

**FFU PhD Workshop,
30th November 2009:
The deployment of
renewable energies in
China and its
implications for climate
protection**

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Pledge of taking up national measures to fight global warming



Declaration of State Council, November 26, 2009:

1. Decrease energy intensity per unit of GDP by -20% up to 2010 and by 40-45% up to 2020 compared with 2005 levels
2. Develop renewable and nuclear energies to reach 15 % of the country's total primary energy consumption by 2020

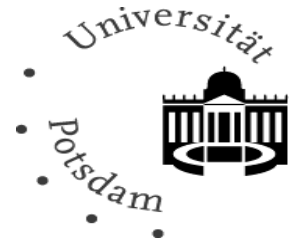
Discussion

Are these national measures sufficient? What could be realistically demanded of China in its situation?

Structure

- I. Background on energy situation in China
- II. Renewable energy deployment
- III. Contribution of CDM to shift to low carbon energy situation

Part I



The energy situation in
China - what is the corridor
for action?

Key Indicators and Reference and 450 ppm scenarios



	1990	2007	2020		2030	
			RS	450	RS	450
Population (million)	1 141	1 327	1 429		1 461	
Share of world population	22%	20%	19%		18%	
GDP (\$2008 trillion, PPP)	1.5	7.6	18.8		28.5	
Share of world GDP	4%	11%	18%		21%	
Share of world CO ₂ emissions	11%	21%	28%	27%	29%	27%

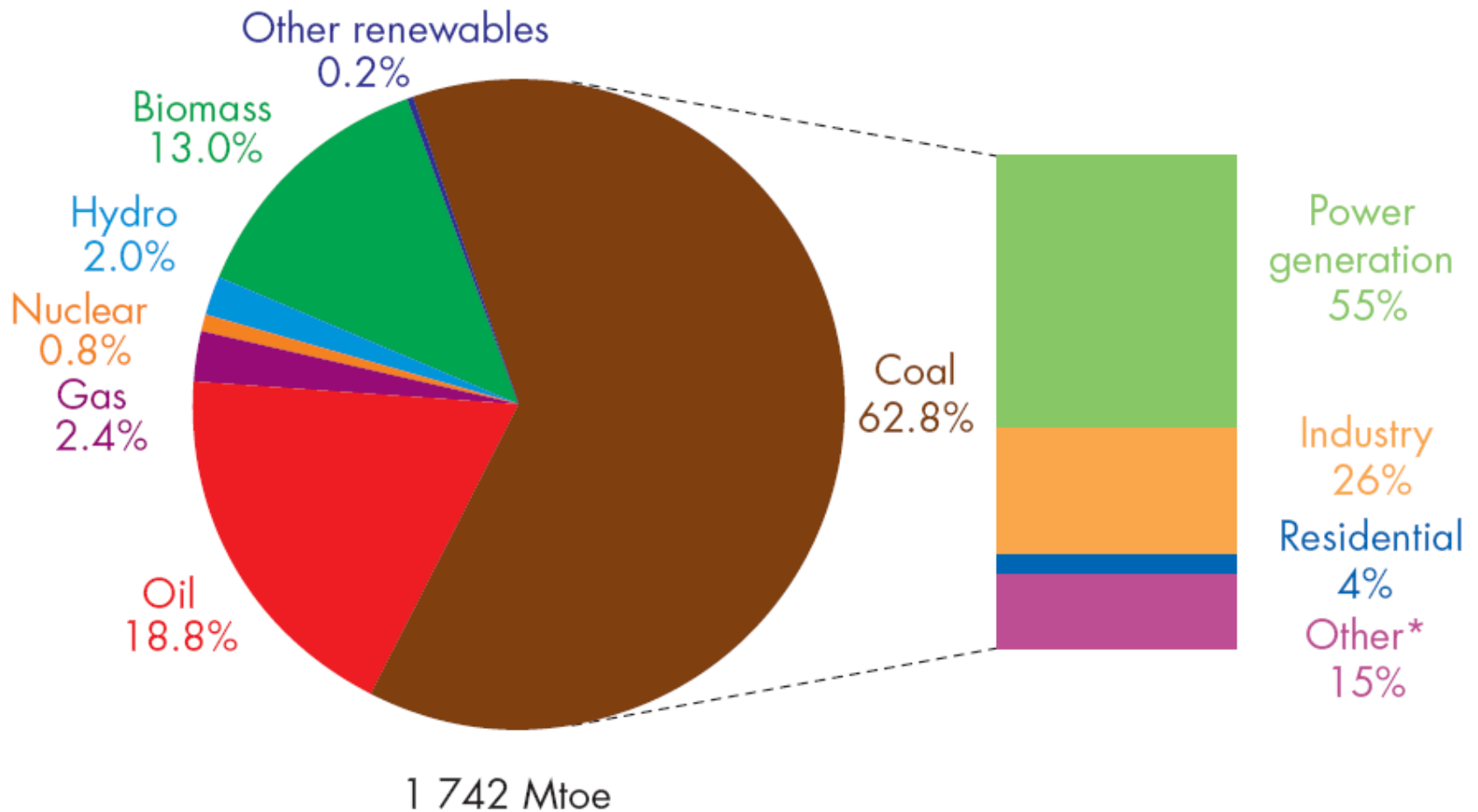
China has overtaken the US and has become top CO₂ emitter in 2007

CO₂ emissions in total	Per capita CO₂ emissions (in tonnes)
China: 24%	USA: 19.4
USA: 21%	Russia: 11.8
EU 15: 12%	EU 15: 8.6
India: 8%	China: 5.1
Russia: 6%	India: 1.8

China's per capita emission were 30% below OECD average in 2005

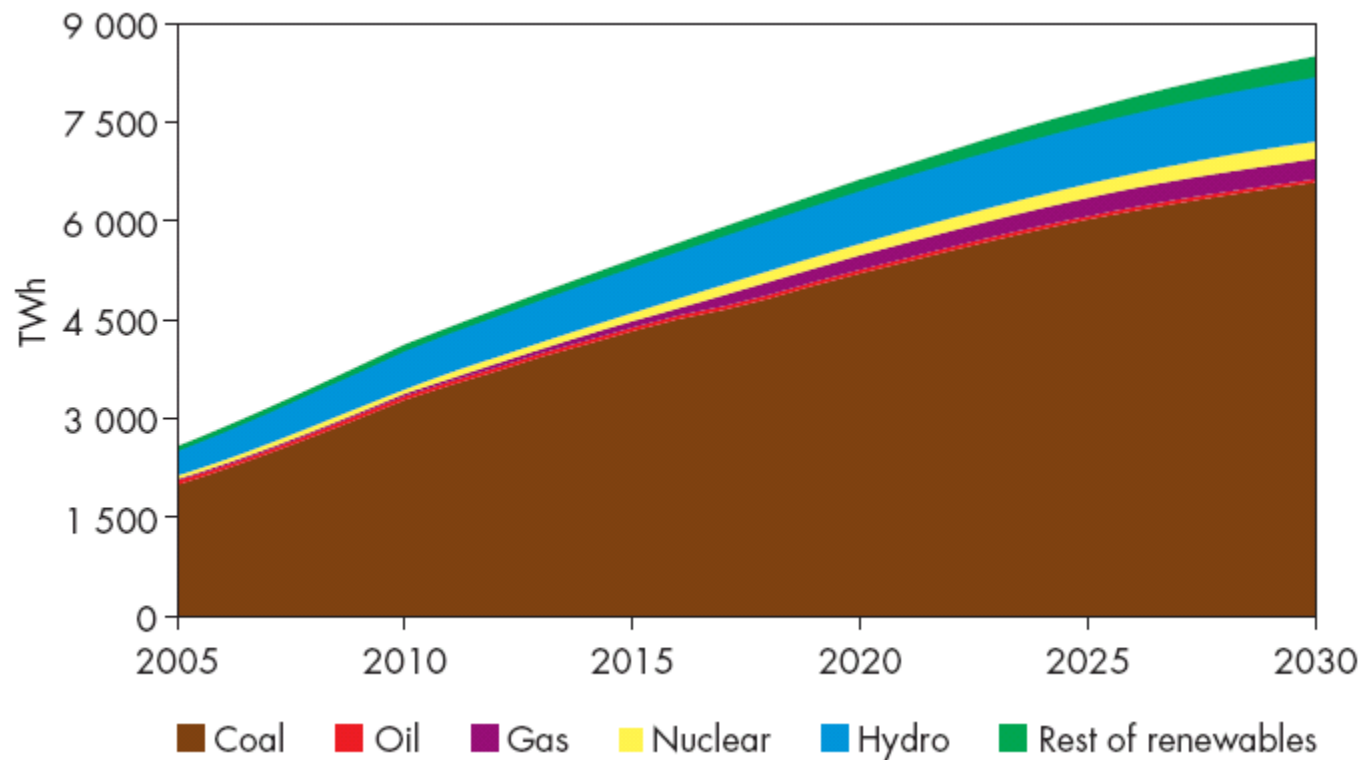
Stern report 2008 recommends: 2 tonnes/capita in 2050

Primary energy consumption in 2005



High need for additional power generation capacity

BAU scenario for additional power capacity installations 2006-2030



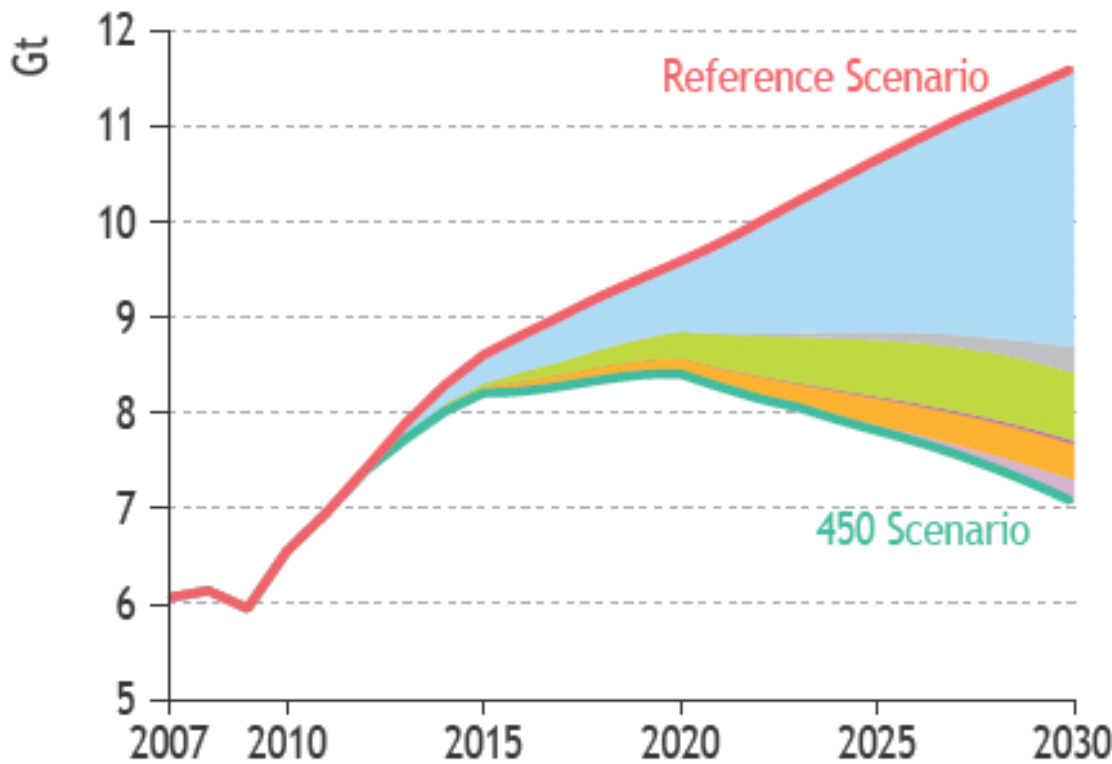
At present: one additional coal power station of 1 GW every 5 days!

Part II



Is deployment of renewable energies an option to curb greenhouse gases in China?

Scenario of how to curb CO₂-emissions



Abatement
(Mt CO₂)
2020 2030

	2020	2030
Efficiency	728	3 195
End-use	728	2 923
Power plants	0	272
Renewables	279	715
Biofuels	0	35
Nuclear	168	366
CCS	3	243

Abundance of reports about renewables in China



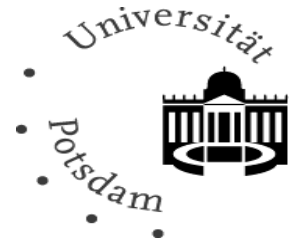
“China is the world’s largest producer of renewable energy - but only if large hydro is taken into account, which accounts for 20% (145GW) of the country’s total power generation capacity”

UNEP and New Energy Finance Ltd. 2008 “Global Trends in RE Investment”

“China has displaced the UK in the first top five attractive countries for investment”

Ernst & Young 2008

Incentives for the deployment of renewables in China



- international pressure to reduce greenhouse gases
- good potential for RE installations
- good potential to take up a leading position in the global RE manufacturing market
- using clean energy can contribute to curb costs of environmental degradation in China. These amounted to 10% of GDP in 2006
- diversifying energy supply by integrating renewables can increase energy security and decrease import dependency on foreign fossil fuels

Status quo and targets for renewable energies in China



Table 1. Installed Renewable Energy Capacity and Targets in China

	2007 Capacity	2020 NDRC Target
Hydro	145GW	300GW (including 7% small)
Wind	6GW	30GW
Solar PV	100MW	1.8GW
Solar Water Heating	130m m2	300m m2
Biomass Power	3GW	30GW
Biogas	9.9 billion m3	44 billion m3
Biomass Solid Fuel	n/a	50m tonnes
Bioethanol	1.6 billion litres (grain-based)	12.7 billion litres
Biodiesel	119 million litres	2.4 billion litres
Geothermal (power & thermal)	32MW (power)	12m tce (power & thermal)
Marine	n/a	100MW (tidal)

Source: UNEP SEFI NEF 2008

Support policies for renewable energies

Renewable Energy Law (since January 2006)

Grid operators are obliged to buy power generated by renewable energies. They must buy for a price consisting of the production costs + a profit margin

Mandatory Market Share – pilot projects

Fujian: 14% share of RE; Sichuan: 10% share of RE

Public RE support program

e.g. 'Brighthness-Program' = a rural electrification program aiming to deliver solar home and hybrid systems to 23 million people with the next 15 years.

e.g. 'Riding the Wind'-Program for facilitating technology transfer in the wind power industry.

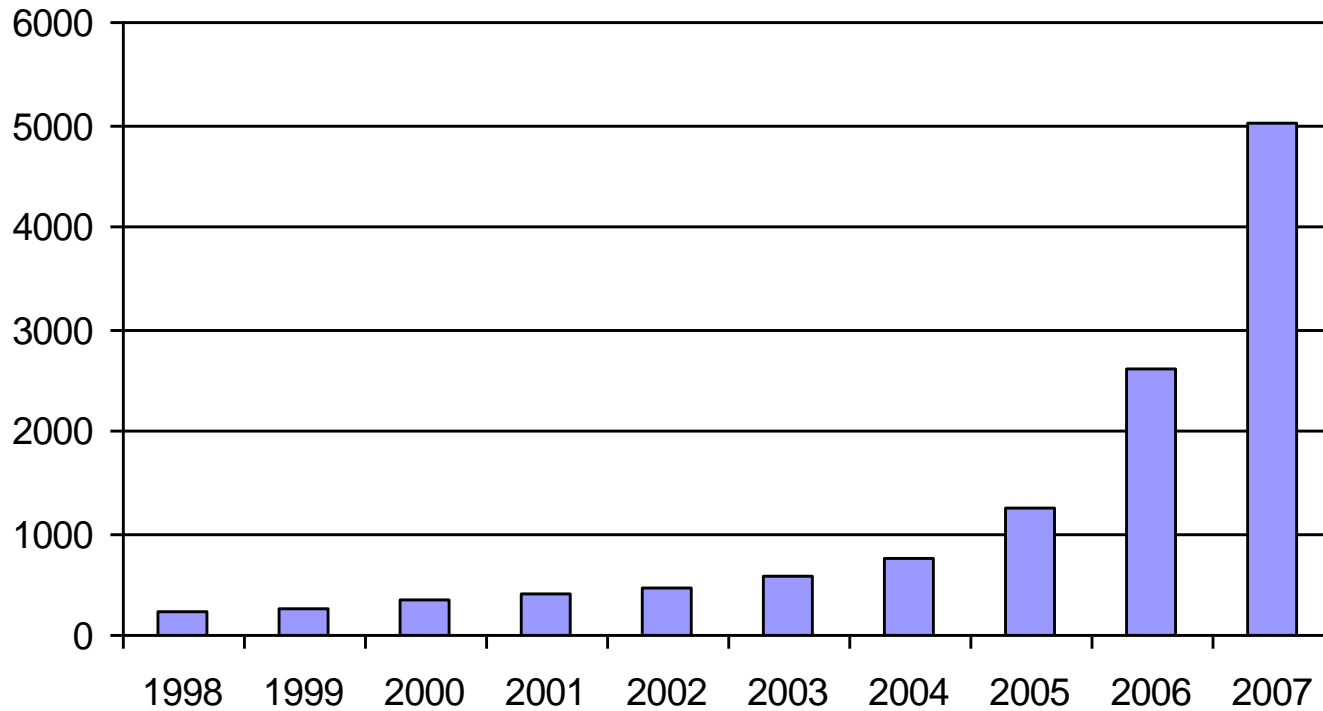
Subsidies

e.g. 21 million Euro for 31 wind power projects and 2.3 million Euro for 6 biomass projects

Wind power deployment



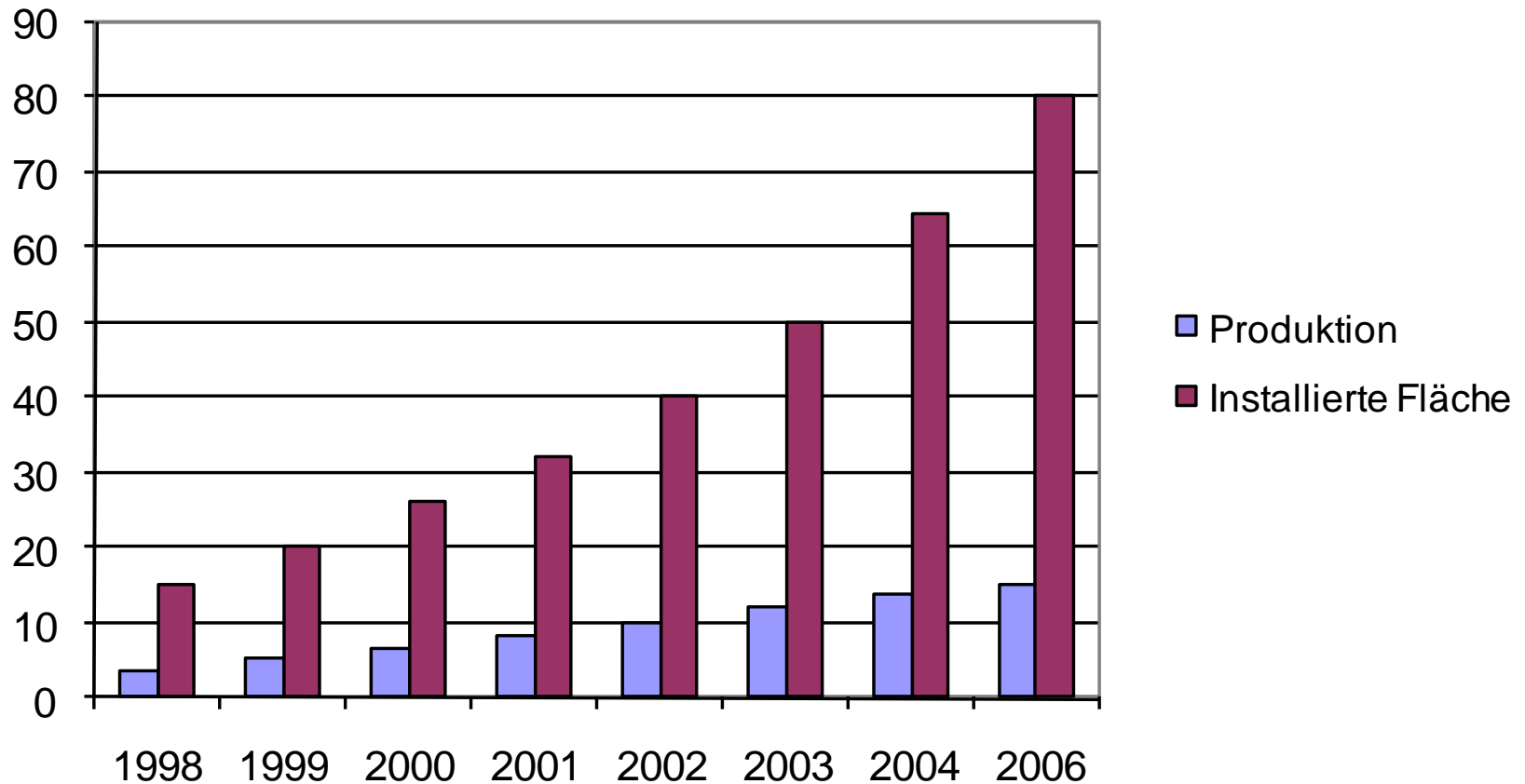
Installed capacity in MW



Source: www.nrel.gov und China Electric Power Research Institute

China is top country worldwide in production and usage of solar thermal installations

Production and installation in m²

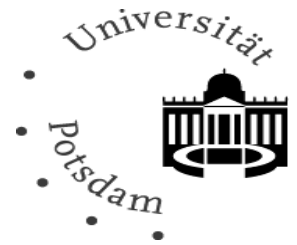


Implementation deficits

Ambitious national targets, but

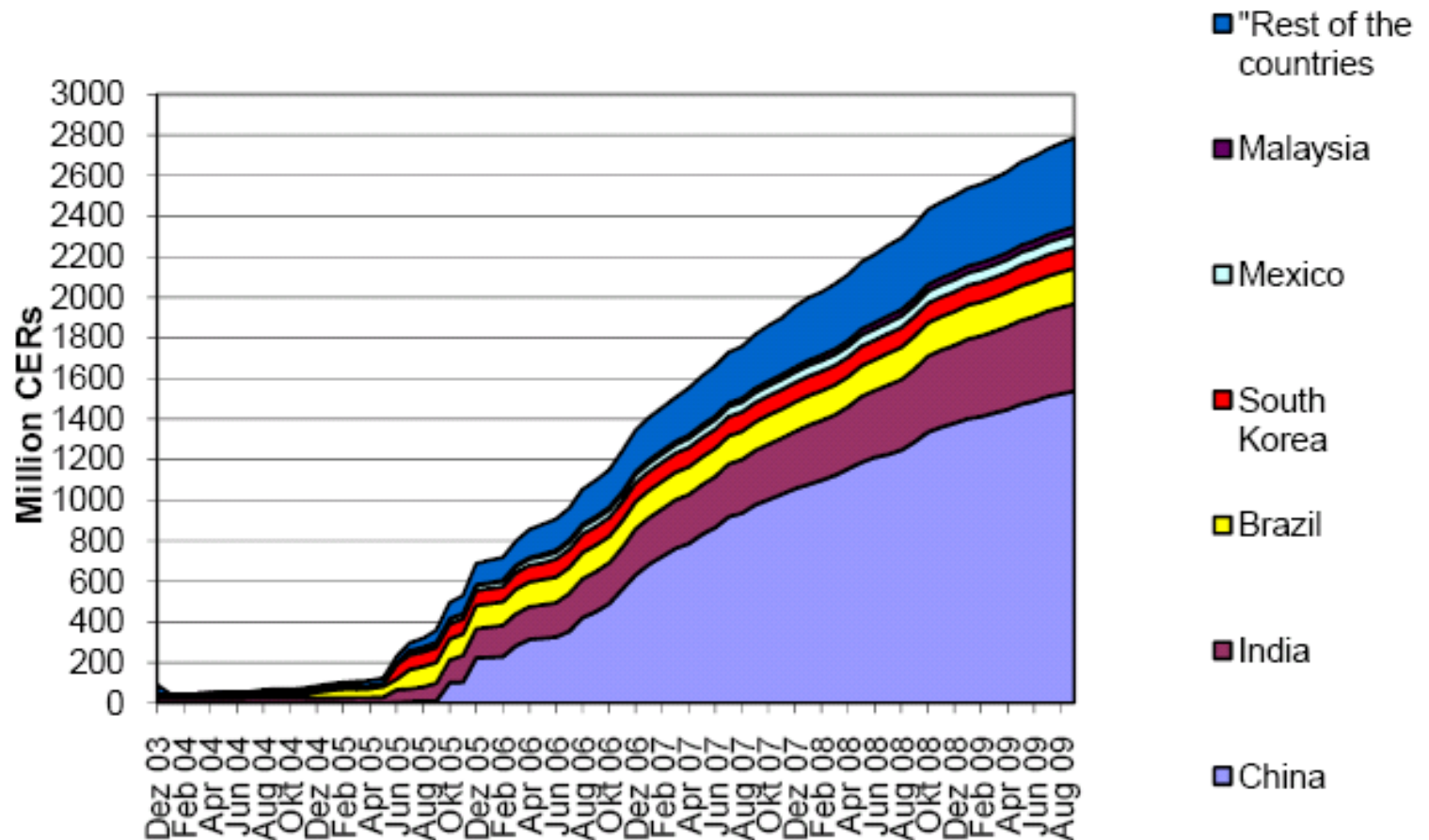
- insufficient local implementation due to divergence between national and local priorities and weak local state capacity
- local environmental pollutions is often not sufficiently covered in media
- lack of know how and technologies, e.g. wind turbine manufactures still have problems to build >1 MW turbines
- high transaction costs for independent RE power producers because they have to renegotiate their power purchase contracts with the grid operators each year anew

Part III



Is the clean development mechanism (CDM) an option to shift to a low carbon power production in China?

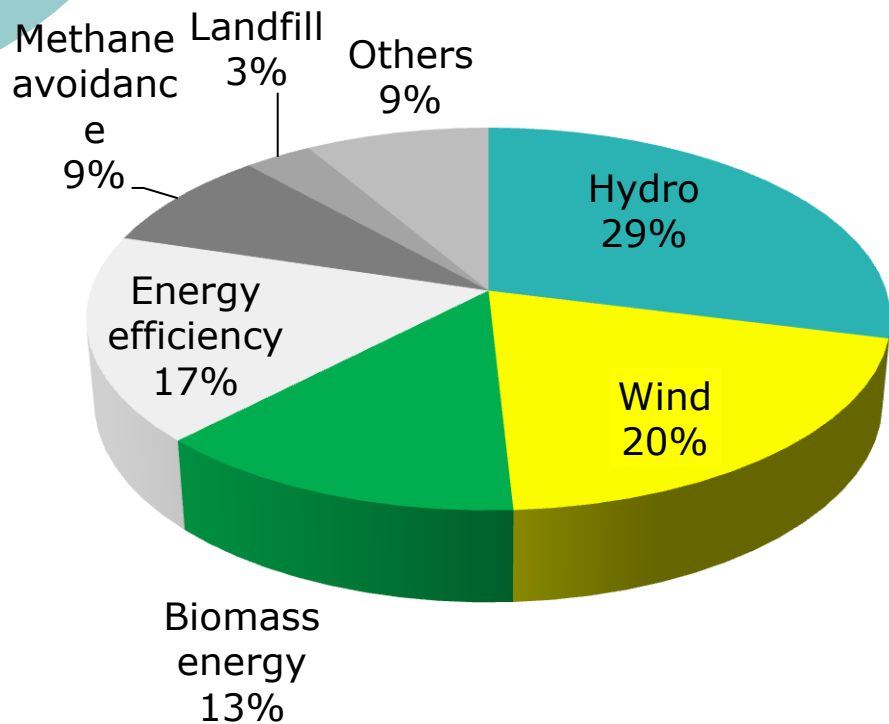
China is world's leading host country for the CDM



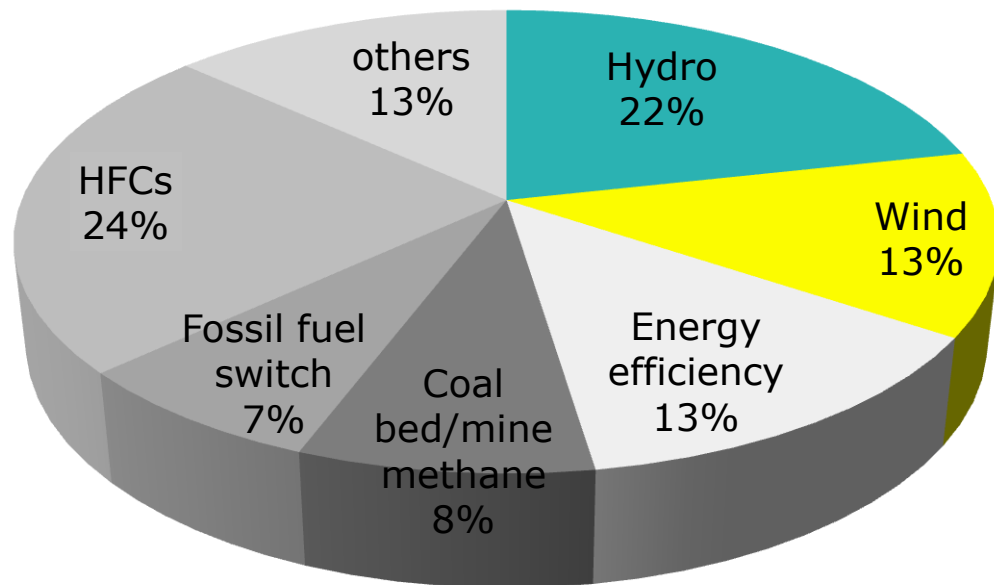
Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, October 1st 2009

Majority of CDM projects in China are renewable energy projects, but...

Share of no. of CDM project types



Share of CERs per CDM project type




What can the CDM deliver?

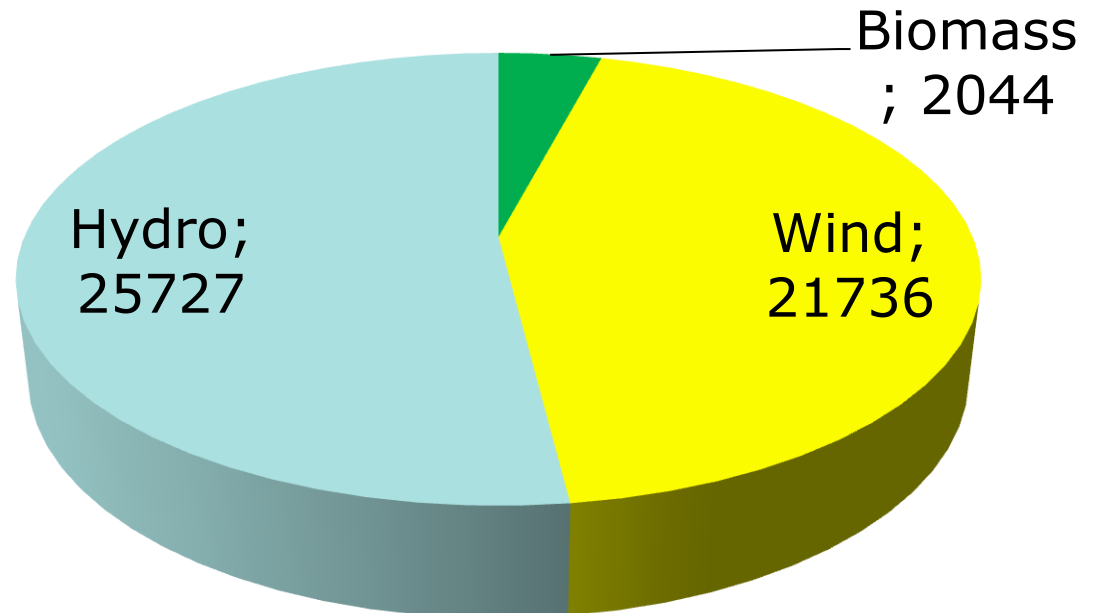
164 GW power capacity needed until 2012
- 91 GW power capacity with help of CDM
until 2012

73 GW left

~ 50,000 MW installed in CDM RE projects



Addition
ality?

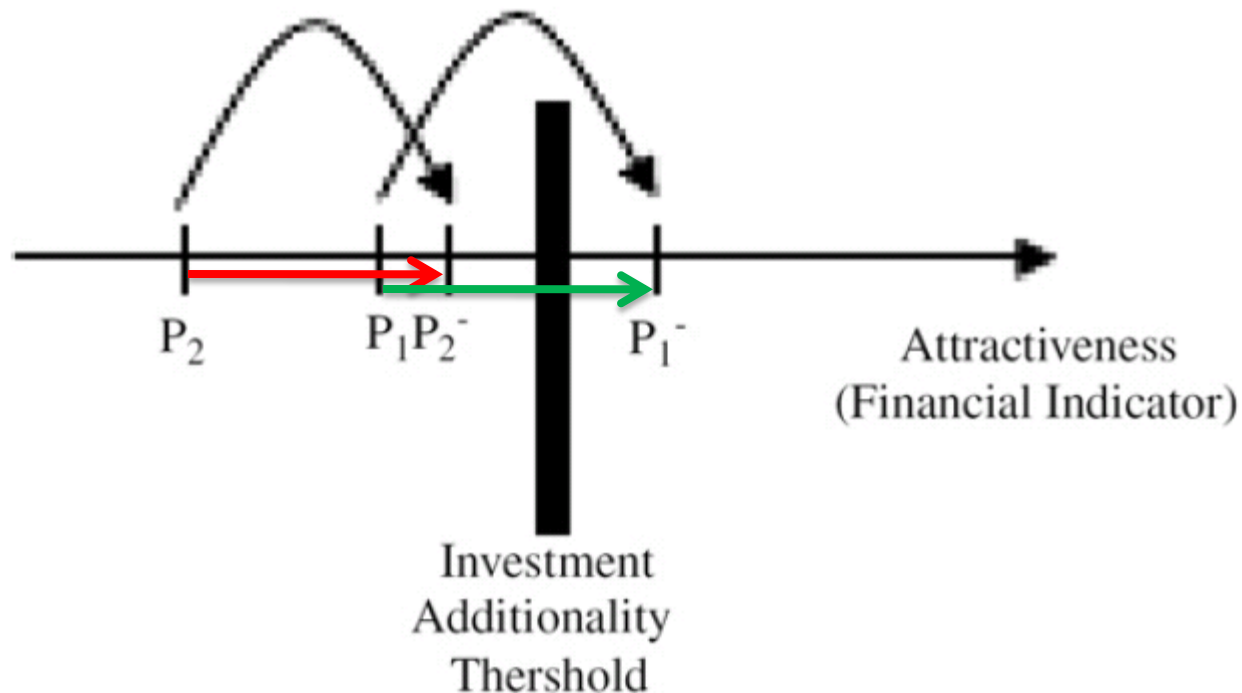


Additionality

Ensures integrity of CDM: reducing additional emissions to the "Business As Usual" Scenario

Hard to prove:

- Projects have to be financially additional
- Projects have to be technologically additional



Additionality of CDM project types



Project type	additionality	Rejected/ under review
Energy efficiency in industry	Very low	59
Hydro power	Very low	96
Wind power	Low	29
Biogas/biomass	Good	3
Solar	Good	-

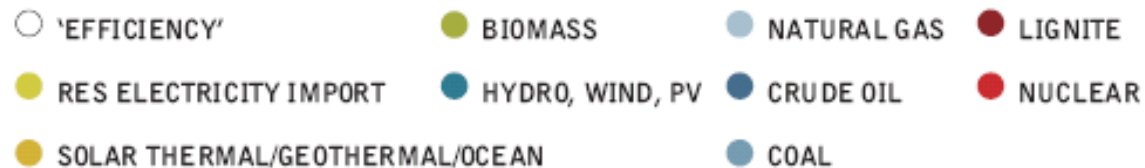
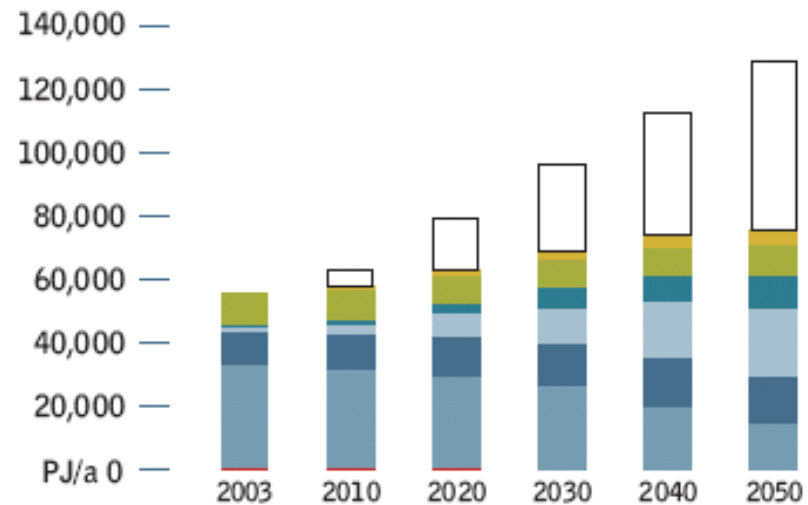
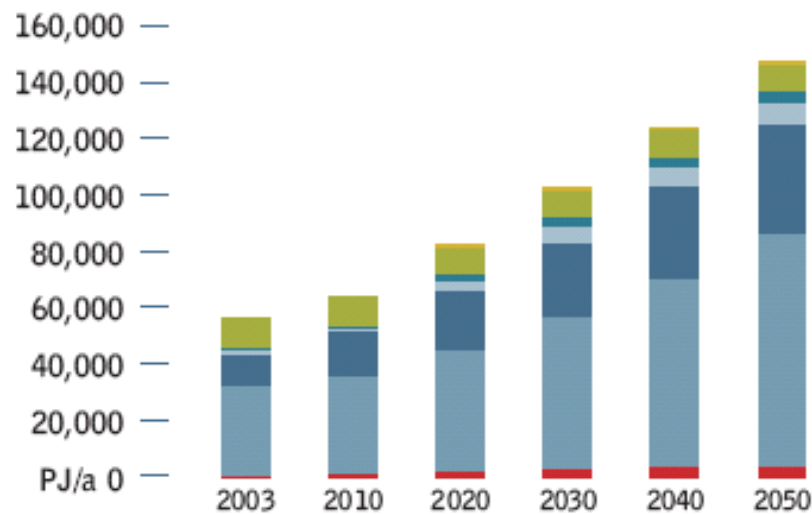
Based on UNDP Risoe November 2009

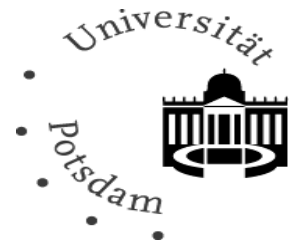
Conclusion: options for an energy [r]evolution?



BAU scenario:
Primary energy consumption

Energy [r]evolution scenario





Thank you for your attention!

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