

# Differentiated rural biogas developments: Germany and China

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# Biogas developments on the agenda

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- Since the turn of the millennium renewed attention
- Strong in Asia and some developed countries
- Hardly in Africa and Latin America



# Objective

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- Compare and explain differences
- Do we see homogenization?
- Taking China and Germany as cases



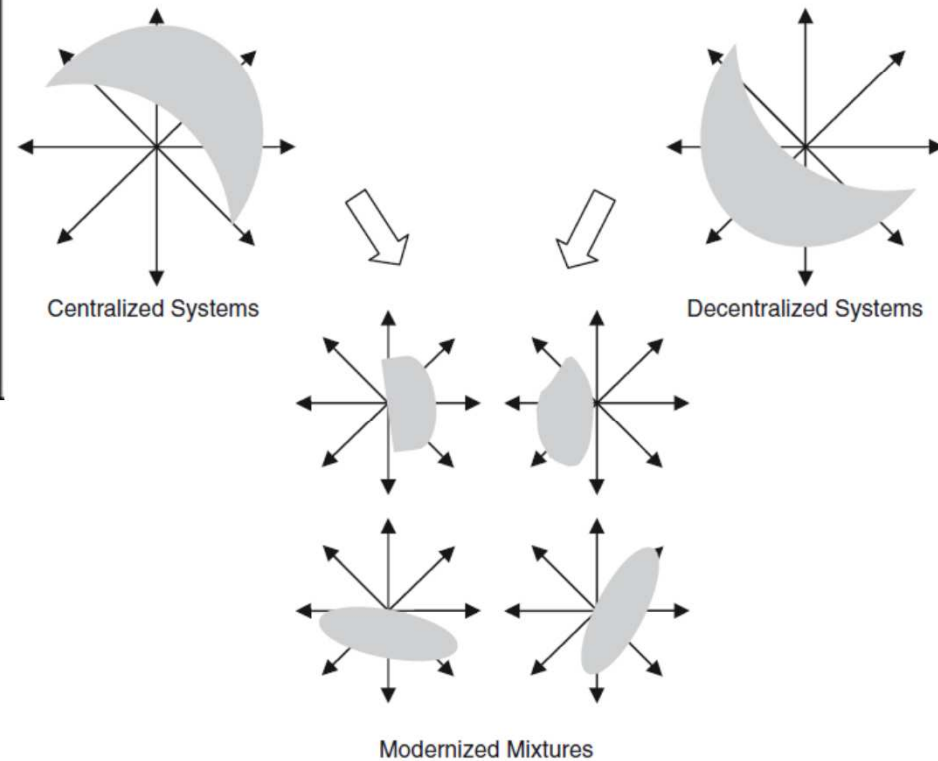
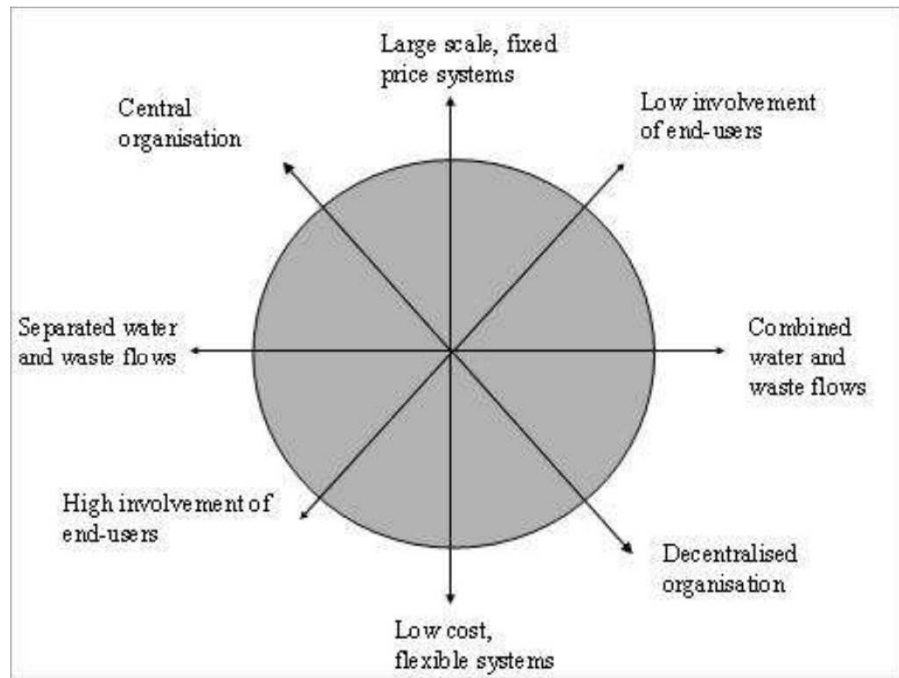
# Framework: modernized mixtures

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- Beyond simple dichotomies (small-large; modern-traditional)
- Modernized mixtures: socio-technical configurations, with variations/combinations in:
  - Level of technology
  - Scale of biogas system
  - Level of connectedness/stand alone
  - Kind of feedstock
  - Level of user involvement
  - Degree of market integration
  - Level of centralization/decentralization



# Modernized Mixtures



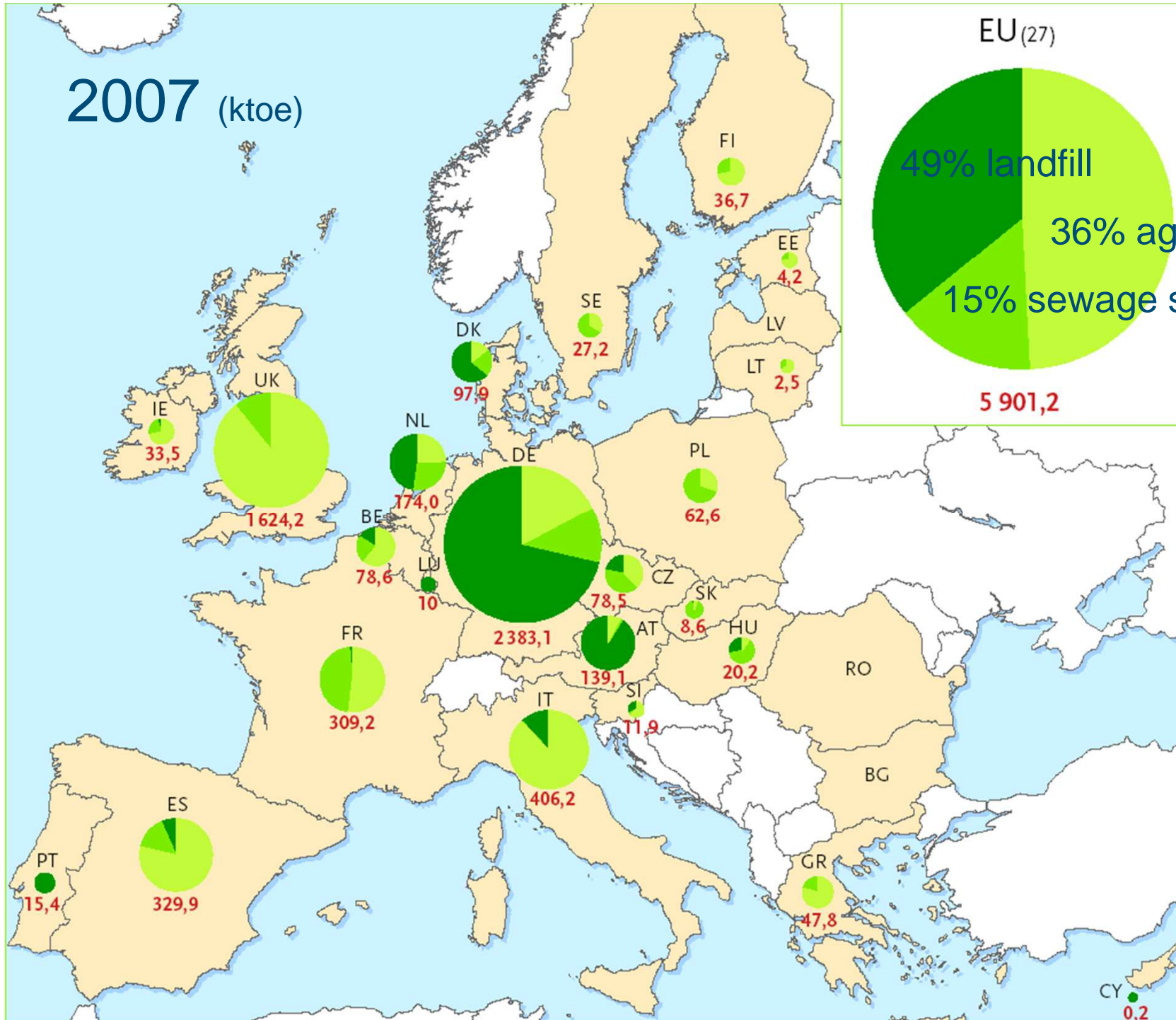
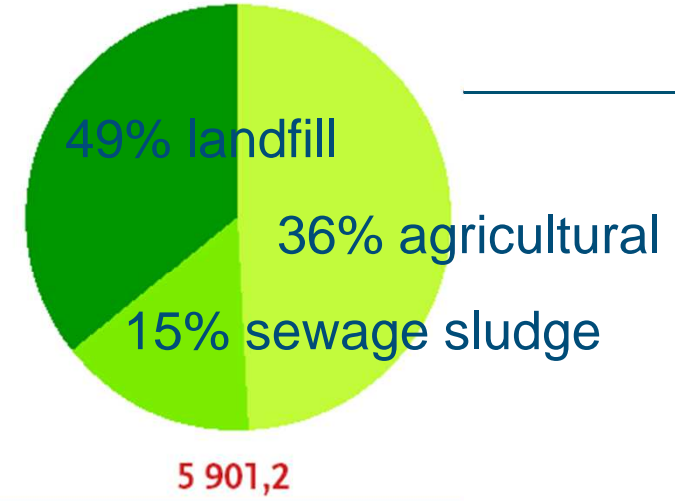
# EU Biogas production 2008/2009 (in ktoe)

	2008				2009			
	Landfill gas	Sewage sludge gas	Other biogas	Total	Landfill gas	Sewage sludge gas	Other biogas	Total
Germany	291.7	384.7	<b>3553.1</b>	<b>4229.5</b>	265.5	386.7	<b>3561.2</b>	<b>4213.4</b>
UK	1416.9	208.6	0.0	1625.4	1474.4	249.5	0.0	1723.9
France	379.3	45.5	28.3	453.1	442.3	45.2	38.7	526.2
Neth.	44.4	48.8	132.5	225.7	39.2	48.9	179.8	267.9
Italy	339.8	3.0	67.2	410.0	361.8	5.0	77.5	444.3
Spain	157.0	19.7	26.6	203.2	140.9	10.0	32.9	183.7
Austria	4.8	21.9	147.8	174.5	4.9	18.9	141.2	165.1
Sweden	32.9	56.3	13.3	102.4	34.5	60.0	14.7	109.2
Denmark	6.4	20.2	67.2	93.8	6.2	20.0	73.4	99.6
<b>Total EU</b>	<b>2888.3</b>	<b>955.7</b>	<b>41553</b>	<b>7999.3</b>	<b>2996.8</b>	<b>1008.4</b>	<b>4340.9</b>	<b>8346.0</b>



2007 (ktoe)

EU<sub>(27)</sub>



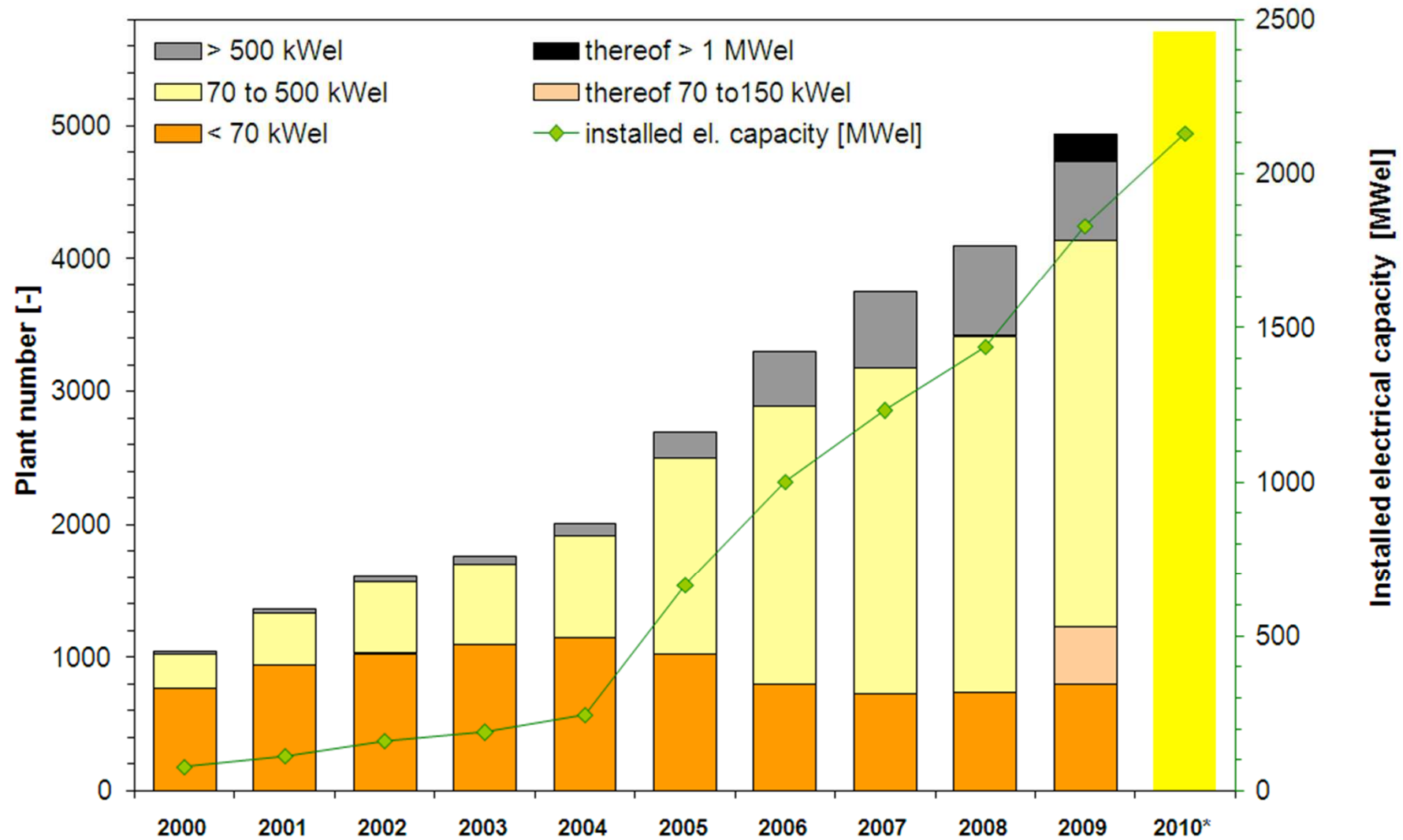


# Rural biogas Germany





# Germany agricultural biogas installations



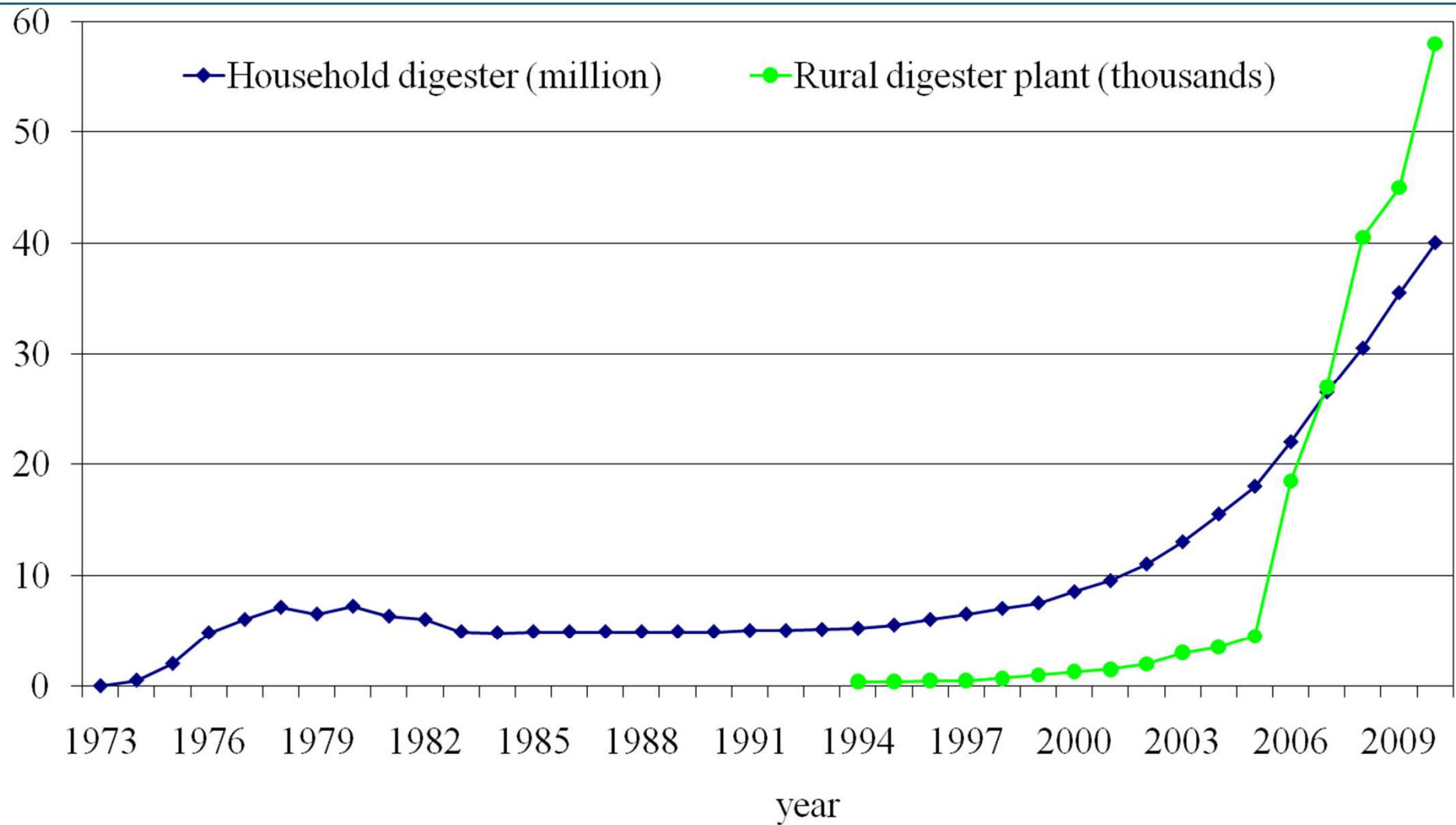
# Developments in Germany

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- Mostly single household, few centralized
- Increase in feed-in prices and premiums
- Fully incorporated in market economy
- Advanced technologies
- Increase in size hh biodigester (500-5000 m<sup>3</sup>)
- Increase in connectedness via electricity (less biomethane)
- Feedstock: increasingly energy crops



# China biodigesters, 1973-2010







# Characteristics and developments in China

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- Majority household, small scale (8-12 m<sup>3</sup>)
- Connection with sanitation
- Simple technologies
- Subsidized by government (800-1200 Yuan)
- Feedstock predominantly waste and manure
- Not conversion to electricity, little connectedness
- Recently more centralized: village and livestock



# Problems

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- Shortage of raw materials
- Used by the 'rural middle class'
- Maintenance structure often missing
- Increasingly labor is missing





# Comparing Germany and China

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Differences	Similarities
Size	Predominantly farm/household based
Technological advancement	Strong government involvement
Grid connections	Multiple goal fulfilment
Feedstock	Not competitive
Market integration	
Energy user involvement	

■ Conclusion: Far from homogenization

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# Thank you

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