



# Methane to Markets

**The Kindersley Centre, Berkshire**

November 29<sup>th</sup> & 30<sup>th</sup> 2006



**defra**

Department for Environment  
Food and Rural Affairs



**Methane to Markets**

Agricultural AD in Germany

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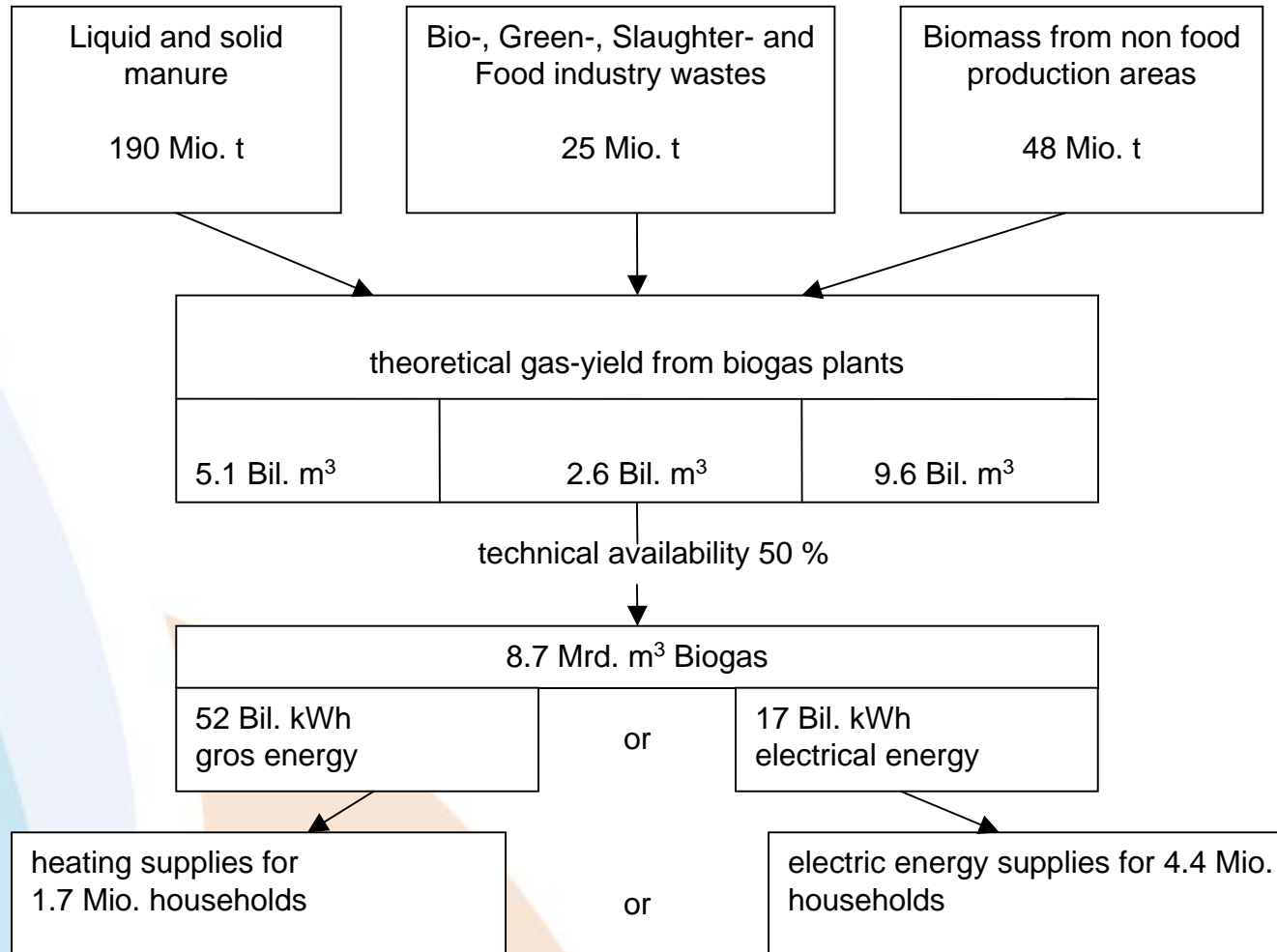


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# Estimated biogas potentials in Germany



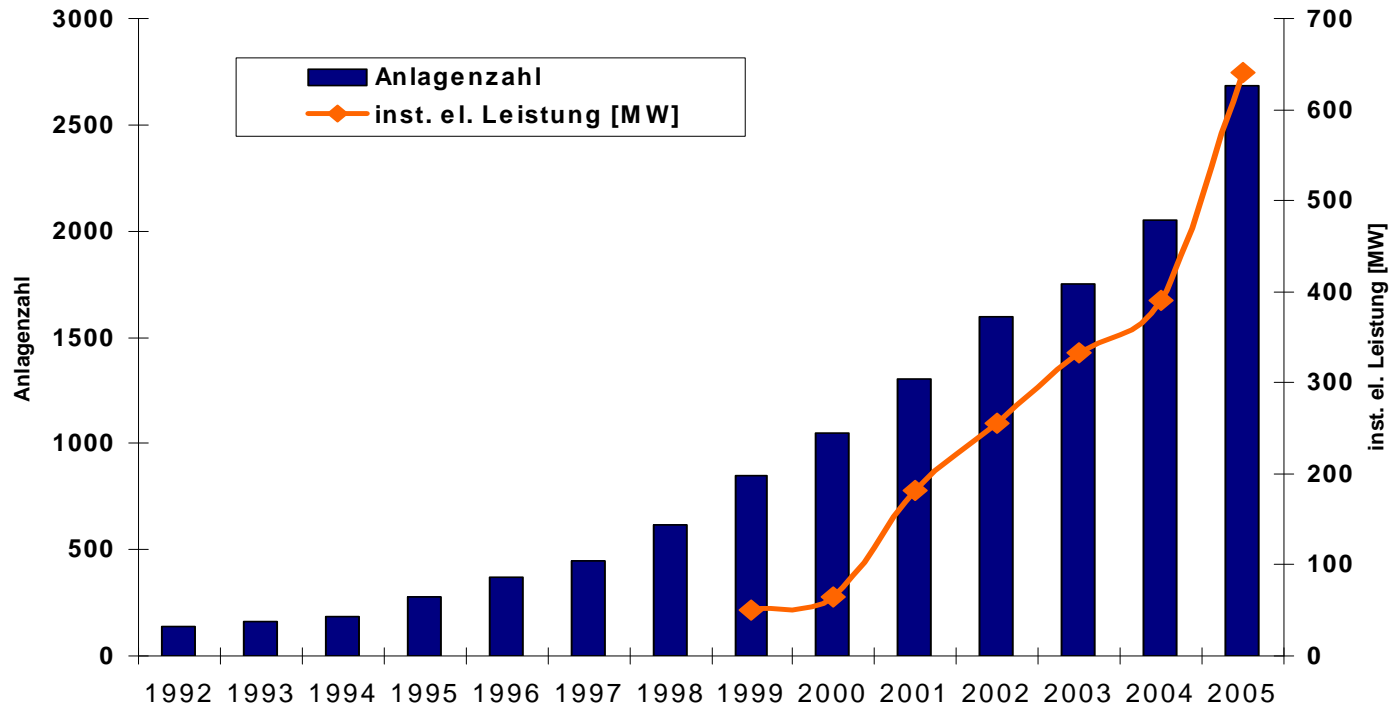
# Fuel Equivalent of different Biofuels per ha and year

	Biodiesel (Rape seed)	Bioethanol (Grain)	Biomass to Liquid (Energy Crops)	Biomethane (Maize silage)
Yield t/ha DM	3,2	6	15	15
Fuel in l or m3	1.300	2.500	3.230	8.550
Fossil Fuel Equivalent (Petrol/Diesel)	1.183	1.631	3.013	4.738

Source: FNR 2006

# Agricultural Biogas Plants in

## Entwicklung: Biogasanlagen in der Landwirtschaft



Fachverband  
Biogas e.V.

German Biogas Association • Asociación Alemana de Biogas • Société Allemande du Biogaz



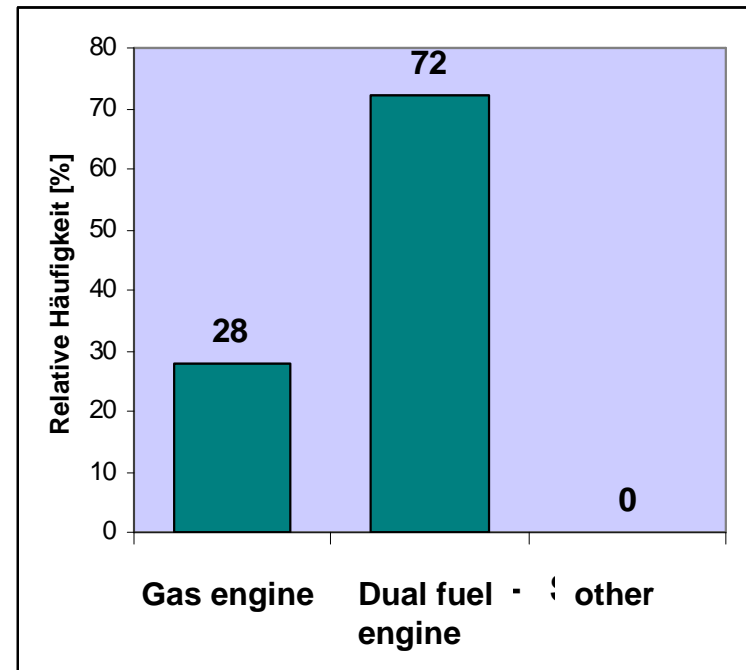
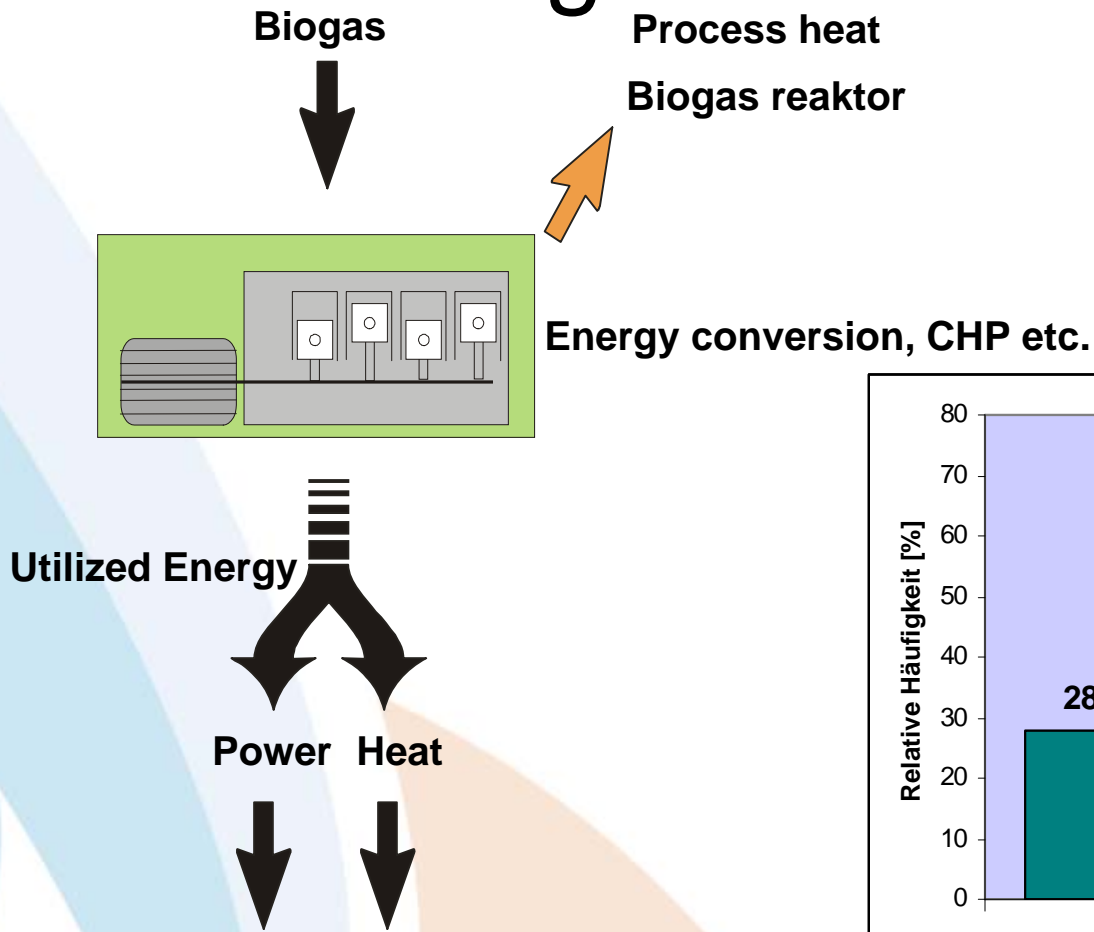
  
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## Biogas in Germany 2005

<b><u>Biogas in Germany</u></b>	
<b>amount of biogas plants</b>	<b>ca. 2.700</b>
<b>installed electrical capacity (cumulative)</b>	<b>665 MW el.</b>
<b>growth against prev. year</b>	<b>70 %</b>
<b>new plants built</b>	<b>250 MW el.</b>
<b>estimated turnover plant installation</b>	<b>650 Mio. EUR</b>
<b>growth compared to prev. year</b>	<b>80 %</b>
<b>employment</b>	<b>&gt; 5.000</b>
<b>avoided climate gas emissions</b>	<b>2,8 Mio t CO<sub>2</sub>-Eq.</b>

# Biogas Conversion



Quelle: FAL (2004)

# Concrete digester with double membrane cover





# Stainless steel digester



# Horizontal digester with paddle stirrer



Steel or  
Concrete



# Direct feeding of solid biomass



# „Garage Type“ Digester

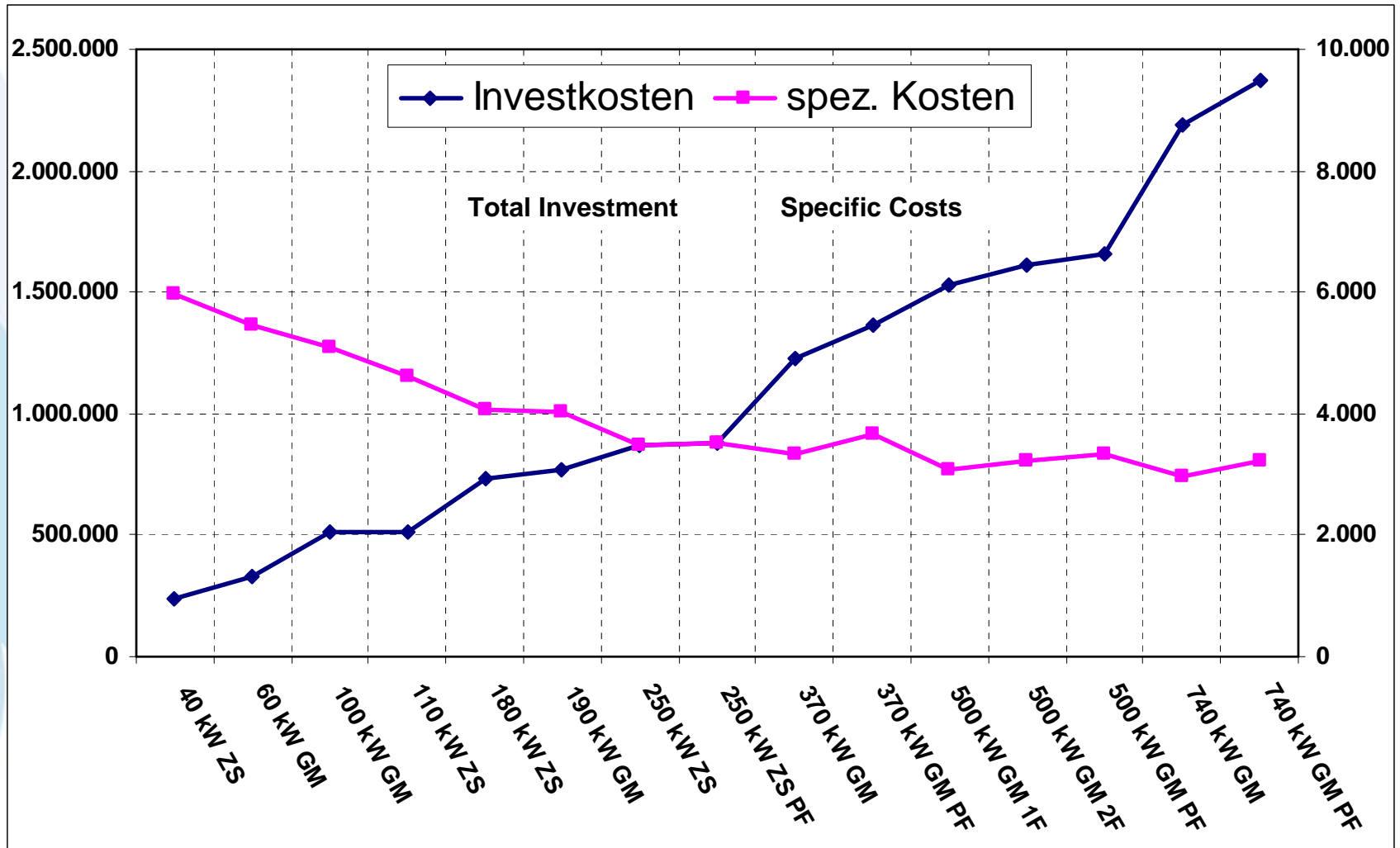


(BEKON, 2005)

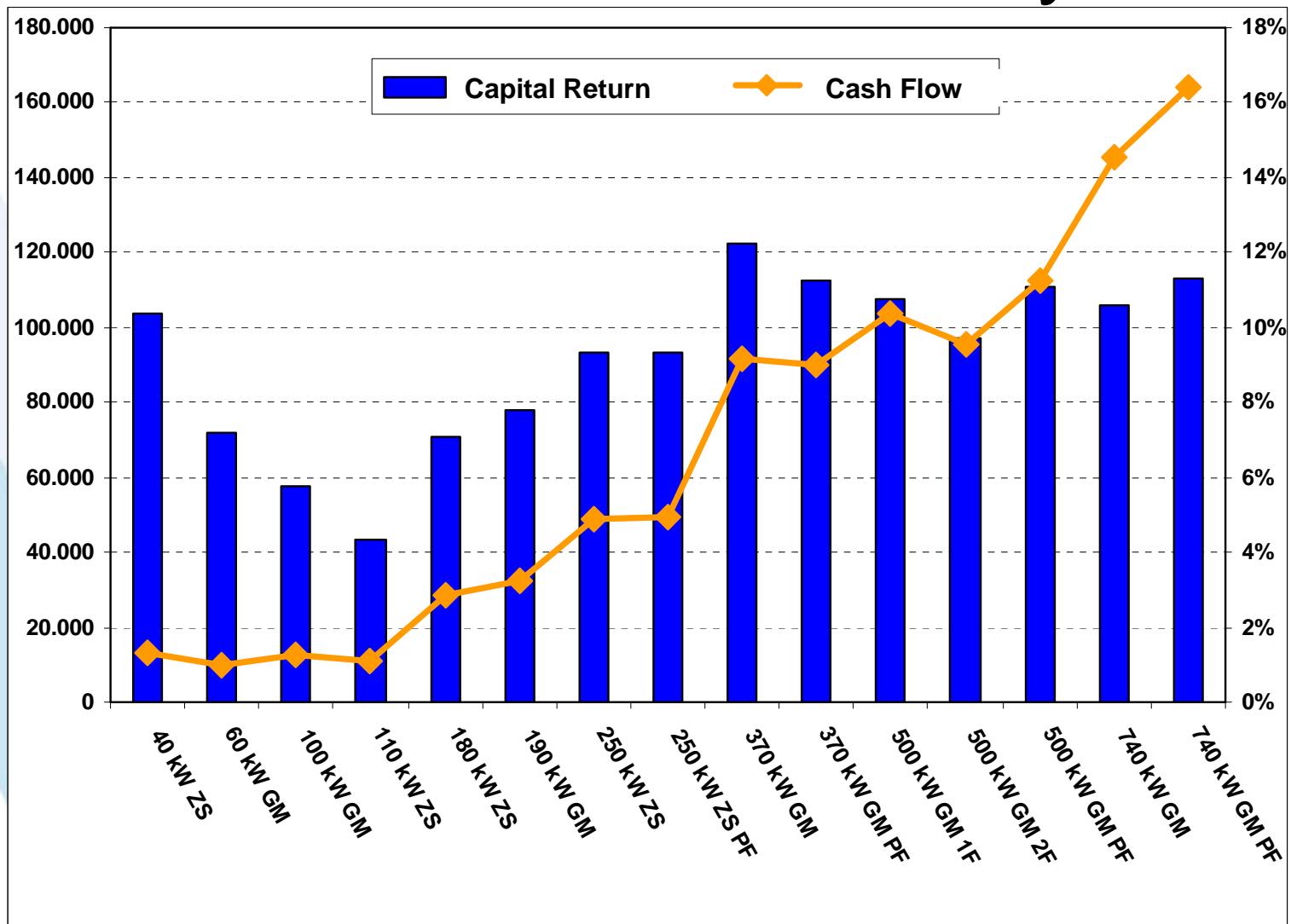
# Agricultural Biogas Basic Investment

	<b>250 - 500 €</b>
<b>Investment Costs per LU</b>	<b>800 - 2.000 €</b>
<b>Investment Costs per kW installed electrical Capacity</b>	<b>3.500 - 6.000 €</b> <b>500 – 30 kW<sub>el</sub></b>

# Investment Costs:



# Case Studies Economy



# Income Comparison of Production Branches

	Biogas 130 kW	Dairy 50 Heads	Fattening Pigs 500 Places	Crops 60 ha
Surplus €/PU	17.433	23.100	9.300	4.500
Working Hours	1.500	2.450	980	480
Hourly Wage Yield	11,62	9,43	9,49	9,38












# Overview: Reimbursement for electricity from biomass (in Cent/kWh)

according to New EEG

		Up to 50 kW <sub>el</sub>	Up to 500 kW <sub>el</sub>	Up to 5 MW <sub>el</sub>	over 5 MW <sub>el</sub>
<b>Basic compensation</b>	Old plants	like before			
	New Plants	11,5	9,9	8,9	8,4
<b>Bonus for energy crops</b>	Old plants	6	6	4	-
	New plants	6	6	4	-

# Tariffs for electricity – who receives what?

Assuming an average consumer price of 18 ct/kWh :

Electricity generation :		3,03
Grid conduction costs :		6,00
Costs of measurements:		1,10
Sales / distribution :		1,00
License fee :		1,99
Electricity tax :		2,05
VAT :		2,54
Feed in Law :		0,42
CHP Law:		0,31

Quelle: Bundesverband erneuerbare Energien e.V., Dezember 2003

## Biogas in Germany

### Present

- **Biogas plants in Germany can produce over 2,9 billion kilowatt hours of electricity per year.**
- **This is three times as much as PV is producing and a tenth of the amount that wind energy can produce.**
- **Therefore biogas plants are supplying electricity to about one million average size households**
- **At the same time about 4 million megawatt hours of heat is available for usage.**
- **Almost one billion cubic meters of imported natural gas could be substituted already directly today through biogas.**

# Biogas in Germany

## Future

- A key to the future biogas utilisation will be the feeding into the gas grid.
- Until 2020 it can be possible to substitute the Russian natural gas imports completely through biogas production on one third of the agricultural area
- Savings of 30 bil. Euros in energy imports and billions in subsidies for agriculture per annum
- The utilisation of biogas through fuel cells in households is possible through the privilege of the EnWG and the bonus compensation of the EEG.
- DVGW regulations give a technical standard for the injection of biogas into the gas grid.

# Thank you for your Attention!

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