



China's March toward Low-carbon Economy (LCE)

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Agenda

1. China's energy/climate challenges

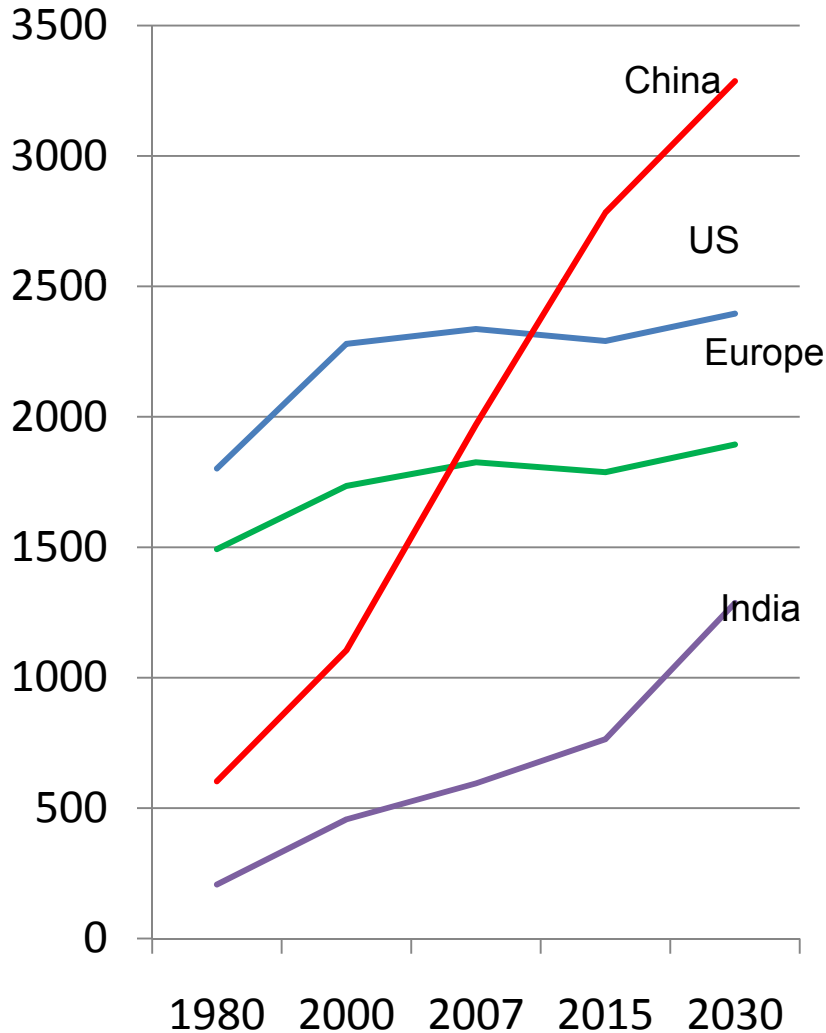
2. Meet the challenges through LCE

3. How does China pursue its march toward LCE?

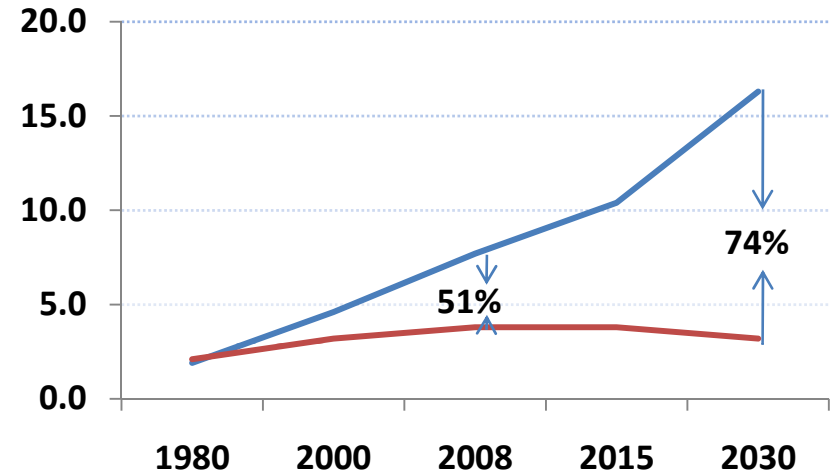
4. What are its challenges and implications?

China's energy challenges in the 21st century

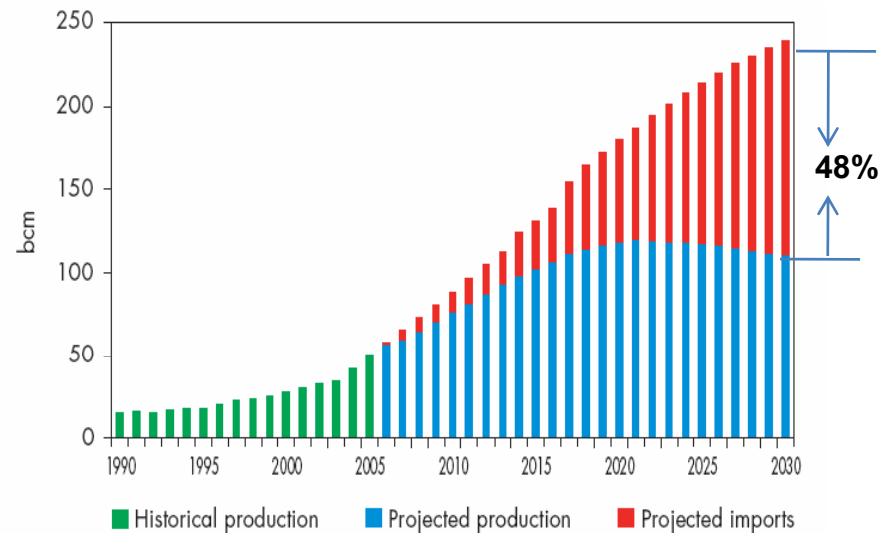
Primary energy demand in the reference scenario (Mtoe), WEO 2009



China's oil balance in the reference scenario (mb/d), WEO 2009

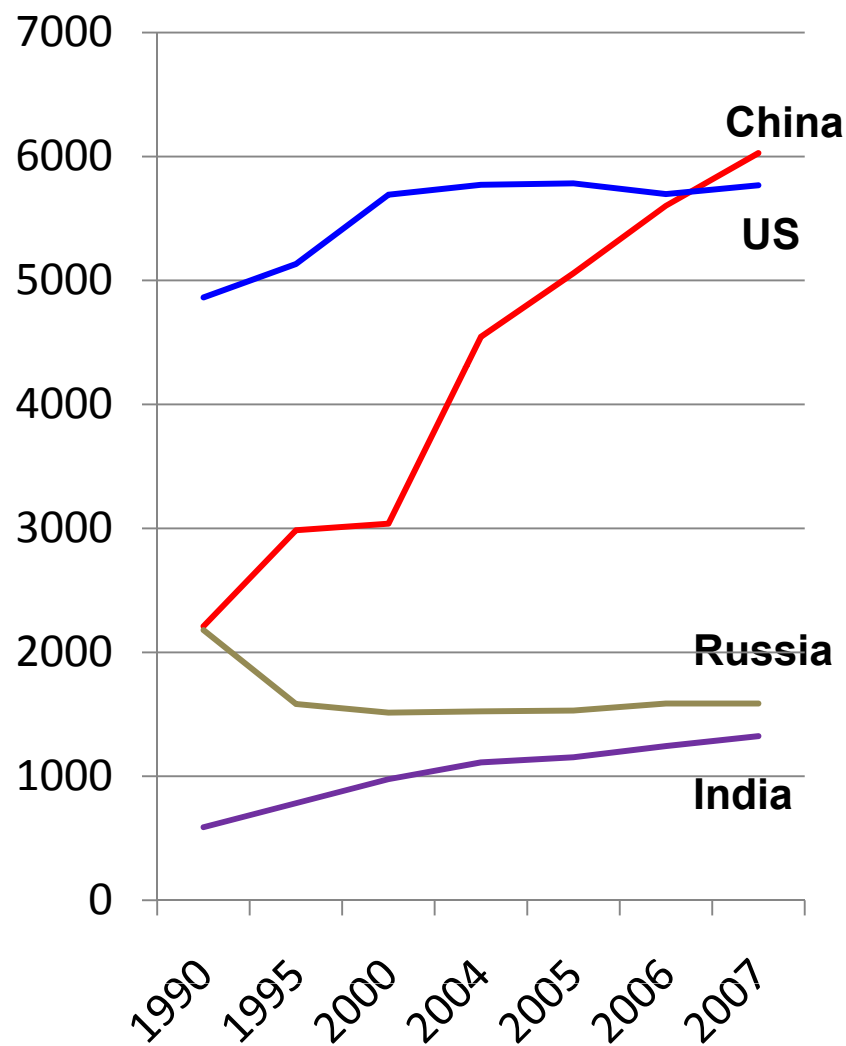


China's gas balance in the reference scenario (bcm), WEO 2007 and WEO 2009

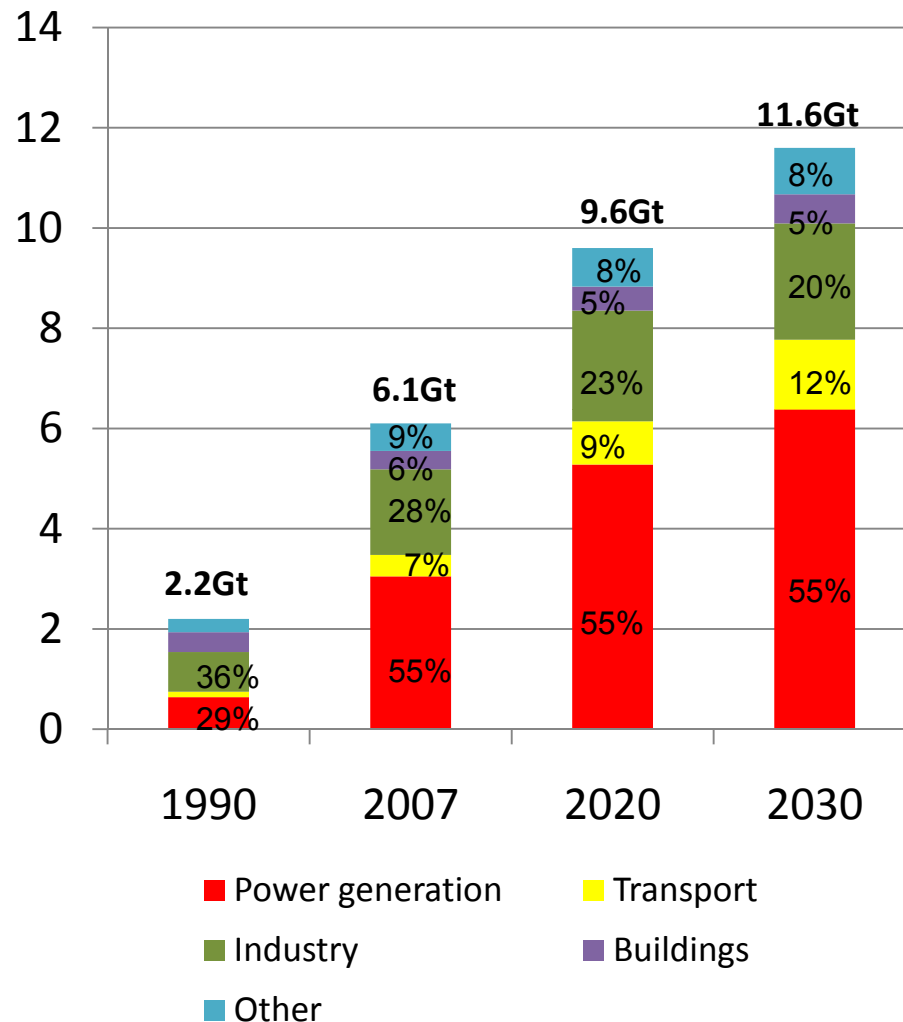


China's growing CO2 emissions

CO2 emissions (million tons)

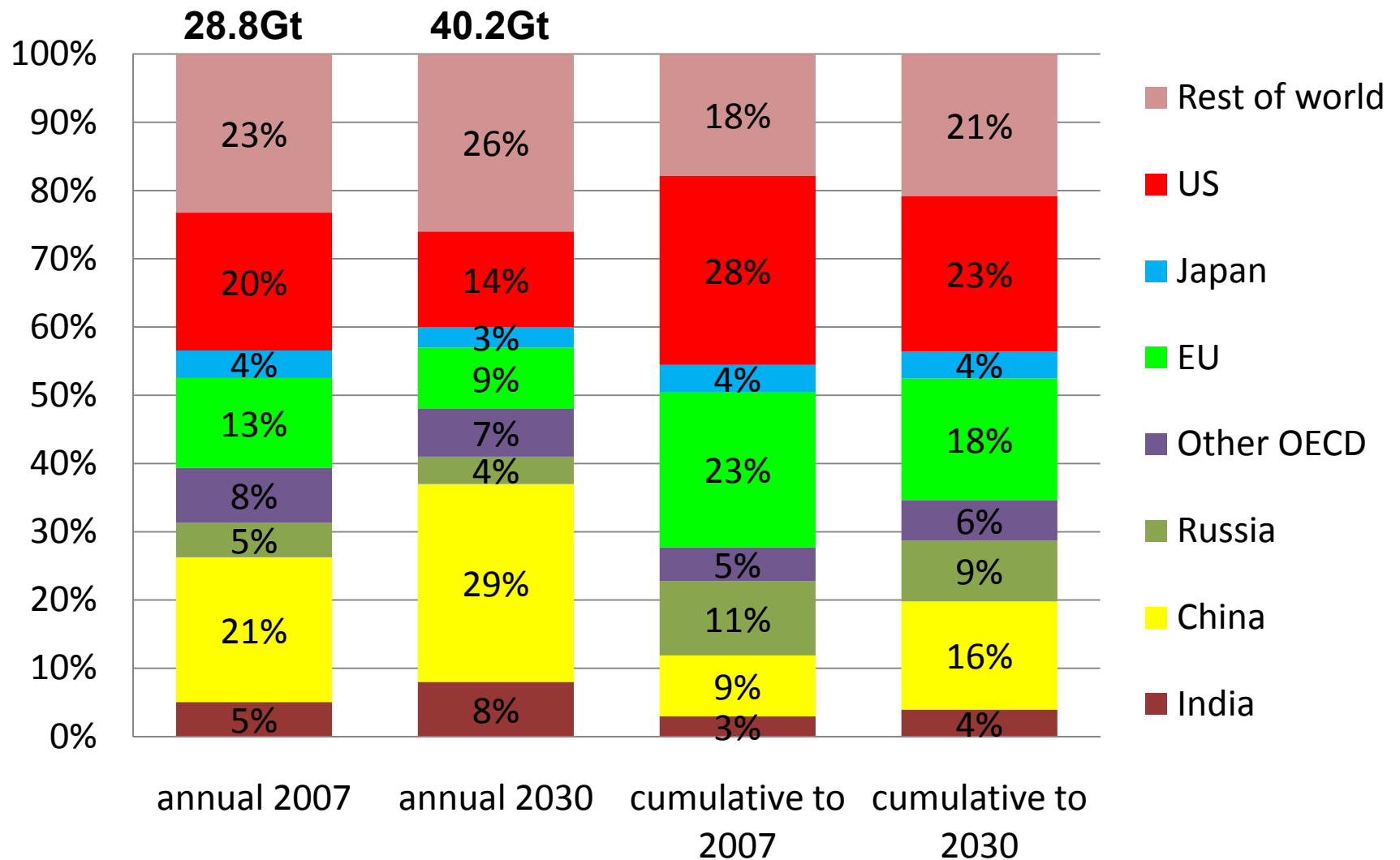


China's energy-related emissions (billion tons)



B/w 2007 and 2030, China will account for 48% of the world's incremental CO2 growth.

China is under pressure to reduce CO2 emissions



Source: WEO 2009, "Global share of energy-related CO2 emissions since 1890 in the reference scenario," p.180.

Growing appreciation of climate threats

- 🔥 Average temperature of the Earth's surface has increased by 0.74°C from 1906 to 2005 but by 1.1°C in China from 1908 to 2007;
- 🔥 From 1978-2008, the sea surface temperature and sea level in China's coastal areas have risen by 0.9°C and 90mm;
- 🔥 For every increase of 1°C , agricultural output drops by 10%;
- 🔥 Agricultural output normally fluctuates by 10-20%, but due to climate uncertainties the fluctuations will increase to 30-50%.
- 🔥 Under the BAU by 2030, crop productivity potential declines by 5-10%;

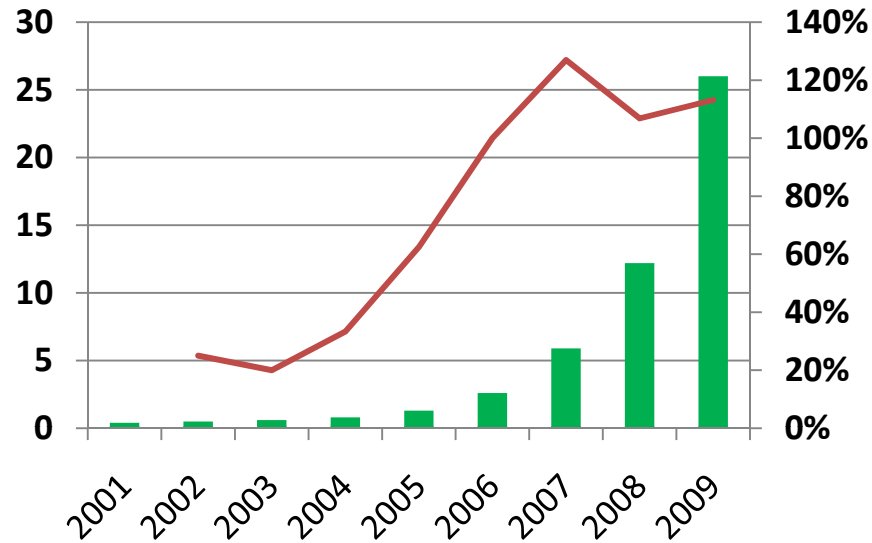
Source: White Paper on China's Policies and Actions for Addressing Climate Change (2008); Zheng Guoguang, Administrator of China Meteorological Administration (CMA), December 12, 2001.

Emerging green ethos under Hu and Wen

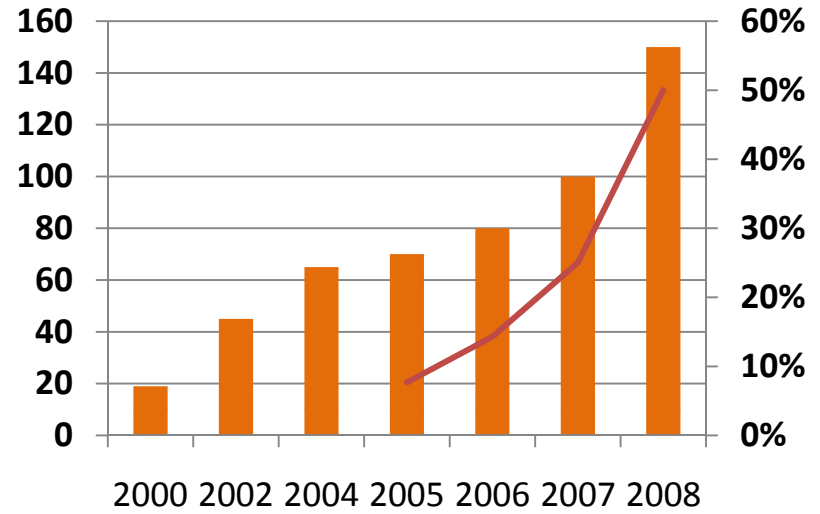
- 🔥 Scientific development and harmonious society
- 🔥 Climate change is real and China is a victim
- 🔥 Adaptation rather than mitigation is the focus
- 🔥 “Green revolution”—pathway to new commanding height
- 🔥 Need to fend off “carbon tariff”
- 🔥 Rising China as “a responsible stakeholder”

Green power

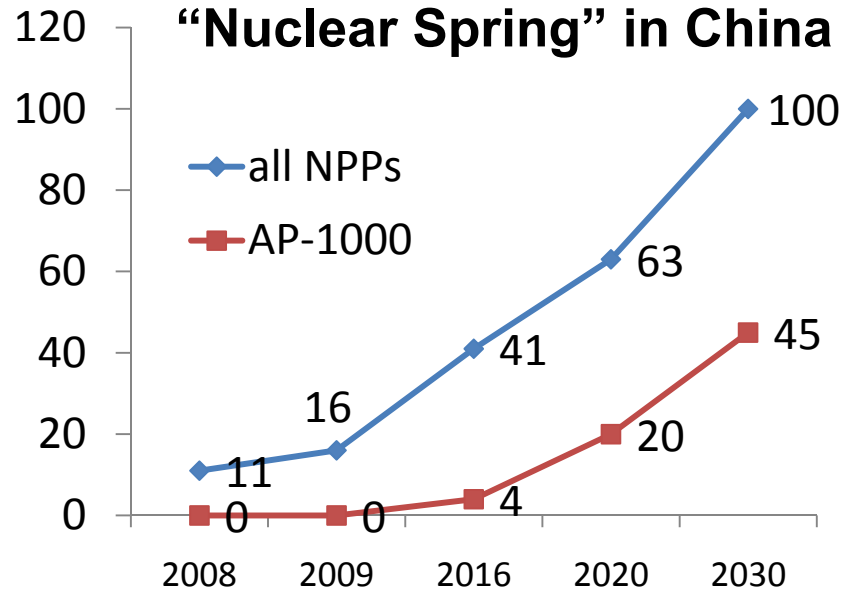
Wind power expansion (GW)



Solar power expansion (MW)



“Nuclear Spring” in China



Composition of China’s thermal power

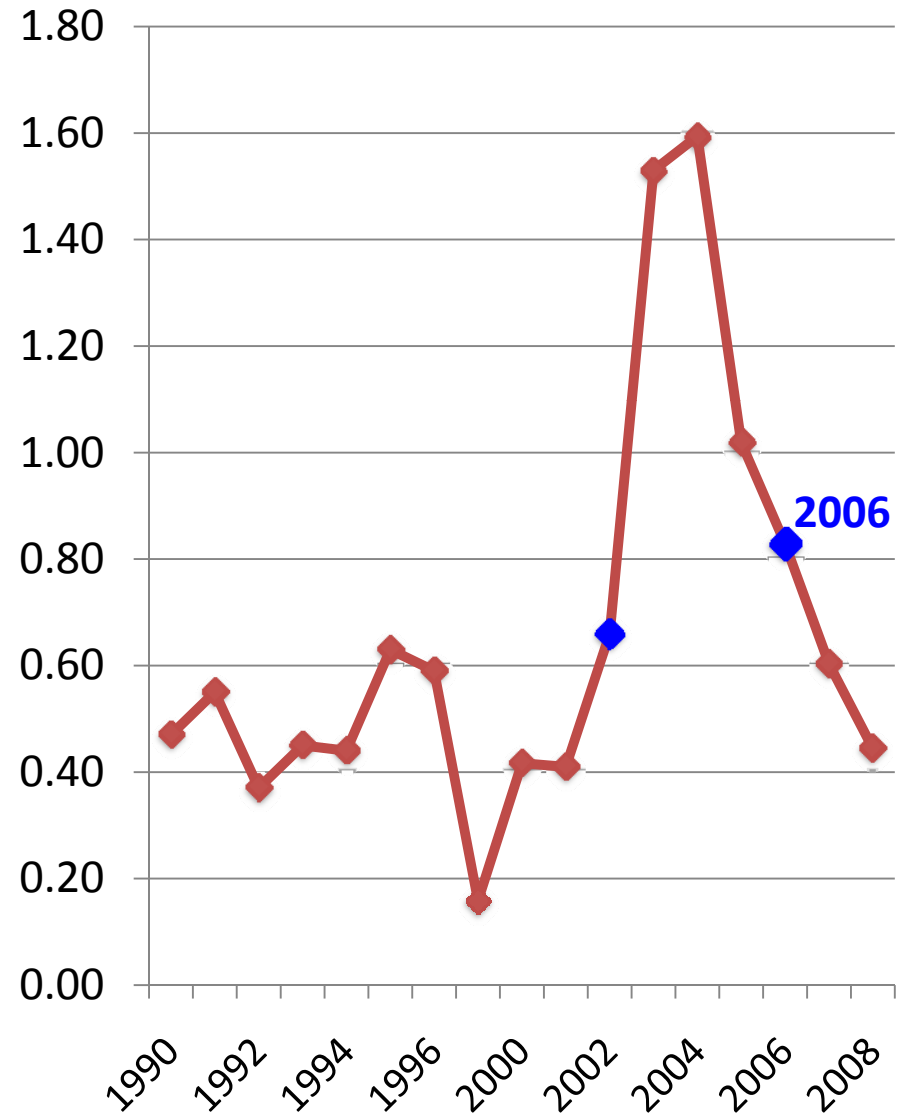
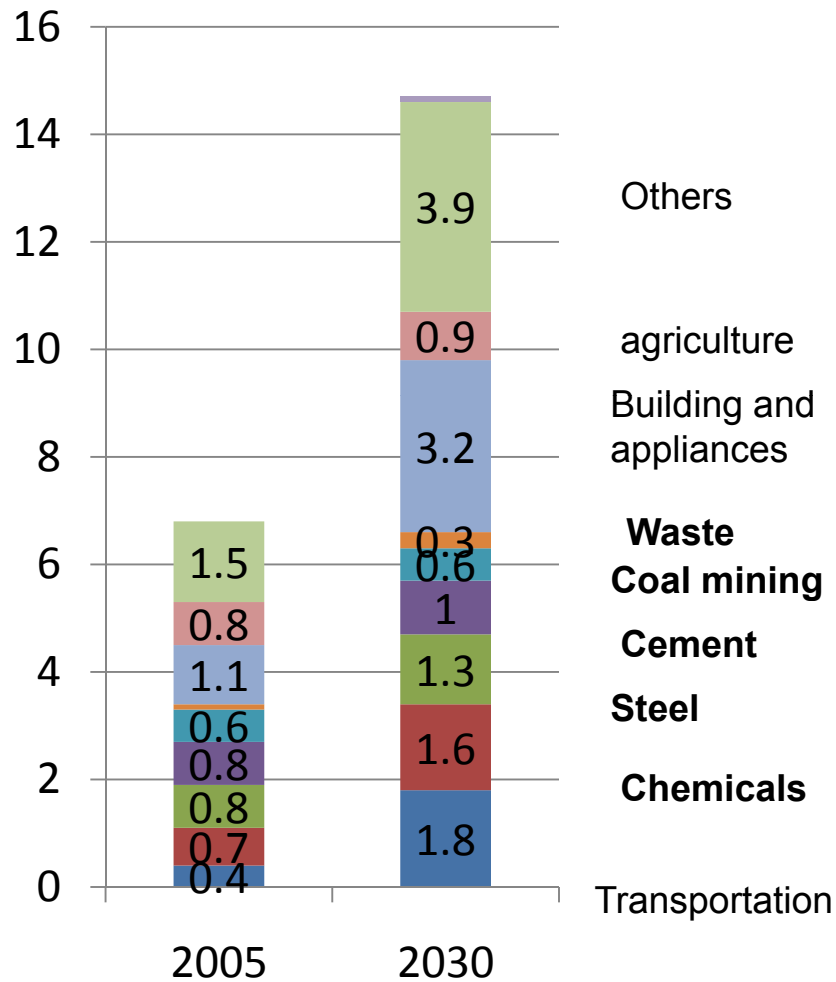
	2007	2008	Capacity
<100 MW	30%	14%	-54.07 GW
<200 MW			80 GW
>300 MW	44%	65%	403 GW
>600 MW		31.3%	194 GW
>1000 MW		3%	17 units
Total		77% of total	620 GW

Sources: The China Greentech Report, Dynabond Powertech Service, and Xinhua.

Green industry

CO2 emissions from power consumption view

Reduce energy intensity by 20% b/w '06-10

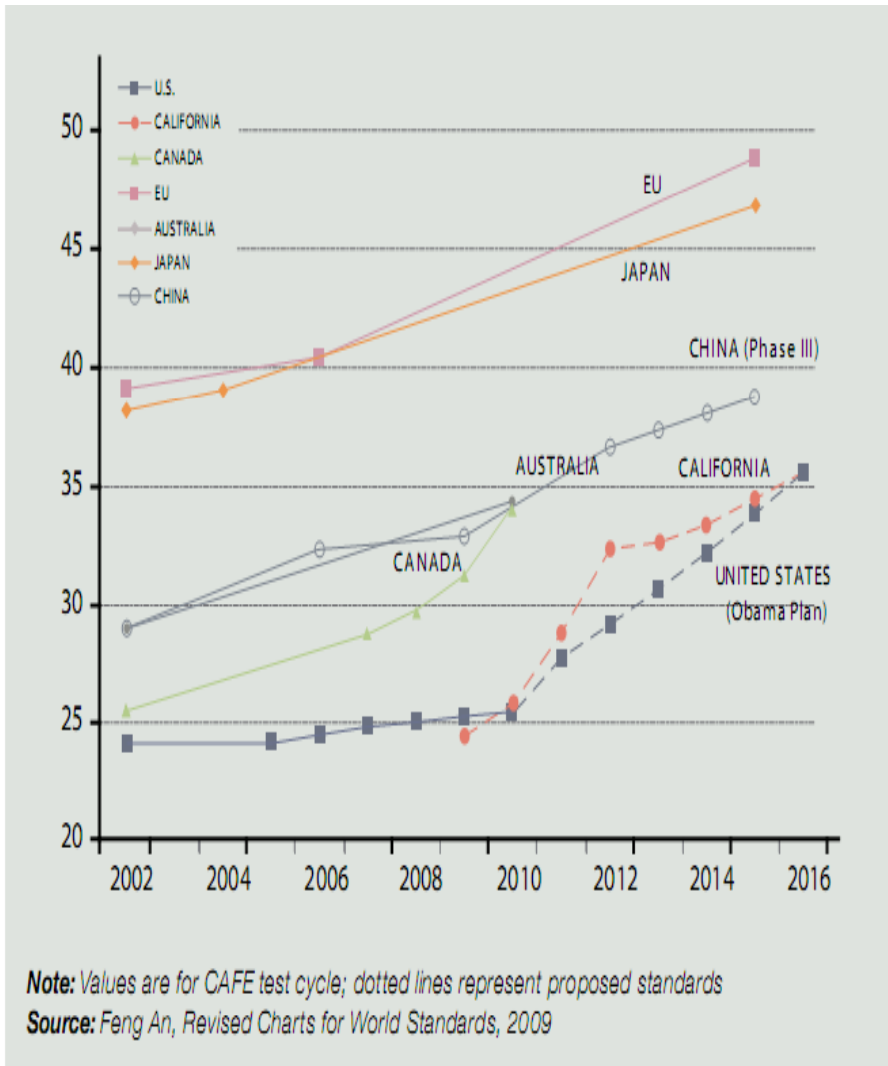


5 sectors—1/3 and 44% of China's energy consumption and CO2 emissions!

Source: McKinsey, China's Green Revolution, 2009

Source: China Statistical Yearbook, 2009

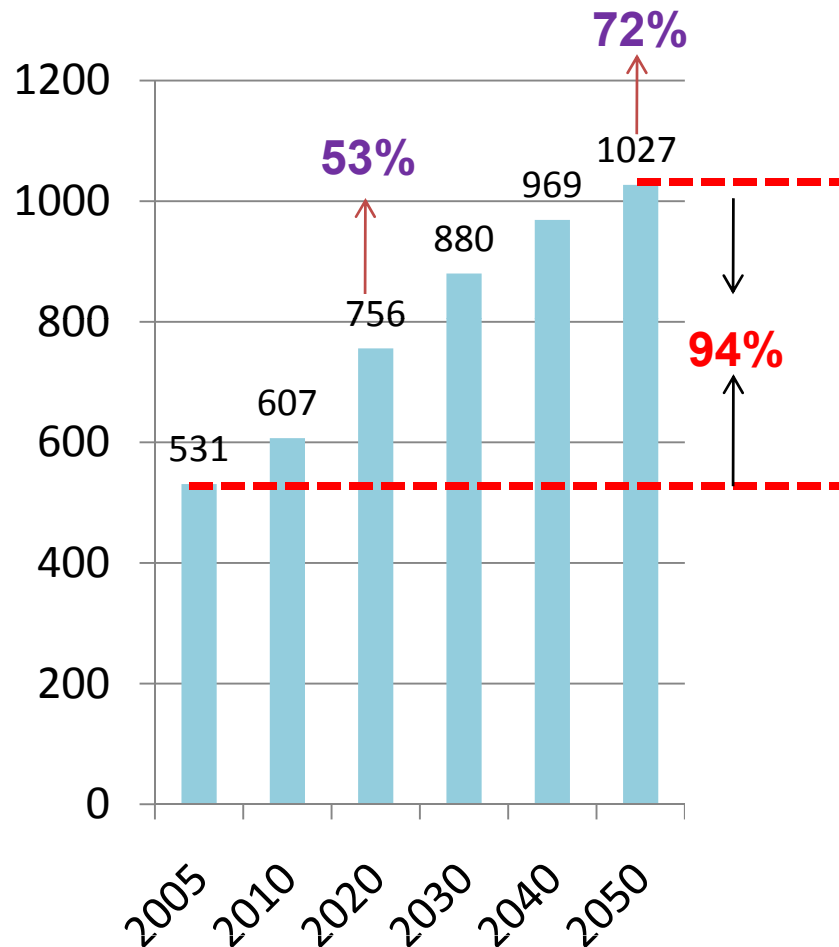
Green fleet



- 🔥 Fuel economy: 32 MPG IN 2008, 40 MPG in 2015;
- 🔥 China accounts for 90% of world's electric scooter and bicycle sales
- 🔥 Increase the production of hybrid and EVs in 2011 to half a million, 5% of total sales (9881 were sold in 2008, 0.2% of total)

Green buildings

China's urban population, 2005-2050



- Annual urbanized people 12-15 million
- China builds half of the world's floor space by 2015
- 2005-2030: floor space will increase from 42 to 91m²
- Reduce energy consumption in buildings by 50% in 2010 and 65% in 2020

Source: United Nations, World Urbanization Prospects: The 2007 Revision Population Database

Source: McKinsey, 2009

Green ecosystems

- Trees absorb, on average, 1.8 tons of carbon dioxide in every cubic meter of new wood
- Expanded forest coverage from 14% in 1990 to 18% in 2005
- To increase forest volume by 1.3 billion cubic meters by 2020
- To increase forest cover by 40 million hectares by 2020

Policy tools (1)— green laws, regulations & programs

- 🔥 **Renewable Energy Law (2005)**
- 🔥 **Circular Economy Promotion Law (2008)**
- 🔥 **Energy Conservation Law (revised 2008)**
- 🔥 **Five Year Plans**
- 🔥 **Medium and Long Term Plans**
- 🔥 **National Programs**

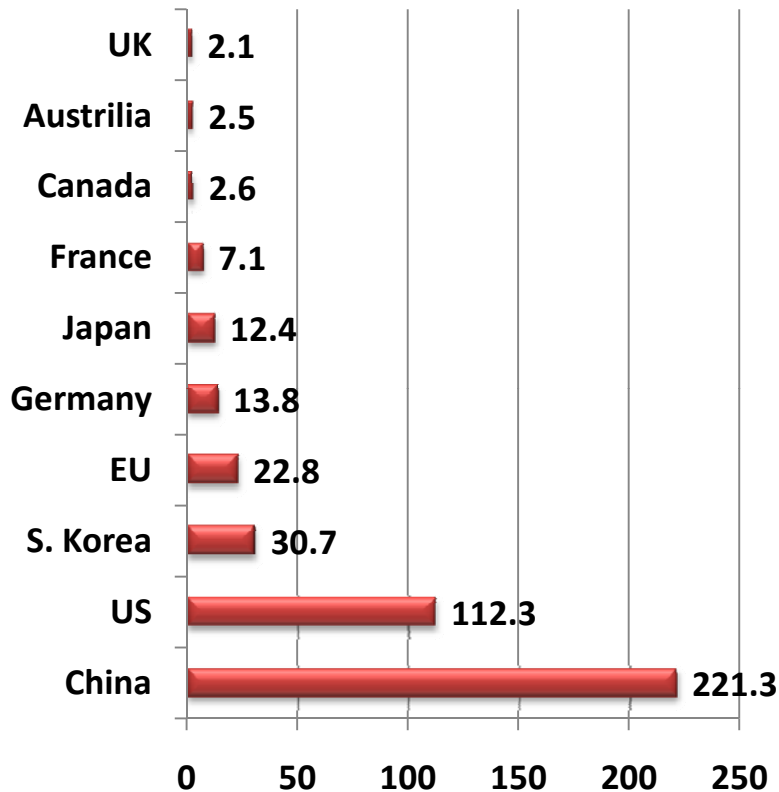
Policy tools (2)—national mandates

Type	2005 actual	2010 target	2020 target
Energy from renewable sources	7%	10%	15%
Hydropower	117 GW	190 GW	300 GW
Wind power	1.3 GW	5 GW (initial target) 10 GW (revised)	30 GW (initial target) 100 GW (revised)
Solar PV	0.07 GW	0.3GW	1.8 GW(initial target) 20 GW(revised)
Solar water heating capacity	80 million m ²	150 million m ²	300 million m ²
Biomass power (agriculture and forestry)	2 GW	5.5 GW	30 GW
Bioethanol	1 million tons	3 million tons	10 million tons (MT)
Biodiesel	0.05 MT	0.2 MT	2 MT
Nuclear	9.1 GW		40 GW (initial target) 75-86 GW (likely)

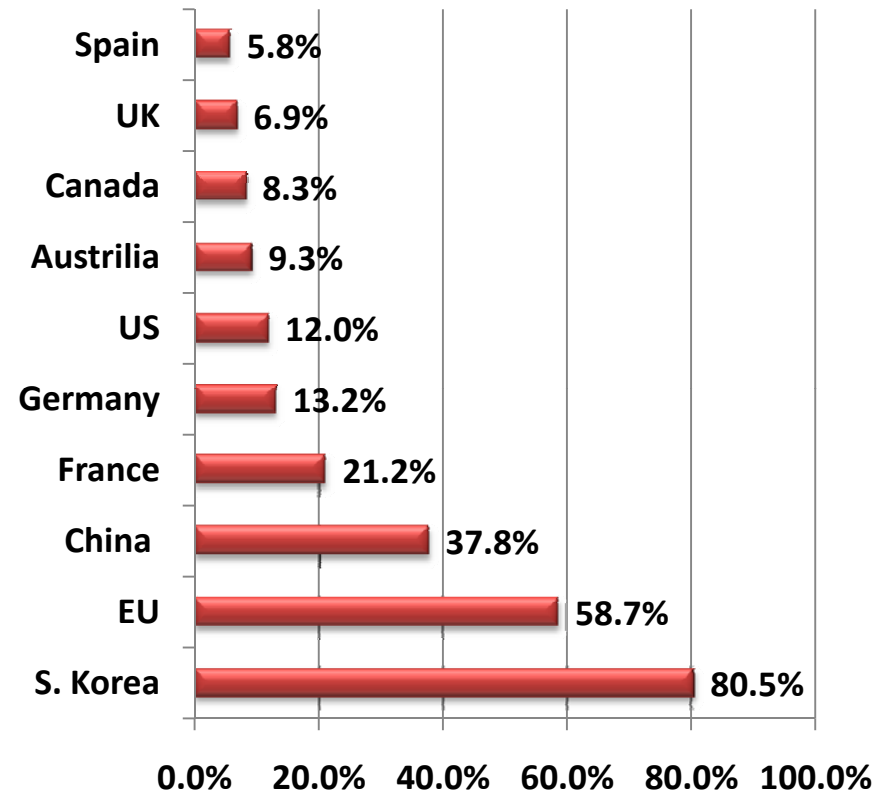
Sources: National Development and Reform Commission, PRC, 2007, and Chinese media reports.

Policy tools (3)—green stimulus & lending

Green Stimulus regional ranking USD bn



Green Stimulus ranking as a % of total stimulus



Source: HSBC, "The Climate for recovery: the color of stimulus goes green," February 2009.

🔥 **Green Credit Policy (2007)**

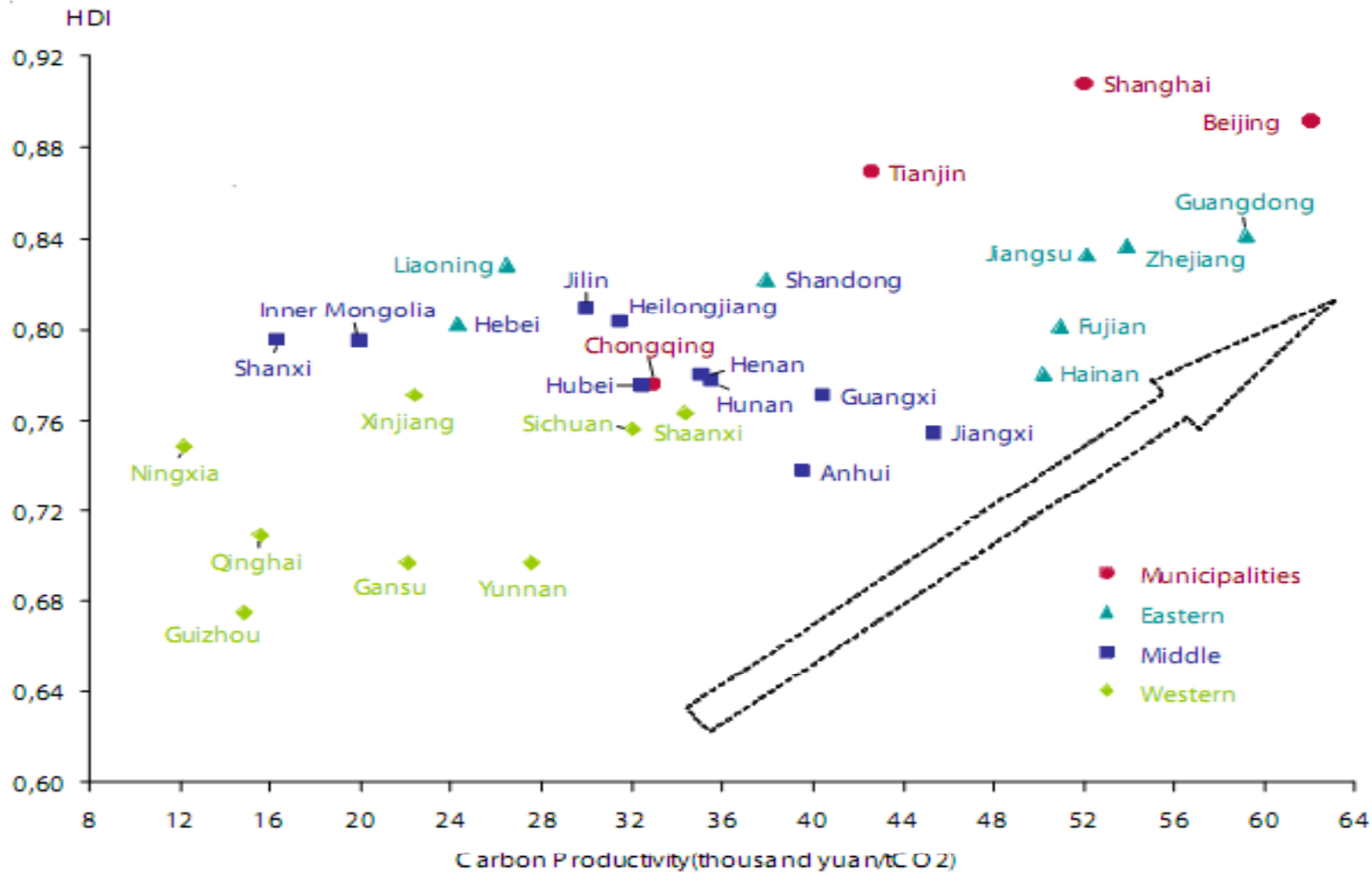
🔥 **Green Securities Policy (2008)**

Policy tool (4)—tax benefits & subsidies

	Announcement date	Subsidy	Eligibility
Golden Sun	July 2009	50% of grid-connected solar 70% off-grid PV investment	300KW min capacity, 1 year max construction period, 20+ year operations requirement
Solar Roofs	March 2009	13-17 yuan per watt of capacity	50 KW min installation BIPV
PHEV/EV/FC	January 2009	28K-600K per vehicle	Minimum fuel saving 5% for passenger and light vehicles and 10% for buses
Wind Turbine	August 2008	600 yuan/kw for the first 50 units	1MW minimum capacity 50/50 b/w component and turbine manufacturers
Wind Power	July 2009	Feed-in tariff for wind power	
Biomass Power	July 2008	0.1 yuan/kw tariff increase	Forest, firedamp and straw feedstock only

Source: The China Greetech Report, 2009

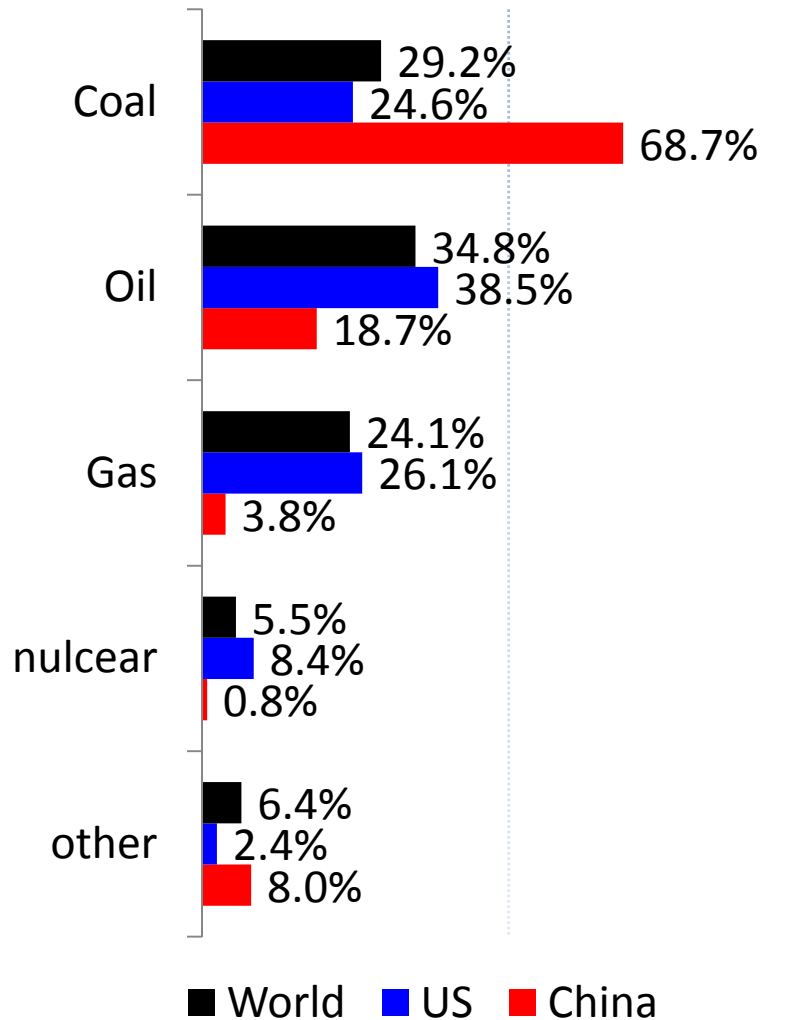
Low-carbon and development not a tradeoff



Source: UNDP, China Human Development Report 2009/10, December 2009.

Structural challenges for China's shift to LCE

China's energy economy 2008



Composition of China's GDP

	Primary Industry (%)	Secondary industry	Tertiary industry
2002	13.7	44.8	41.5
2003	12.8	46.0	41.2
2004	13.4	46.2	40.4
2005	12.2	47.7	40.1
2006	11.3	48.7	40.0
2007	11.1	48.5	40.4
2008	11.3	48.6	40.1

Source: China Statistical Yearbook and BP Statistical Review of World Energy June 2009.

Challenges for China's push for LCE

- 🔥 CO2 growth is determined by—GDP growth, population growth, carbon intensity growth, and energy intensity growth (40-45% carbon intensity reduction—not easy)
- 🔥 Deepening urbanization, industrialization, and automobilization
- 🔥 Wind—2% of installed capacity, 2/3 of which not connected to grid, 0.3% of electricity
- 🔥 Local implementation—jobs, costs, and competitiveness

Implications of China's push for LCE

- 🔥 Lead the world's green energy generation, e.g. 10% and 2/3 of global wind power and solar water heating output
- 🔥 Lead the world's green equipment and technologies trade, e.g. 1/3 of world wind equipment MKT
- 🔥 Green jobs and green competitiveness
- 🔥 In 2008, 98% of PV cells exported: will China encounter protectionism?