

Summary of Biogas in REAPS – Comparison of Biogas Strategies

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- Biogas production: Where are we today?
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European Biogas Association

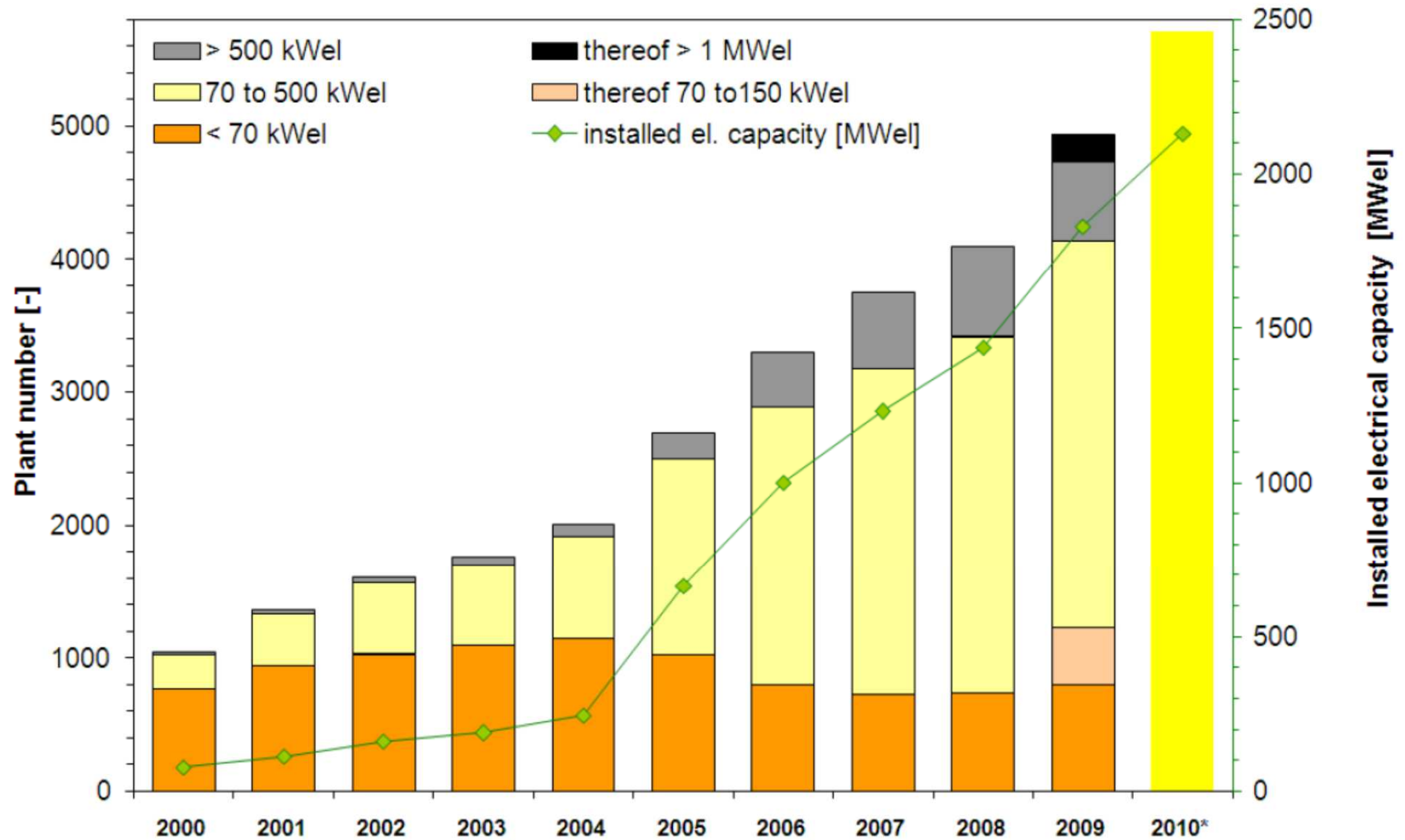
Founded in 2009

20 countries – 21 national Organisations – 13 companies and research institutes



Where is biogas today?

Germany sets the pace



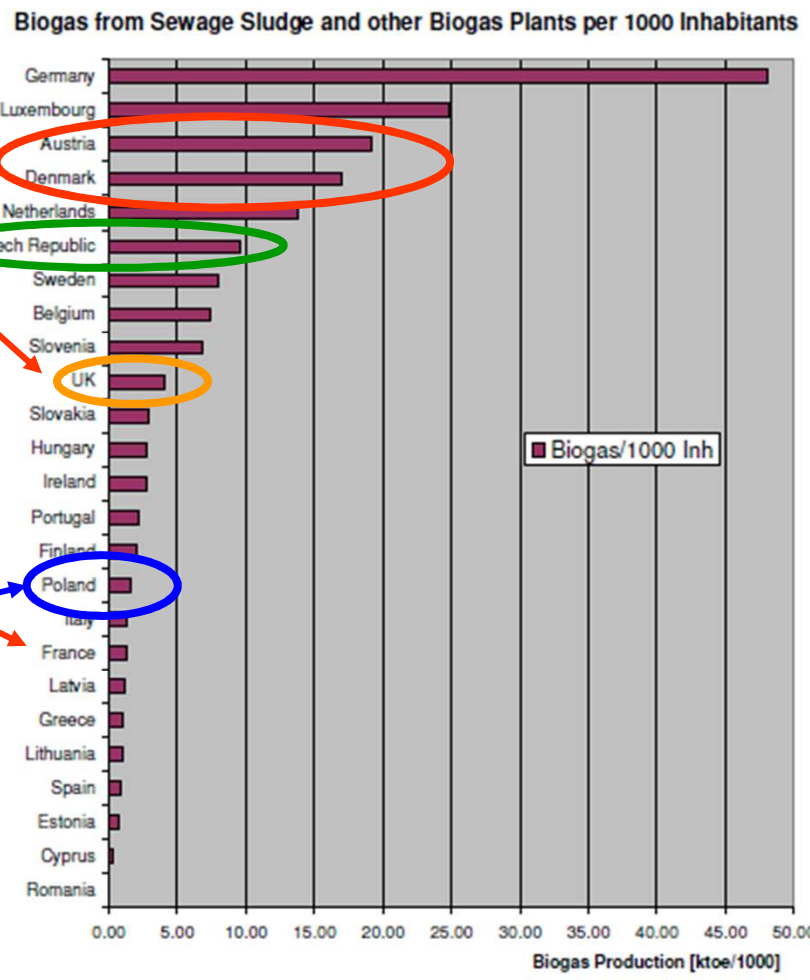
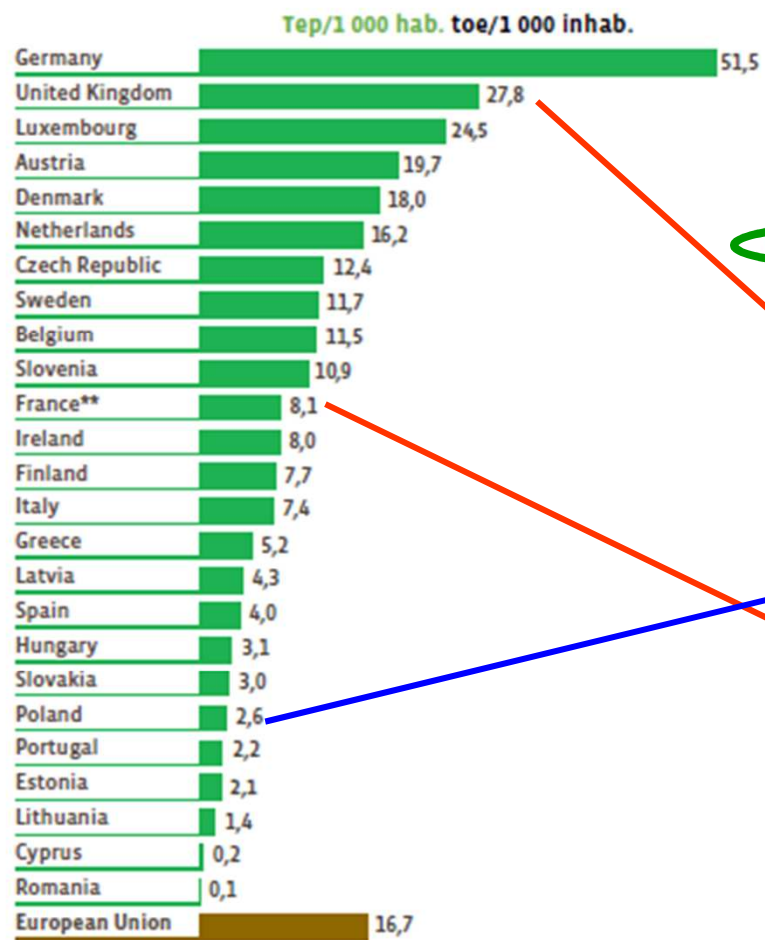
Germany: Key Figures

	2009	2010 (estimation)
Number of biogas plants	4.900	6.000
Total installed electric capacity	1,900 MW	2,280 MW
Electricity production	12.5 bio kWh	16.3 bio kWh
Biogas production (raw gas)	599 kWh/capita*a	781 kWh/capita*a
Share of total electricity production	2.5 %	
Turnover biogas sector	2.6 billion €	2.3 billion €
Export quota	~ 5 %	
Created jobs	> 16.000	17.000
CO2 reduction	10 million t/a	

Source: Fachverband Biogas



...and the other European countries?



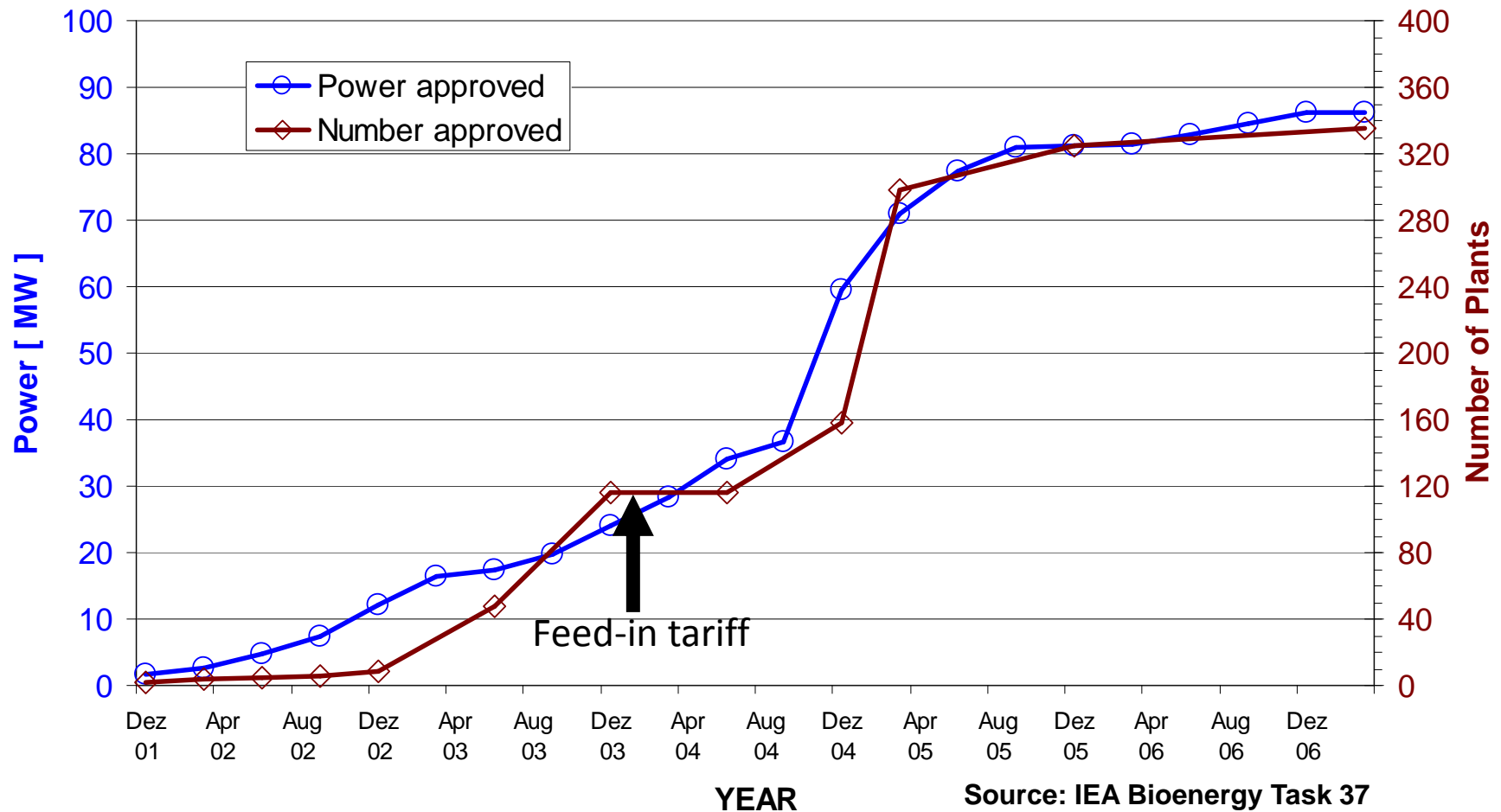
* Estimation. ** DOM non inclus. French overseas departments excluded.
 Les décimales sont séparées par une virgule. Decimals are written with a comma.
 Source: EurObserv'ER 2010.

Figures for 2009



The classic biogas countries: Austria

Biogas Plants in Austria
Data: e-control Austria



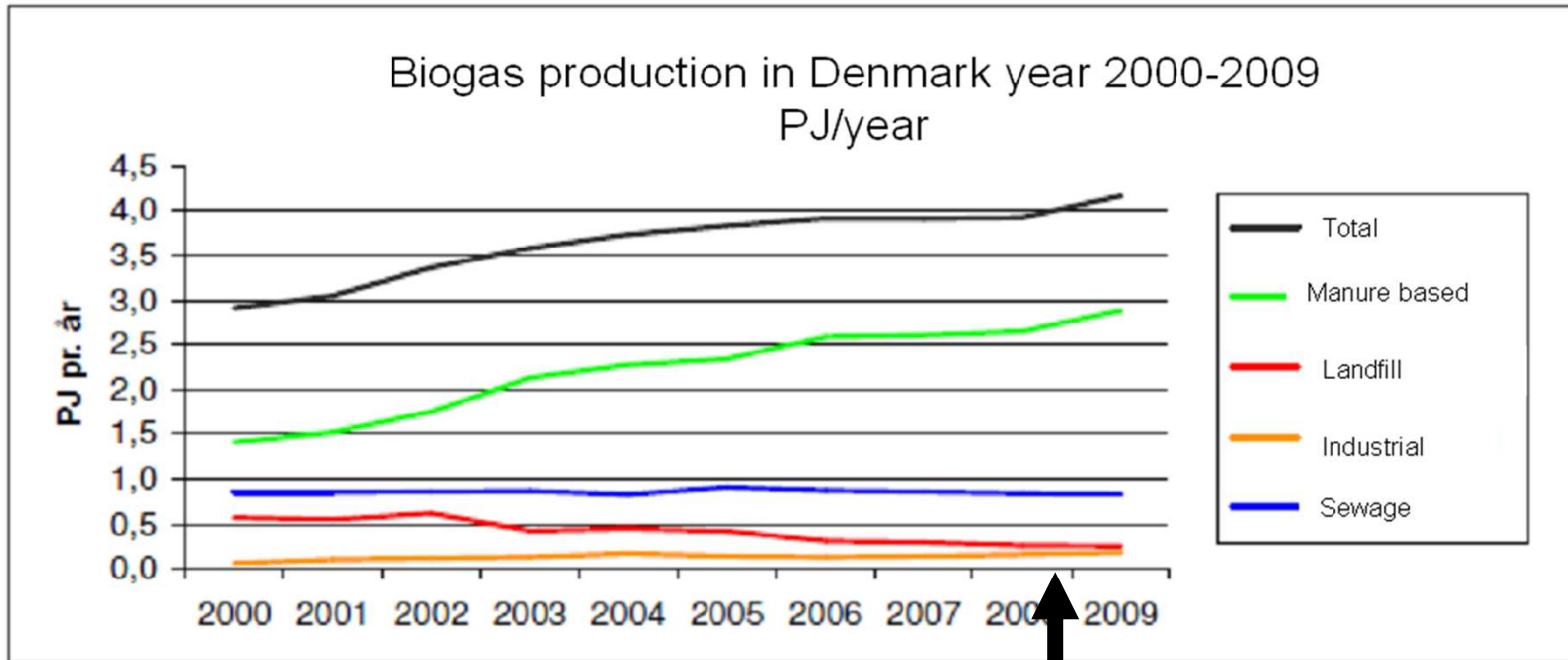
Source: IEA Bioenergy Task 37

The classic biogas countries: Austria

Number of digestion plants (2009):

	<u>number</u>	<u>GWh/a</u>	<u>kWh/Inhab*a</u>
- Agriculture	~350		
- Industrial WW	~ 25		
- Sewage sludge	134		
- Biowaste	~30		
- Landfill	62		
Total	ca. 600	1'870	223

The classic biogas countries: Denmark



New feed-in tariffs

The classic biogas countries: Denmark

	<u>Number</u>	<u>GWh/a</u>	<u>kWh/Inhab*a</u>
Agriculture	76		
Industry	5		
Sewage sludge	61		
Landfill	25		
Total	167	1'165	212

12 agricultural plants are under construction (2010)

The booming biogas countries: Czech Republic

Waste stream	Number	GWh/a	kWh/Inhab*a
Agriculture	138		
Landfill	61	ca. 250	
Sewage sludge	57		
Biowaste/MBA	8		
Total	264	1510	144

In 2008, 2009 und 2010, 40 plants each have been built in agriculture

Emerging Markets: United Kingdom

Type of waste	Anzahl	GWh/a	kWh/Inhab*a
Agriculture	40	2'000	32
Industry	18	?	?
Landfill	345	19'000	308
Sewage sludge	151	2'500	40
Total	554	23'500	380

Poland: An emerging market?

Waste stream	Number	GWh/a	kWh/Inhab*a
Agriculture	11	ca. 150	
Landfill	73		
Sewage sludge	46		
Total	130	1370	36

Estimation after data provided by P. Haider; PBA

What are the NREAP targets for biogas?

	Biogas Production 2010	Biogas NREAP 2020	Growth factor
	GWh	GWh	as of 2010
Czech Republic	1,510	10'481	6.9
Denmark	1,165	9,830	8.5
Poland	1370	17,680	12.9
Germany	43,500	90,112	2.1
Austria	1870	1,879	1
United Kingdom	23,500	20,046	0.85
United Kingdom	4500	20,046	4.5

Very ambitious

o.k

Very modest

What was the effect of the RED 2009/28/EC ? (The so called 20/20/20 Directive)

- In most of the countries (new) feed-in tariffs were announced or introduced
- Some of the countries announced goals for biogas
- There is hardly any measure set for biogas as transport fuel

The classic biogas countries: Austria

New feed-in tariff as of September 2009

Goal for RES: 34 % (actually 25.6%)

Doubling the green electricity until 2015 (up to 15 %)

Support increased from 17 to 21 mio € per year

Guaranteed tariffs for biomass/biogas over 15 years

Feed-in tariffs: 13 to 18cts/kWh (increase of 1 to 3 cts)

Plus 2 € cents / kWh for CHP (eff. >60%)

Source: IEA Bioenergy Task 37

The classic biogas countries: Denmark

National Strategy/Support for Exploitation of Biogas

- Guaranteed price of 0,772 DKK/kWh (10.3 €cts/kWh)
- The government has set up a green growth plan (→ Subsidies):
 - Until 2020 four large scale co-digestion plants shall be built per year until 2020
 - Until 2020, 50% of the animal waste shall be digested (today it is 3-6%)
 - The goal is the production of 12PJ from biogas (today it is 4,2PJ)

The booming biogas countries: Czech Republic

Renewable Energy Act 180/2005

- Regulation for all renewable energies
- priority grid access (until net capacity is reached)
- Choice between feed-in tariffs and green certificates
- Two categories of biogas (agriculture/biowaste)

The tariff is fixed yearly (one year ahead) and should allow a pay back of the whole installation within 15 years. Since 2010 the tariff is 18 €cts/kWh (16€cts./kWh)

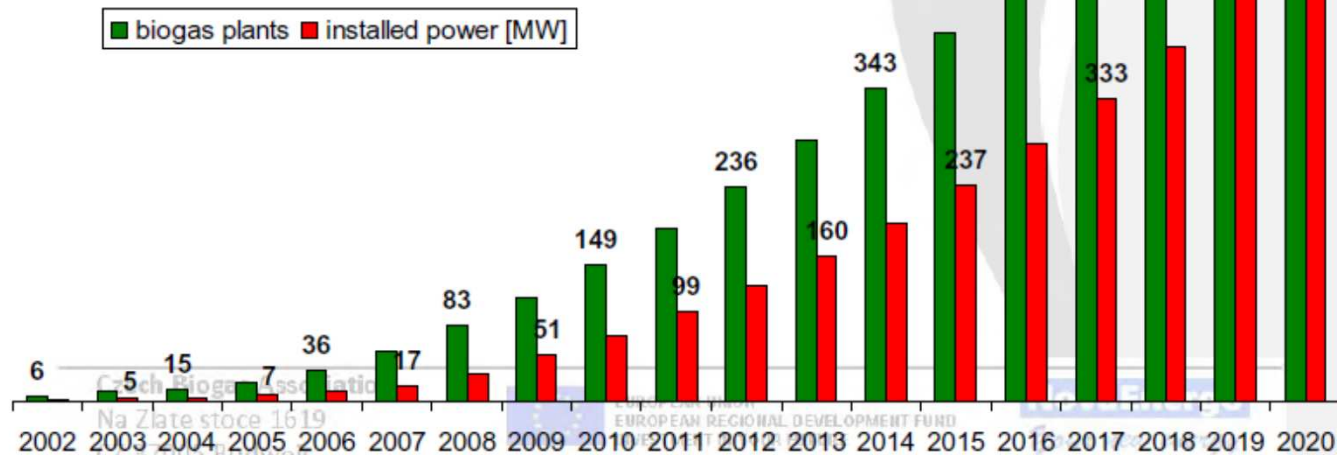
Adjustments really occur. Biogas started with 13 €cts/kWh in 2005.

In 2010 PV was reduced by 6%.

The booming biogas countries: Czech Republic



Biogas in the CZ —the 2020 scenario



Emerging Markets: United Kingdom

Renewable Obligation Certificates (ROCs)

(currently paying 4.8p/kWh x 2 for AD)

Feed –in -Tariffs for electricity/CHP as from April 2010

(11.5p/kWh <500kW, 9p/kWh >500kW–5 MW)

Renewable Heat Incentive including CHP (Spring 2011)

Anaerobic digestion framework document published by 1.12.2010

announcing strategies for AD support measures (planned for end of 2010)

Defra and DECC are working together on an **AD Action Plan**. This will set out steps to promote the **increase in energy from waste through anaerobic digestion**, for consultation with interest groups and industry in November 2010. This work will lay the foundation for a detailed action plan, to be published in spring 2011.

Poland: An emerging market?

- There are no **Feed - in -Tariffs** for electricity from renewables
 - There are rainbow certificates but...
 - even the highest **Green Certificate** is modest with 8.2 cts/kWh
 - they are not legally anchored
 - the running time is too short
 - nobody knows what's happening afterwards
- this is no driver for biogas but rather a barrier
- However, there are significant **Subsidies** between 50% and 70%, sometimes even as high as 85% if ever the money is available
- even then subsidies may makes biogas installations interesting but **does not stimulate efficiency** of production.

Targets compared with potentials

	Biogas 2020 NREAP	Potential DBFZ		Potential Map	AEBIOM Road Mapure and Primary Products	
	GWh	Products	Waste Primary	GWh		% of Potential DBFZ
Germany	90'112	125'556	135'000	39'884		35%
United Kingdom	20'046	69'722	0	21'977		29%
Czech Republic	10'487	22'222	15'000	8'721		28%
Denmark	9'380	19'167	18'889	7'907		25%
Poland	17'677	65'278	34'167	36'395		18%
Austria	1'879	33'333	6'389	5'000		5%

How should biogas be used?

Electricity or Fuel?

Politically the question can easily be answered:

The support programmes tell us where to go

Is there a scientific answer ?

Transport: ecologically the most reasonable solution:

- Biomethane has very low emissions
- Car engines are less noisy
- No distribution infrastructure needed, grids are available
- Biomethane can be blended at any ratio with natural gas
- For long distance transport LBG/LNG is available

Problem: There are not enough fuelling stations available

Is there a scientific answer ?

Electricity: economically the best solution

- In all countries except Sweden, Romania and Poland there are reasonably high feed-in tariffs
- No costly gas upgrading is required
- After 2020 electricity will become an important vehicle fuel
- Problems: - The grid infrastructure needs significant improvement
 - Peak loads are often not absorbed by the grid
 - Utilisation of heat is insufficient

Conclusions

The national biogas targets in the NREAPs are too modest in most of the countries when compared to actual productions

The biogas potential is even far higher than the most ambitious goals

The potential of biogas for transport has not been recovered yet

The heat utilisation of CHPs is marginal