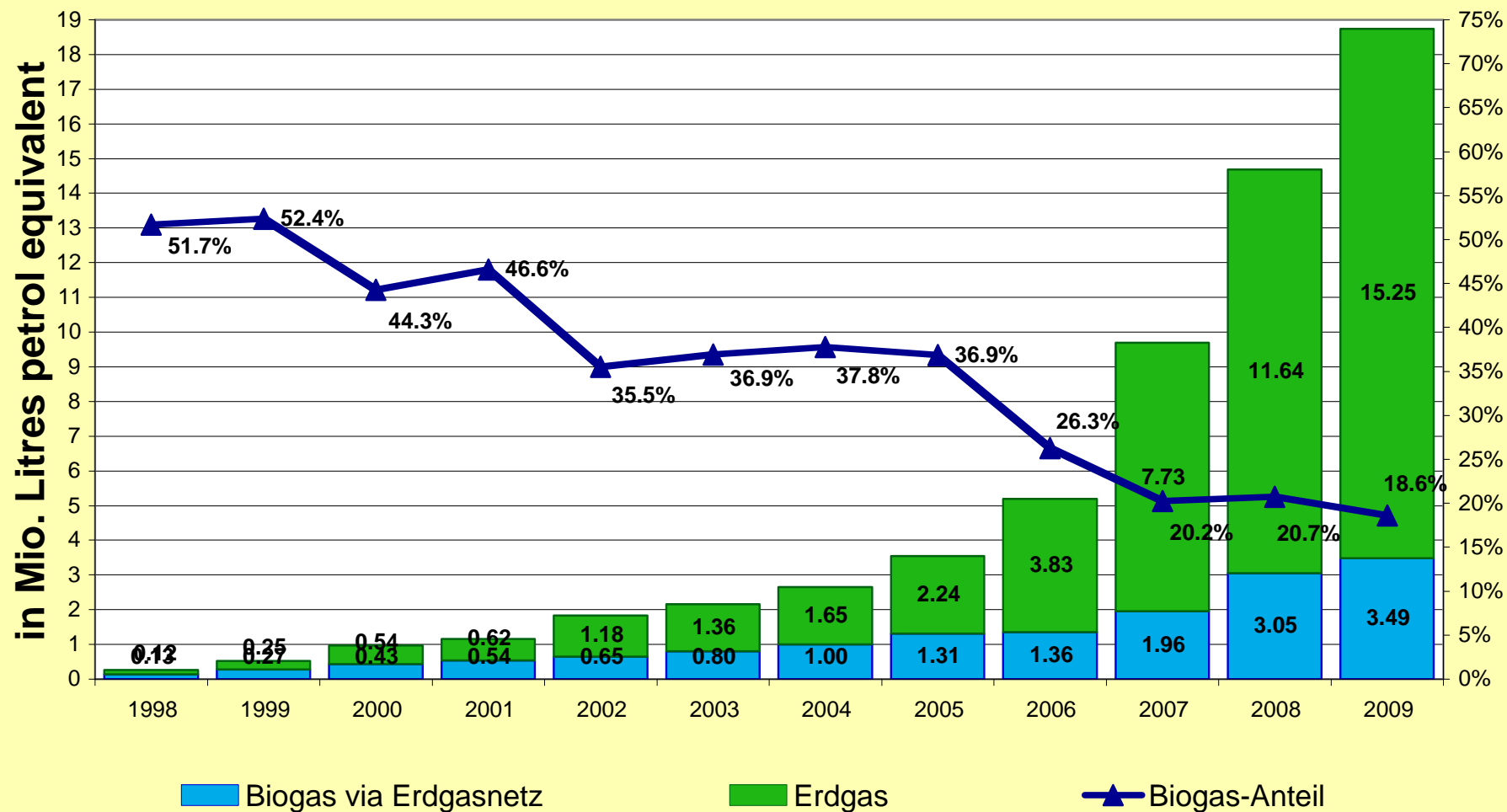
Quelle: ASTRA/MOFIS, CH-Importgesellschaften, gasmobil ag



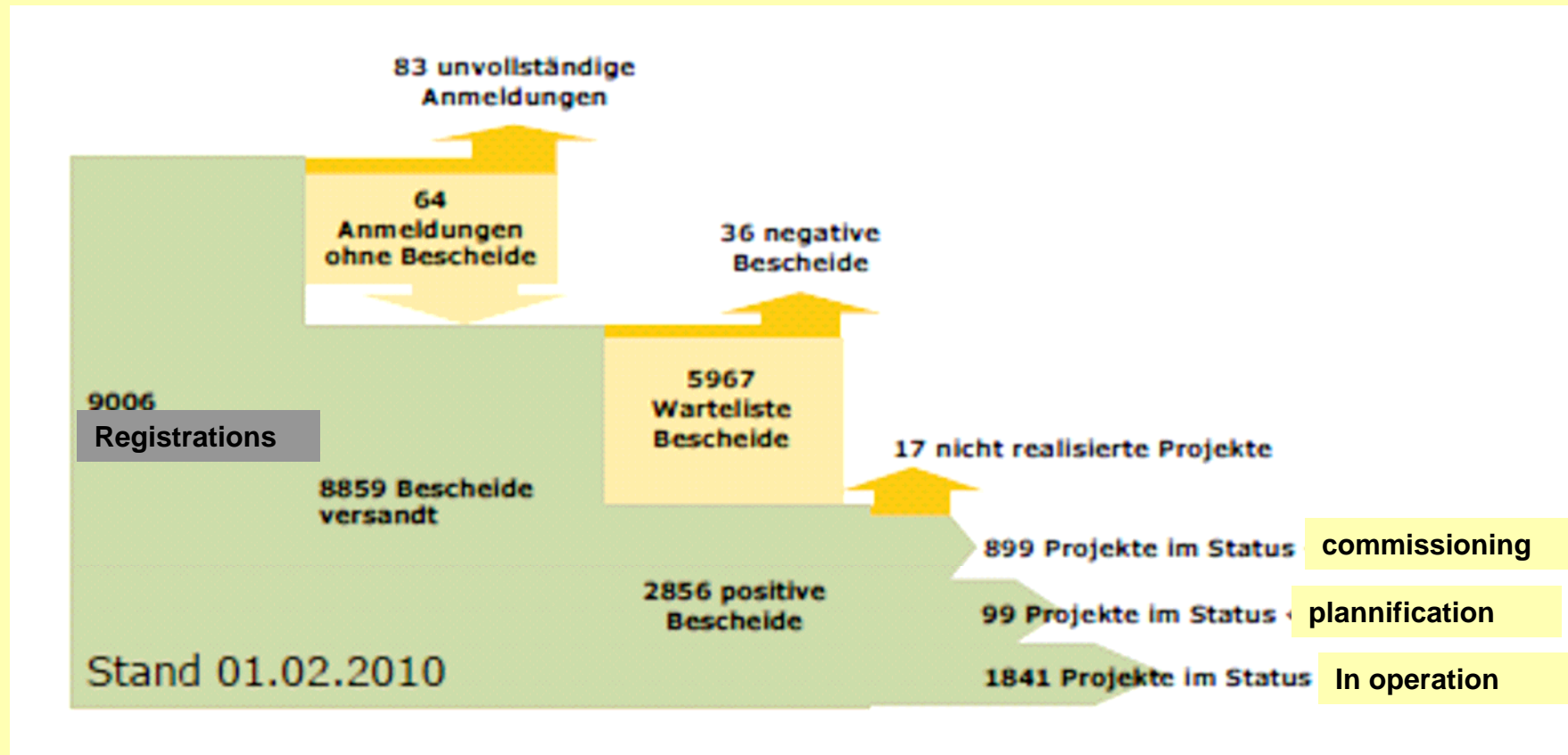
**NOVA** Energie

# Biogas Plant Inventory

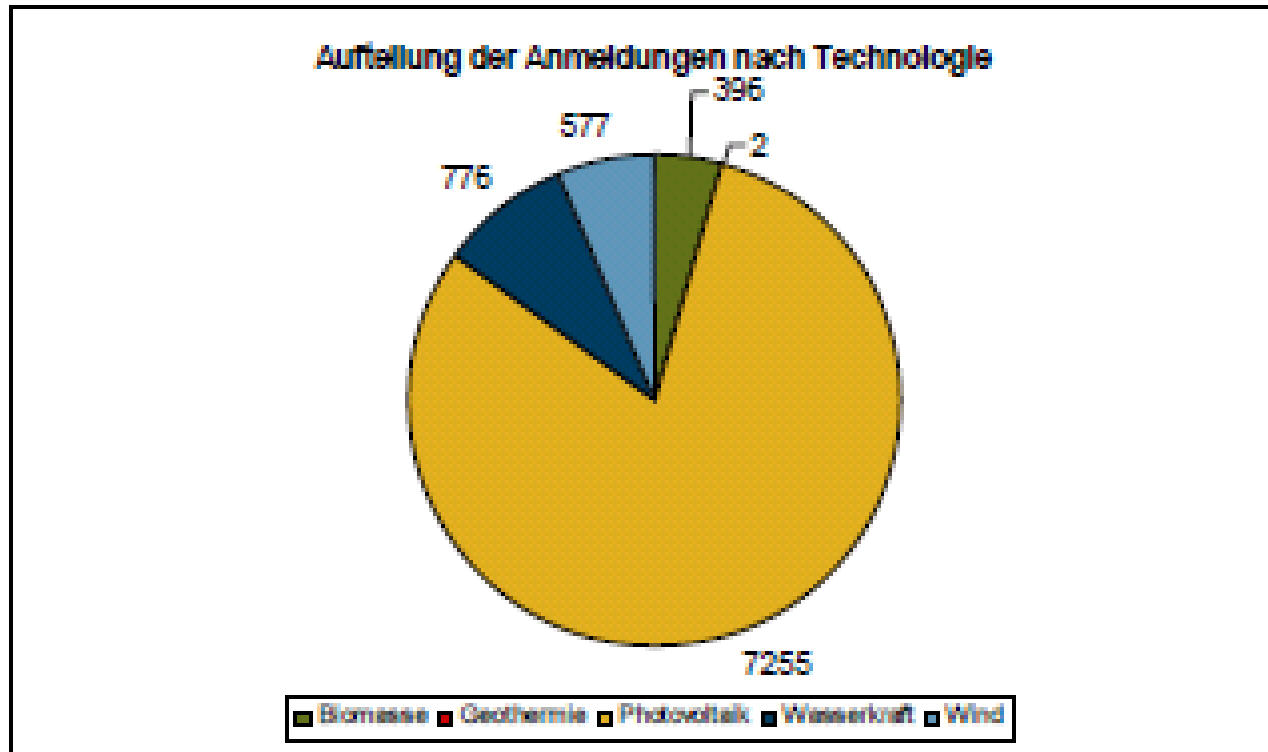
## Natural Gas and Biogas as Vehicle Fuel



# Feed-in tariffs



# Feed-in tariffs



## Kommentar

Anzahl KEV-Anmeldungen am 1.2.2010:

- Biomasse: 396
- Geothermie: 2
- Photovoltaik: 7255
- Wasserkraft: 776
- Windkraft: 577
- **Total** 9006

Stand 01.02.2010

# Feed-in tariffs

## Indications of the plants in operation

Anzahl KEV-Anlagen in Betrieb am 1.1.2010:	Gesamte Leistung der KEV-Anlagen nach Technologie (am 1.1.2010):	Gesamte Leistung der KEV-Anlagen nach Technologie (am 1.1.2010):
• Biomasse: 109	• Biomasse: 52.2 MW	• Biomasse: 304.4 GWh
• Photovoltaik: 1576	• Photovoltaik: 20.1 MW	• Photovoltaik: 19.1 GWh
• Wasserkraft: 143	• Wasserkraft: 44.4 MW	• Wasserkraft: 207.1 GWh
• Windkraft: 6	• Windkraft: 2 MW	• Windkraft: 4.3 GWh
• <b>Total</b> 1834	• <b>Total</b> 118.7 MW	• <b>Total</b> 534.9 GWh

Thereof biogas  $\leq$  100 GWh

# Private Support of RE

Certification with



## Certified electricity from RE

Total 1,400,000 MWh

Thereof

Agricultural plants 15,000 MWh

Industrial plants 21,800 MWh

WWTP 5,700 MWh

**Total Biogas 42,500 MWh**

→ **Roughly 50% of biogas from feed-in tariffs**

# Quality Assurance of Digestate

Qualitätsmerkmale	Einsatz Acker- und Futterbau (Landwirtschaft)			Einsatz im Gartenbau	
	Gärgut flüssig	Gärgut fest	Kompost	Kompost für den Gartenbau im Freiland	Kompost im gedeckten Gartenbau
Mindestqualität	Erfüllt nach Mindestqualität (FAC 1995)				
Schwermetalle	< Grenzwerte ChemRRV				
Fremdstoffe	Erfüllt nach ChemRRV				
Hygiene	erfüllt		erfüllt nach Mindestqualität, mit Temperatur-Protokoll		
Nährstoffe: P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O, Mg, Ca	X	X	X	X	X
Verrottung	Ausgangsmaterial nicht mehr erkennbar, ausser Holz				
TS (Trockensubstanz)	X	X	X	> 50 %	> 55 %
OS (Organische Substanz)	X	X	X	< 50%	< 40 %
pH-Wert	X	X	X	< 7.8	< 7.5
Siebgrösse		X	X	< 25 mm	< 15 mm
Spezifisches Gewicht	X	X	X	X	X
Extraktfärbung		(X)	< 1.0 (~HZ 37)	< 0.5 (~HZ 20)	< 0.2 (~HZ 7.5)
Salzgehalt	X	X	X	< 20 gKCl <sub>eq</sub> /kg TS	< 10 gKCl <sub>eq</sub> /kg TS
Gesamt N	X	X	X	> 10 g/kg TS	> 12 g/kg TS
C/N-Verhältnis	X	X	X	X	X
Ammonium-N	> 3000 mg/kg TS	> 600 mg/kg TS	< 600 mg/kg TS	< 200 mg/kg TS	< 40 mg/kg TS
Nitrat-N			(X)	> 80 mg/kg TS	> 160 mg/kg TS
Nitrit-N			(X)	(< 20 mg/kg TS)	(< 10 mg/kg TS)
N <sub>min.</sub>	> 3000 mg/kg TS	> 600 mg/kg TS	> 60 mg/kg TS	> 100 mg/kg TS	> 160 mg/kg TS
Nitrat-N /N <sub>min.</sub> -Verhältnis			(X)	> 0.4	> 0.8
Pflanzenverträglichkeit:					
Kresse offen				> 50 % der Ref.	> 75 % der Ref.
Kresse geschlossen			(X)	> 25 % der Ref.	> 50 % der Ref.
Salatetest				> 50 % der Ref.	> 70 % der Ref.
Bohmentest					> 70 % der Ref.
Raygrastest					> 70 % der Ref.
Krankheitsunterdrückungstest					(X)

Dunkel hinterlegte Felder: zu erfüllende Minimal-/Maximalwerte

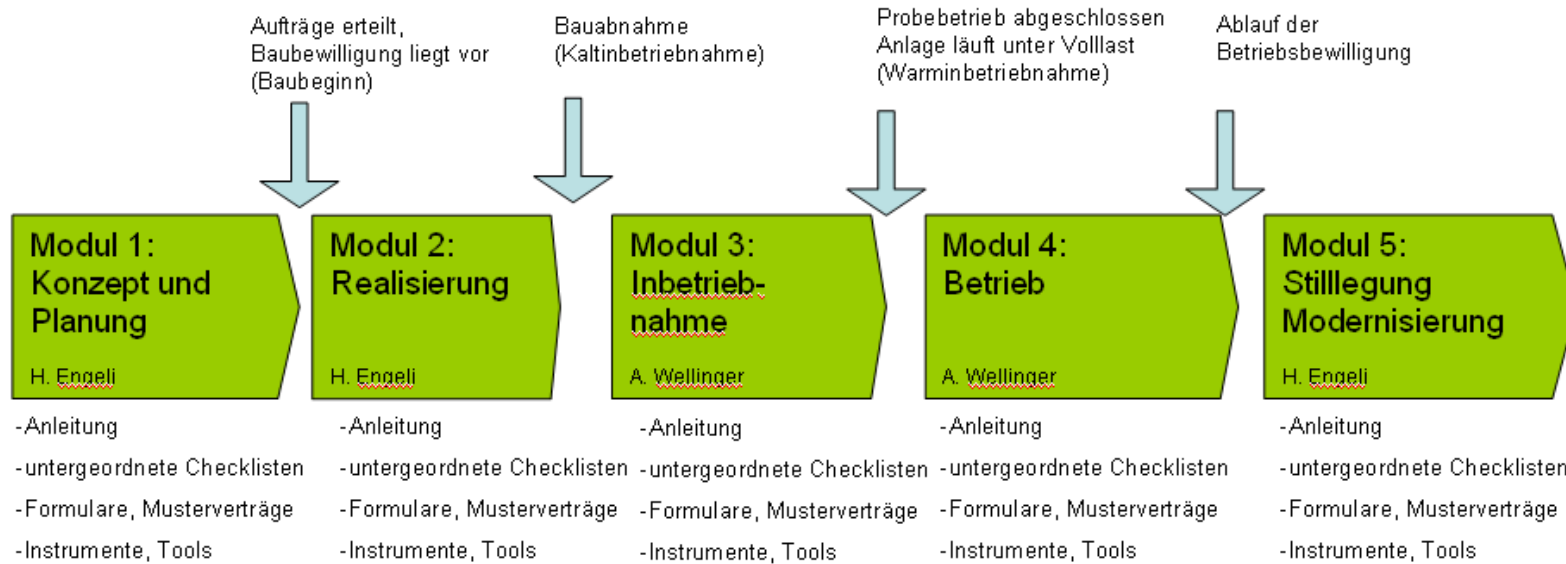
Hell hinterlegte Felder: empfohlene Minimal-/Maximalwerte (für die Interpretation)

X: Angaben obligatorisch (X): Angaben empfohlen (Interpretation)

# Quality Management

Hauptteil (allg. Teil): Einführung, Übersicht, Lesehilfe

Meilensteine QM



**Modul 6: Störfälle**

BiomassEnergie

**Modul 7: Sicherheitsmanagement und Ausbildung**

BiomassEnergie

**Modul 8: Substrate und Produkte**

BiomassEnergie

Anhang mit (gesetzlichen) Grundlagen, zum Beispiel Vollzugshilfe UWS in der LWS, Teil Biogas

# Research Projects

- Optimization of digestion process through pre-treatment and additives
- Odour emissions from biogas installations
- Methane emissions from biogas installations
- Standardized gas potential measurement in batch digesters
- Digestion of manure and co-substrates in a MBR reactor
- Methane emissions through EPDM membranes