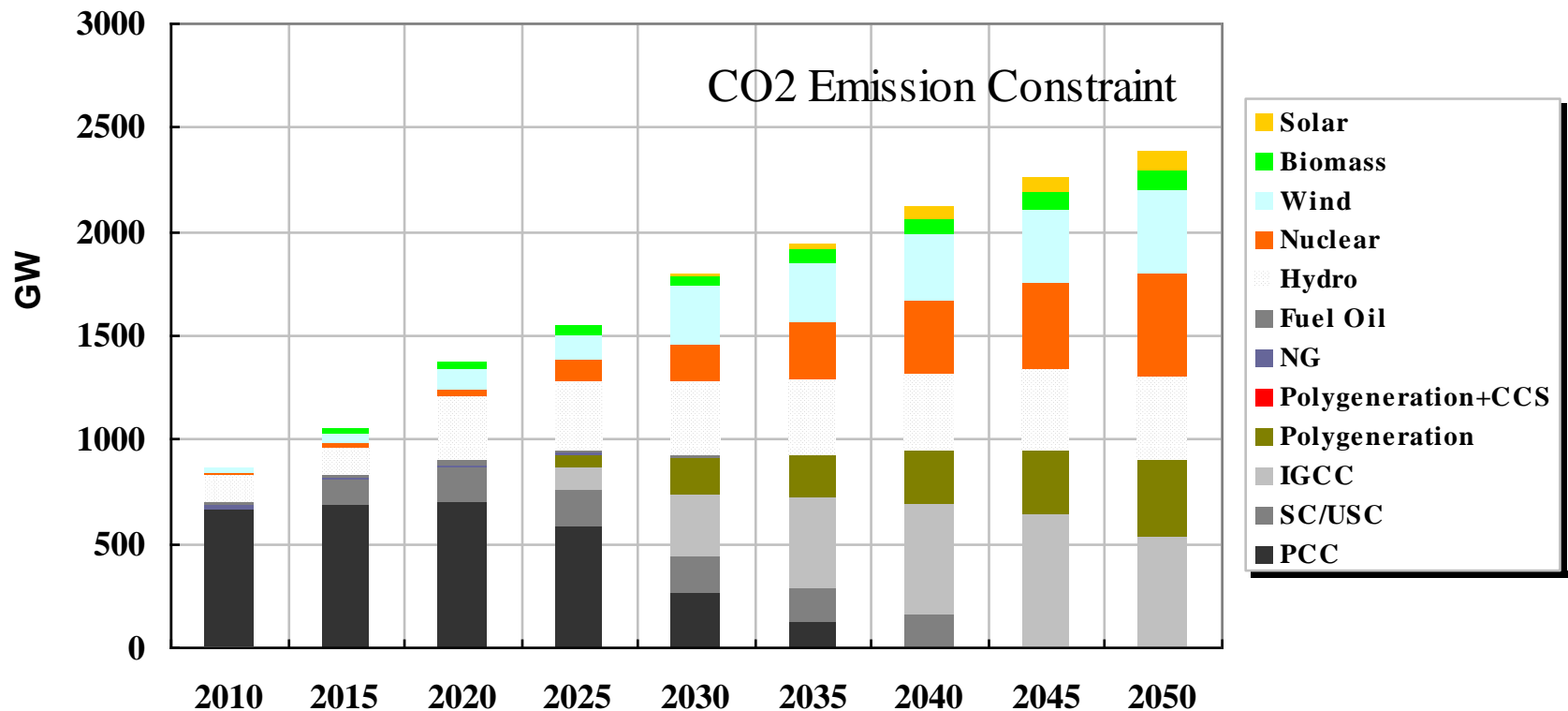


Renewable Energy Technology Development and Deployment: Some Observations from China

Zhang Xiliang
Institute of Energy, Environment & Economy
Tsinghua University

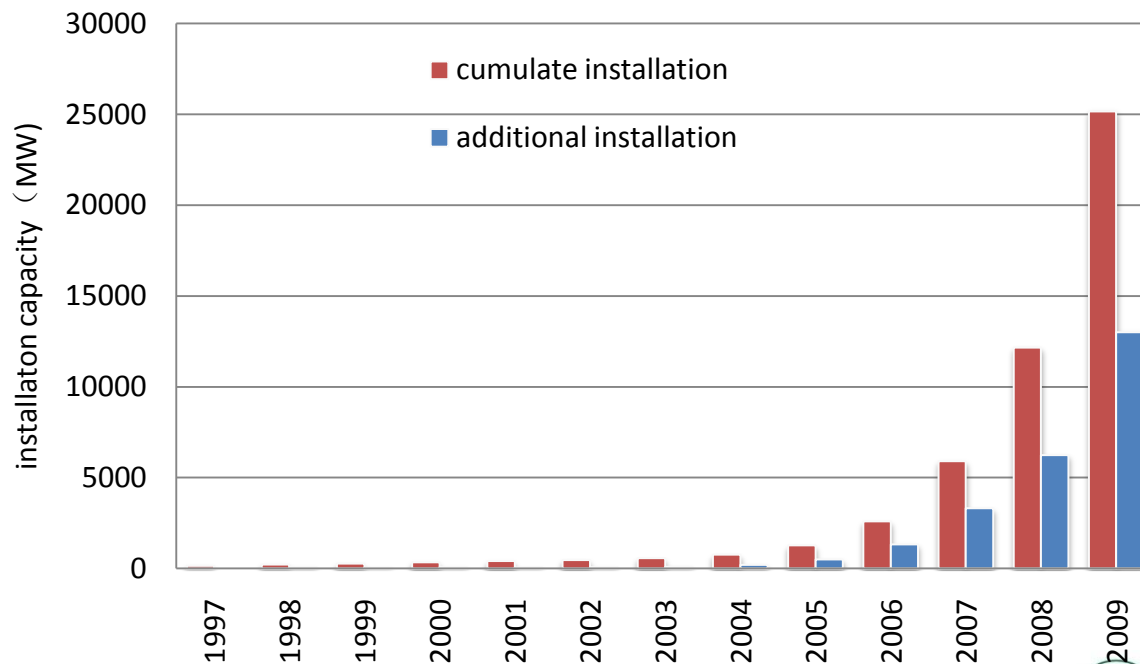


A power supply scenario under CO2 emission control

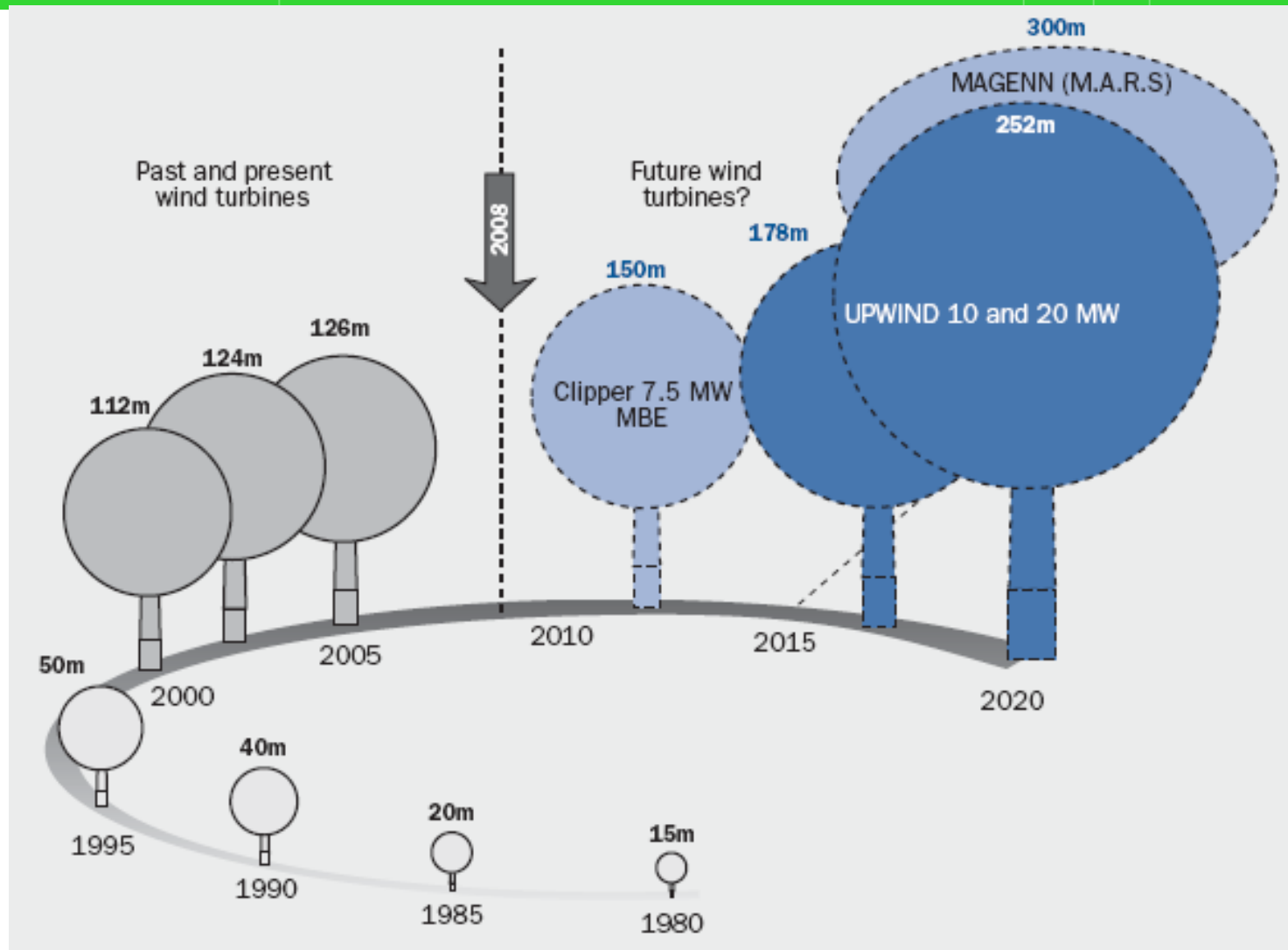


Wind power

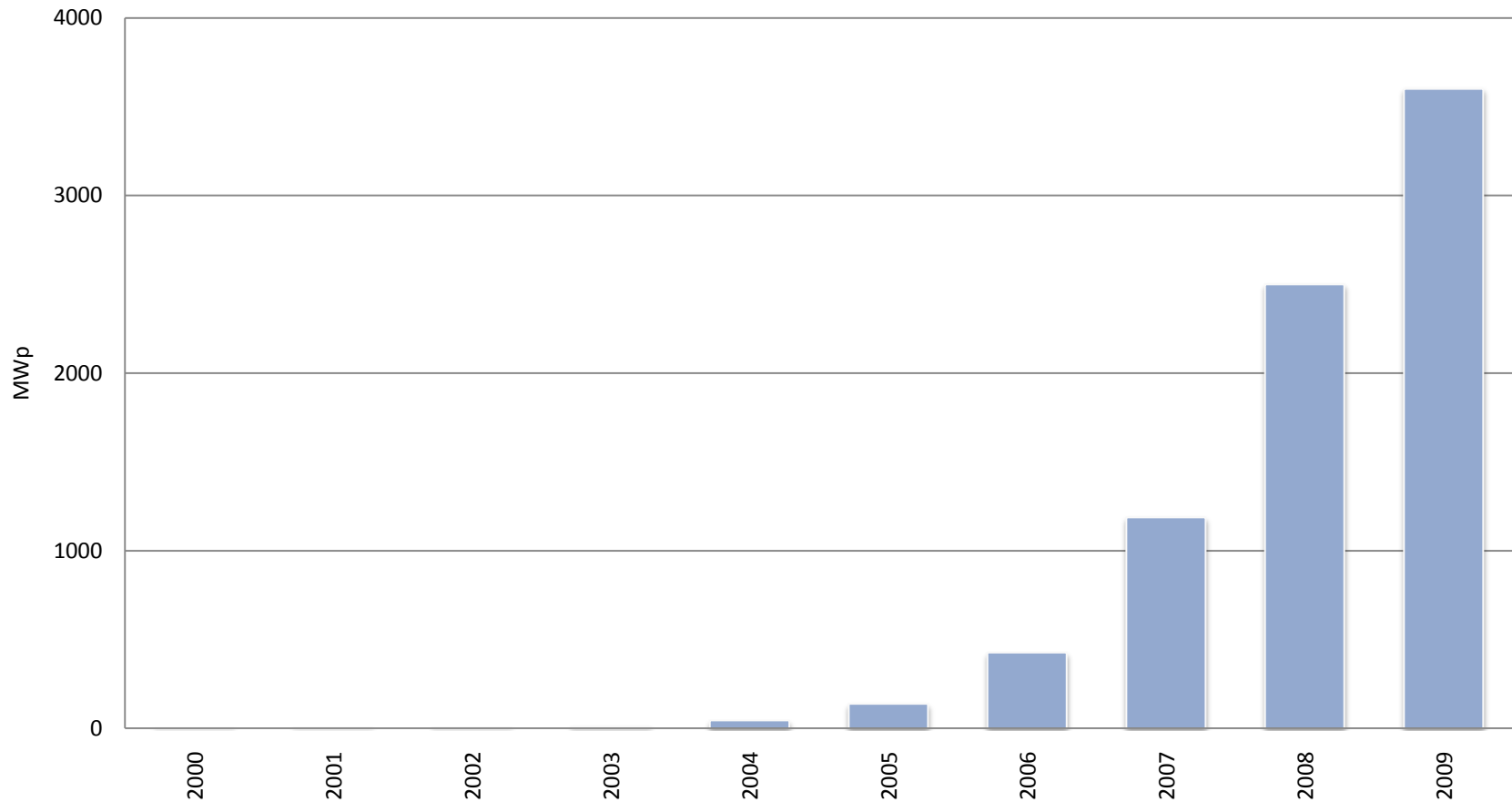
- Wind power experienced rapid growth during the last few year. And the cumulate installation increased to 25 GW in 2009 from 1.3 GW in 2005.
- The annual growth rate had reached about 100% for 4 years already.



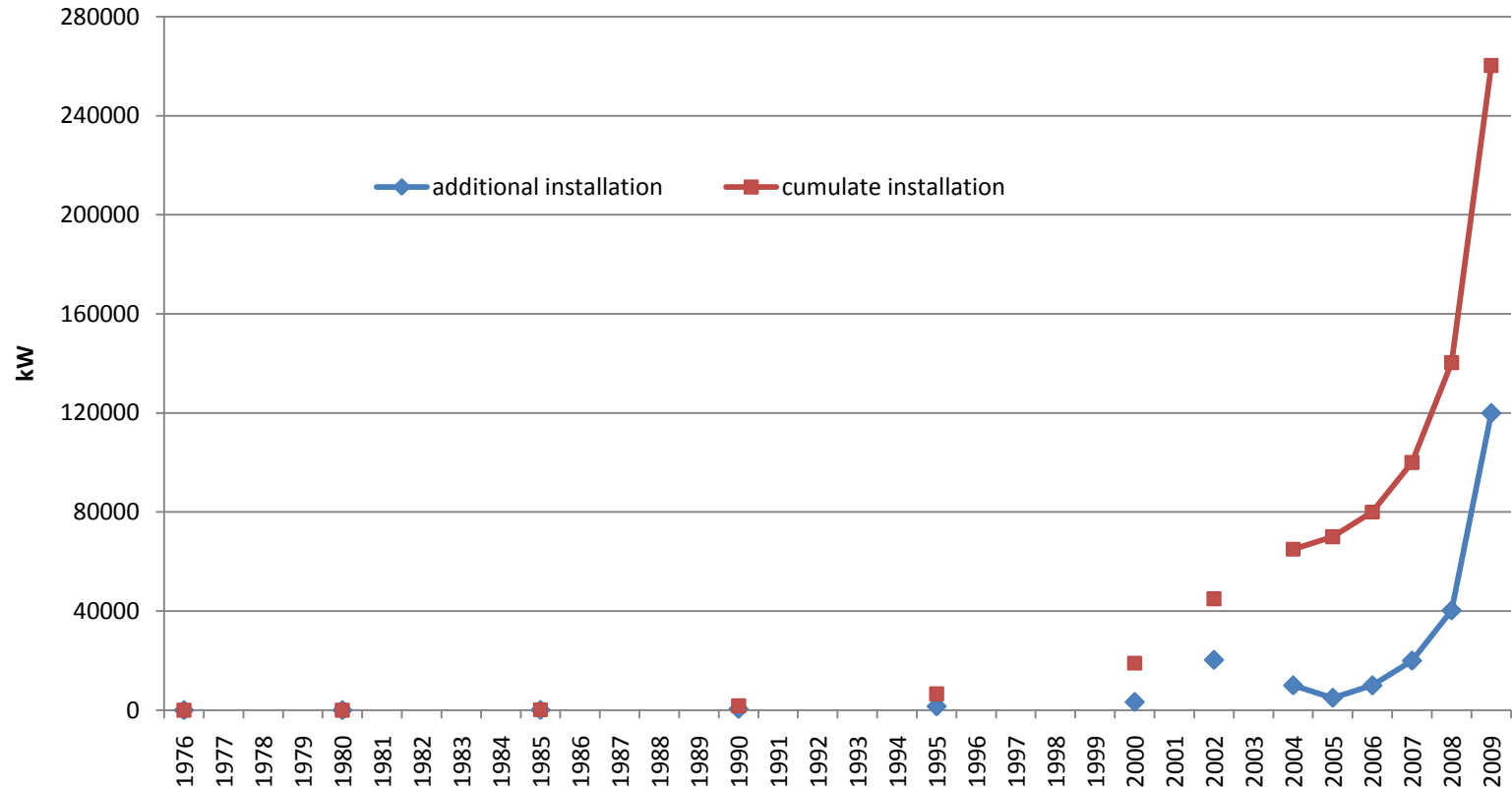
Wind Power Technology



Solar PV Production in China



Solar PV Installation in China



Top 15 of Solar Cells Shipment in 2009

Rank	2008	产量(MW)	Rank	2009	产量(MW)
1	Q-cell (DE)	570.4	1	First Solar (US,DE,ML)	1100.0
2	First Solar (US,DE,ML)	504.0	2	Suntech Power (CH) 尚德	704.0
3	Suntech Power (CH) 尚德	497.5	3	Sharp (JP)	595.0
4	Sharp (JP)	473.0	4	Q-cell (DE)	586.0
5	Kyocera (JP)	290.0	5	Baoding Yingli (CH) 英利	525.0
6	Baoding Yingli (CH) 英利	281.5	6	JA Solar (CH) 晶澳	520.0
7	JA Solar (CH) 晶澳	277.0	7	Kyocera 日本京瓷	400.0
8	Motech (TW)	272.0	8	Trina Solar (CH) 天合	399.0
9	Sun Power (PH)	236.9	9	SunPower 美国	397.0
10	Solar World (US,DE)	221.0	10	Gintech 台湾昱晶	368.0
11	Sanyo (JP)	210.0	11	Canadian Solar (CH) 阿特斯	300.0
12	Trina Solar (CH) 天合	209.0	12	Solarfun (CH) 林洋	220.0
13	Solarfun (CH) 林洋	189.0	13	China Sunergy (CH) 中电	194.0
14	Mitsubishi Electric (JP,+HEL)	188.0	14	Changzhou Yijing (CH) 亿晶	135.0
15	GinTech (TW)台湾昱晶	180.0	15	Ningbo Solar (CH) 宁波	140.0
others		3300.7	others		2757.0
Total	2008	7900	Total	2009	9340



Domestic Policy Interventions

- Renewable Energy Law
- Mandatory Renewable Market Share
 - RE: 10% in 2010 and 15% in 2010 of primary supply
 - NH-REP for electricity producers: 3% in 2010 and 8% in 2020
 - NH-REP for the grids: 1% in 2010 and 3% in 2020
- Concession Program/Feed-in Tariffs
 - PPA
- Power Surcharge for Renewables
- Relief of VAT and Duty
- Subsidy for renewable energy installations
- Public R&D



Wind Technology Transfer Mechanisms in China

Manufacturer	Technology list	Technology transfer		
		Time	Collaborator	Mechanism
Sinovel	1.5MW	2003	German Fuhrlander	Jointly develop
	3MW	2007	Austria Windtec	Jointly develop
	5MW	2007	Austria Windtec	Jointly develop
Goldwind	660kW	1997	German Jacobs	Licensing
	750kW	2001	German REpower	Licensing
	1.5MW	2005	German Vensys	Jointly develop
	2.5MW, 3MW, 5MW	2008	German Vensys	Purchasing the foreign company
Dongfang Electric	1.5MW	2004	German REpower	Licensing
	2.5MW	2005	German Aerodyn	Jointly develop



Clean Development Mechanism

- By the end of April 2009, the Chinese Government approved 1766 CDM projects in total, and 337 of them were wind power projects;
- Approximately 95% of the wind power projects which do not belong to the Wind Concession Program are of CDM projects; and
- The wind farm investors could get an economic incentive of approximately 10 cents/kWh on average from CDM projects.



Some Observation Remarks

- Renewable energy development largely come from science advance in different disciplines.
- China's renewable energy development benefit from science advance in the world.
- China is also a contributor particularly for translating science advance into applications
- Public policy and international cooperation could play an important role in science advance and technology innovation.



Thank you for attention!

