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Climate Change Mitigation in China

Challenges and Policies in the Process of Industrialization and Urbanization

Jiahua Pan

Institute for Urban & Environmental Studies, Chinese Academy of Social Sciences jiahuapan@163.com

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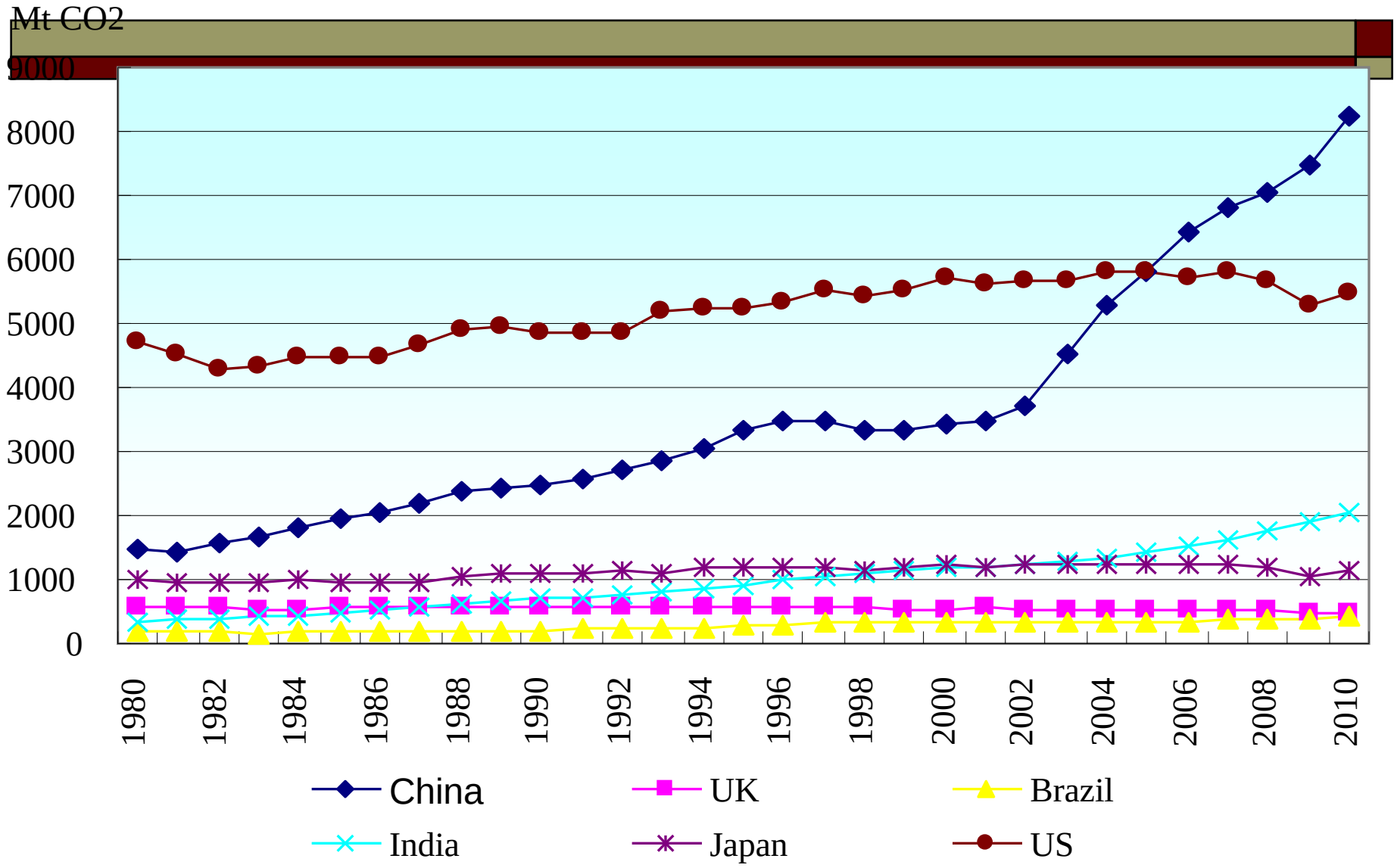
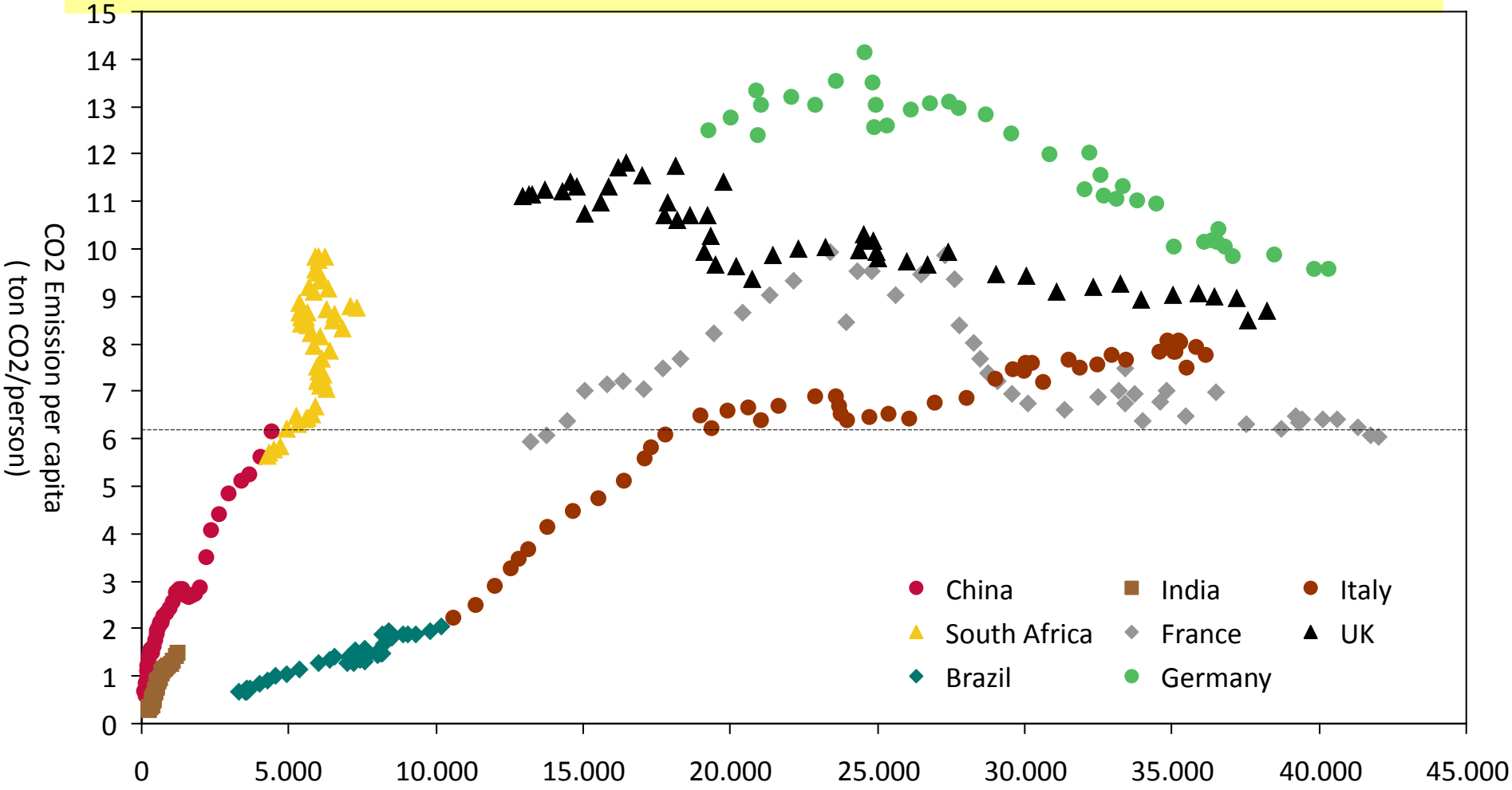


CO_2 emissions peaked, or to be peaked?

US, EU, China and India compared

Source: http://cdiac.ornl.gov/.

Emissions trends: GDP per capita and CO_2 Emission per capita, BASIC and Major EU Countries



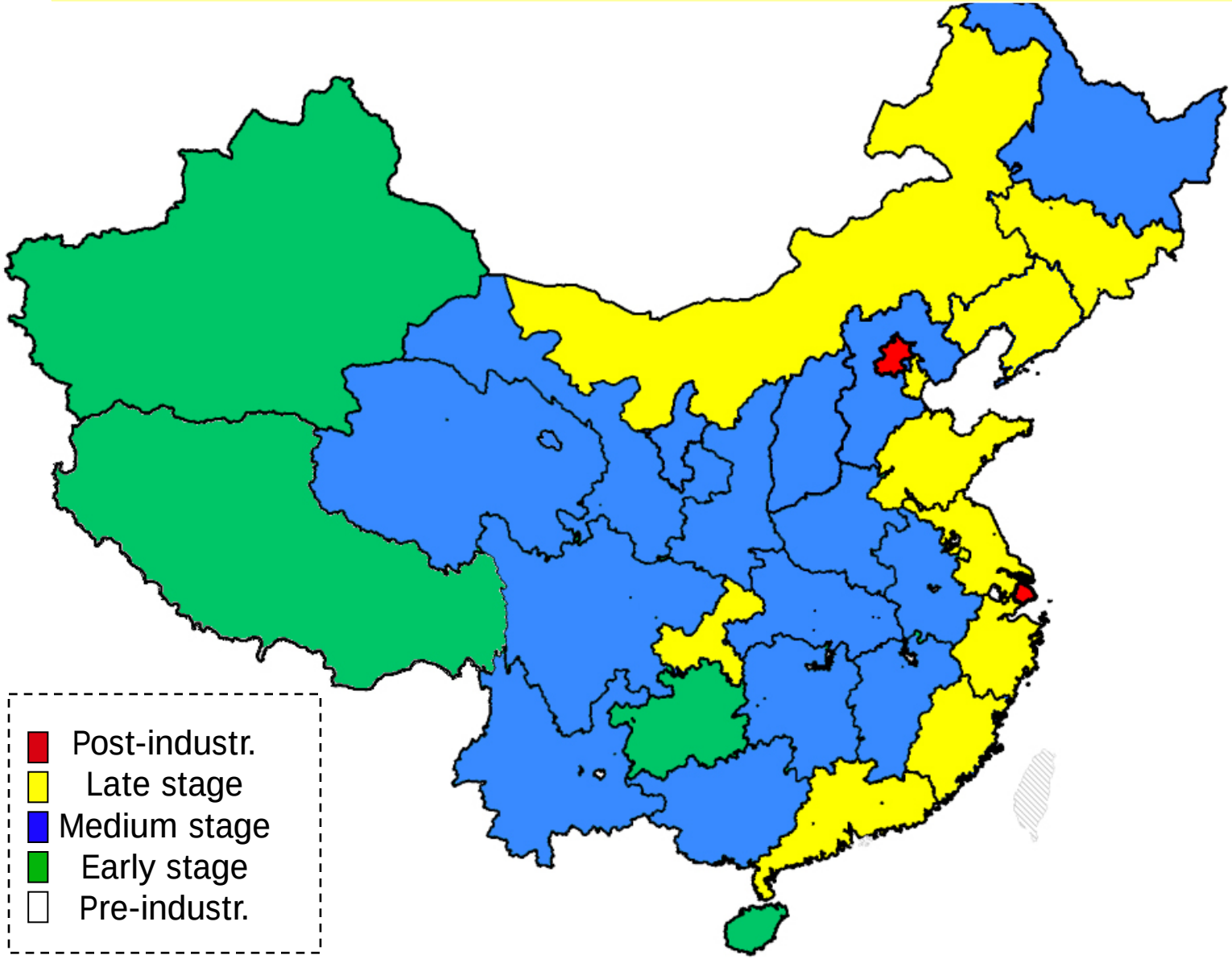
Data Source:

1.CO2 Emission data is from Carbon Dioxide Information Analysis Center(CDIAC) and Oak Ridge National Laboratory 2011，include emission from fossil fuel combustion and Cement process 。

2.GDP Data is from World Bank Database 2012，Price is 2010 dollar constant price。

3.Data of CO2 Emission from fossil fuel combustion from CDIAC and IEA are basically Consistent， Error is in 1%.

Challenges: industrialization in different parts of China at various stages



Industrial production (physical output for selected manufactured goods, 2009 and 2011) :

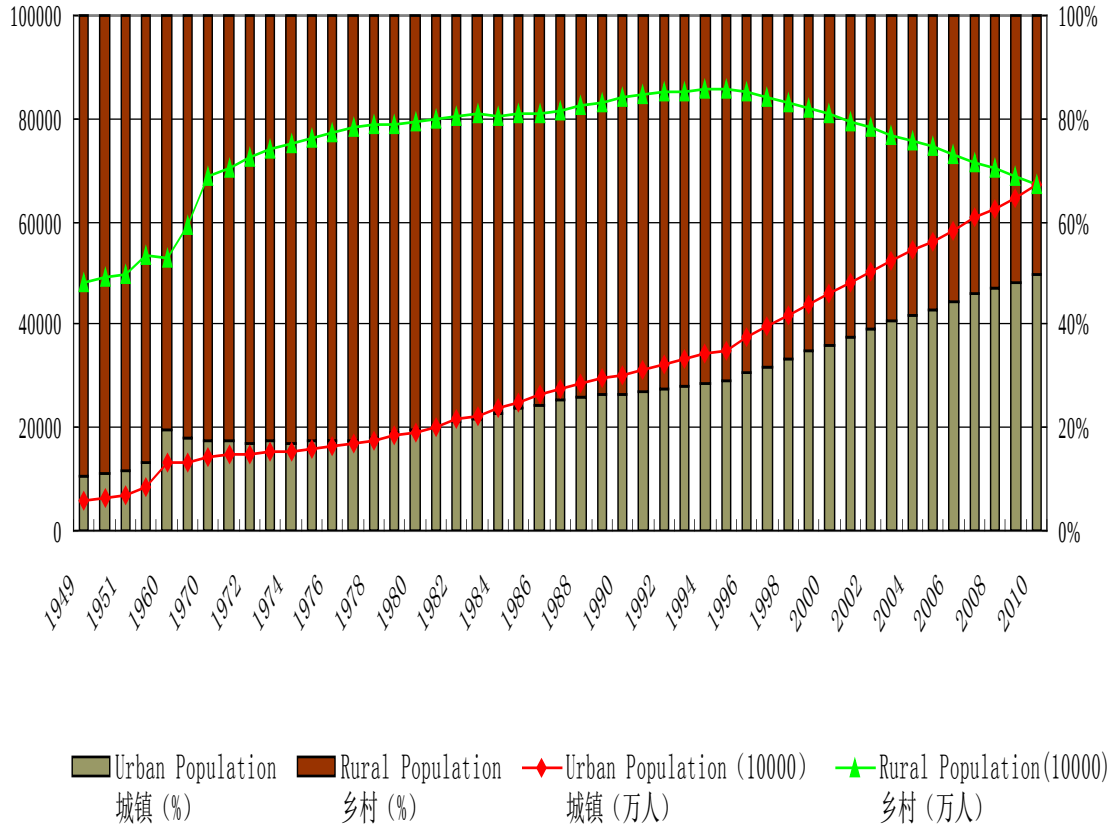
-- world workshop for global market

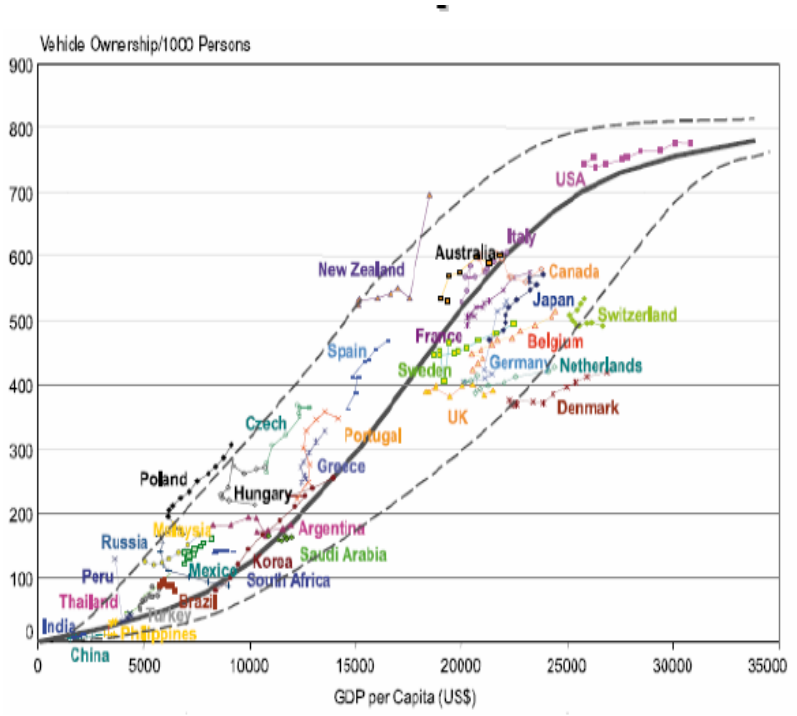
-- no more room for physical expansion

	unit	2009	% world	2011
raw steel	mt	568	46.6	684
steel	mt	696	～50	883
cement	bt	1.63	>50	2.09
aluminum	mt	12.85	35	17.68
copper	mt	4.13	25	5.18
coal	bt	3.05	45	3.52
Chemical f.	mt	66.0	35	62.17

	unit	2009	% world	2011
automobile	m	13.79	25	18.41
computer	m	182	60	320
Color TV	m	98.99	48	122.31
refrigerator	m	59.30	60	86.99
Air conditioner	m	80.78	70	139.12
Mobile phone	m	619.0	50	1,133.0
Chemical fiber	m	27.3	57	33.9
Cotton fiber	m	23.9	46	29.0

Challenges: Urbanization

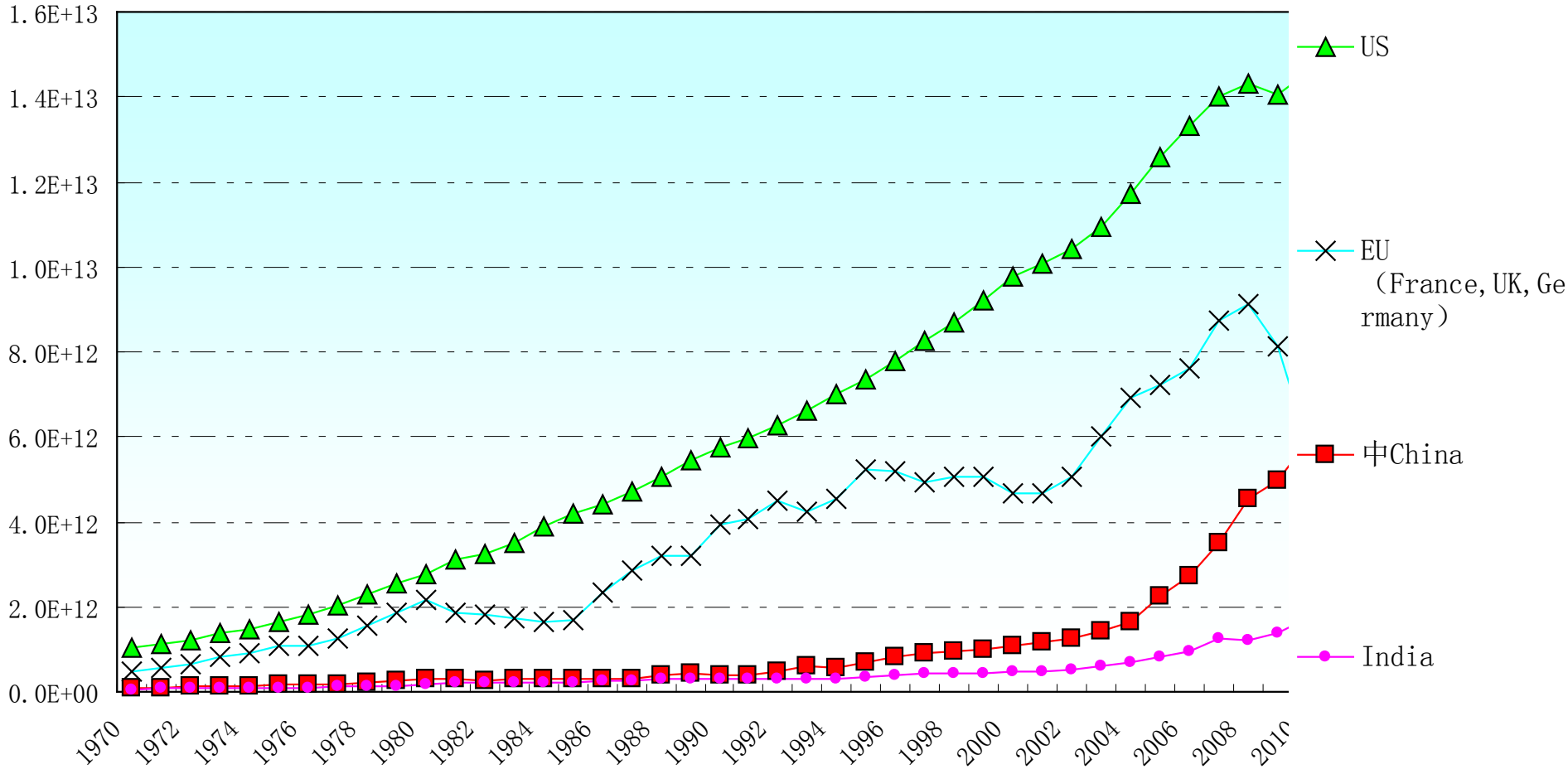




- **End of 2011: urbanization rate: 51.3%, totaling 691m**
- **Incomplete urbanization: 250 m rural migrants in cities**
- **2030: urban. Rate: 70%; 300 million people**
- **Rural: increase in income and living standard**

Consumer behaviour:

End of 2011: automobile fleet totals 105.8 million, 16.4% increase over the previous year. Private vehicles 78.7 million; households cars: 43.2 million, 25.5% more than 2010.



Opportunities: increase in capabilities（1970-2010）

单位：美元 current USD

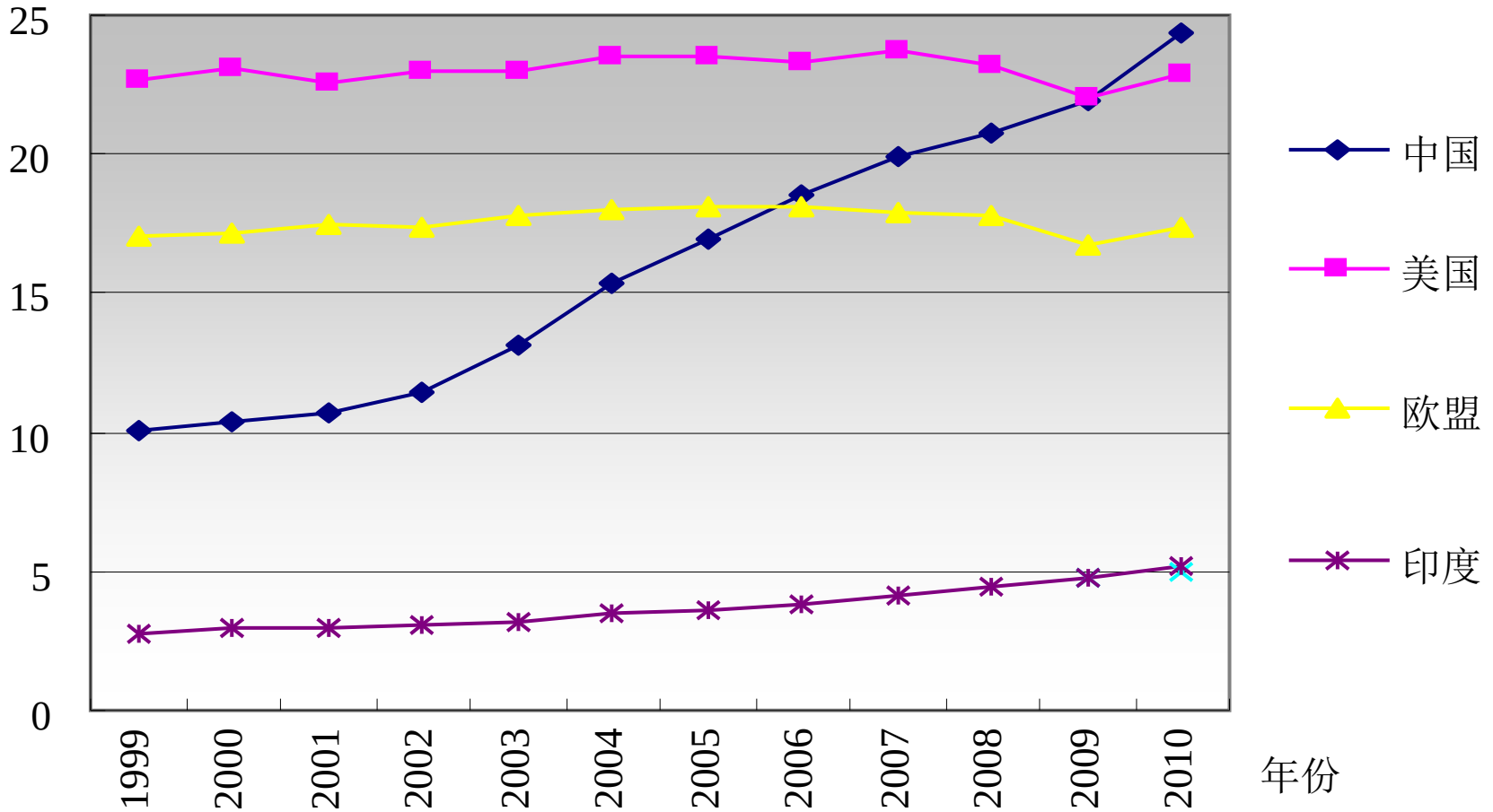
http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?page=1

Demographic trend: peak and aging

census	date conducted	Growth rate per yr (%)	Family size (no.)	Urban. Rate (%)	% 0-14 yrs	% 60 yrs & above	total population (M)
6th	1st Nov 2010	0.57%	3.10	49.68%	16.60%	8.87%	1,371
5th	1st Nov 2000	1.07%	3.44	36.09%	22.89%	6.96%	1,295
4th	Jul 1990	1.48%	3.96	26.23%	27.69%	5.57%	1,160
3rd	1st July 1982	2.10%		20.6%			1,032
2nd	30th June 1964			18.4%	40.4%	5.5% (60 yrs)	723
1st	30th June 1953			13.26%			574

Source: population census bulletin, various years

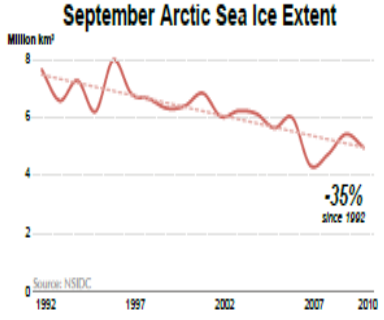
Opportunities: Energy security, env quality
Primary energy consumption (100 mtoe) for selected economies

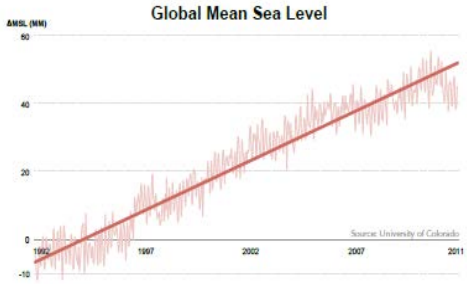


2011 in China: total primary energy consumption 3.48 btce, 7.0% increase over 2010

Opportunities: Climate Security – urban resilience

Drought in Shandong Province, 2011





Mitigation policies: target setting & implementation

- **2020 CO2 reduction targets**
  - **Per unit GDP reduction of CO2 by 40%—45%, as compared to 2005 level**
  - **Share of non-fossil fuel energy over primary energy consumption: 15%;**
  - **Increase in forested area by 40 m ha as compared to 2005 level; timber volume increase by 1.3 billion cubic meters, as compared to 2005 level**
- **12th five year (2011-2015) plan mandatory targets**
  - **Cut of Conventional environmental pollutants**
    - **Chemical oxygen demand and SO2 by 8%**
    - **NH_3 and NOx by 10%**
  - **Forest cover increase to 21.66%, timber volume increase by 600 m cubic meters**
  - **Energy and CO2 emission**
    - **Energy consumption cap**
    - **Energy saving: 16% energy intensity reduction**
    - **Carbon reduction: 17% carbon intensity reduction**
  - **Non-fossil fuel energy: increase in share from 8.3% in 2010 to 11.4% 2015**

Regional desegregation of national targets for performance evaluation on local gov officials

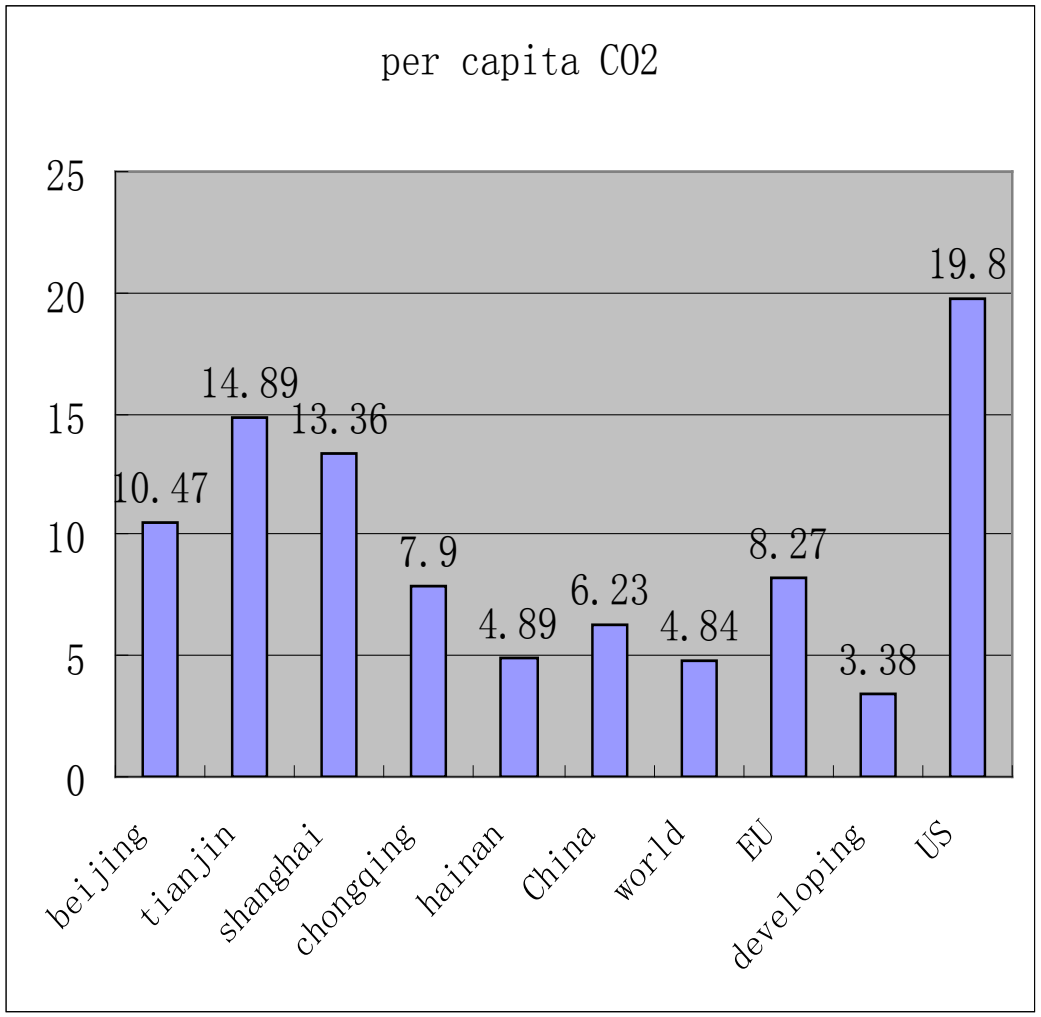
regions	provinces	Energy intensity targets
Group I	Tianjin, Shanghai, Jiangshu, Zhejiang and Guangdong	18%
Group II	Beijing, Hebei, Lianning and Shandong	17%
Group III	Shanxi, Jilin, Heilongjiang, Anhui, Fujian, Jiangxi, Henan, Hubei, Hunan, Chongqin, Sichuan and Shaanxi	16%
Group IV	Inner Mongolia, Guangxi, Guizhou, Yunnan, Ganshu and Ningxia	15%
Group V	Hainan, Tibet, Qinghai and Xinjiang	10%

Mitigation policies: measures & actions

- Energy efficiency
  - super- super- critical thermal power, mandatory shutdown of small scale generation units
  - automobile: from Euro I to Euro IV and V in 10 years
  - Buildings codes
- renewable energy
  - China became the largest investor in renewable energy market, with 48.9 billion USD in 2010, consisting 28% of the world investment.
  - Wind: China has 42.3 GW of wind power; surpassed the US in terms of total installed capacity. China has become the world's largest producer of wind energy equipment."
  - Solar:
    - by 2011, China has 13018.4MW Solar PV, consists 47.8% of the world market.
    - Solar water heaters: completely commercialised
  - Hydropower: China's Hydro power installation increased 5.3% in 2010, the newly added installation consists 50% of the world total installation in 2010.
  - Bio-gas:
- forestation

Sources:UNDP2010 Report on Renewable Energy;
Netherlands Environmental Assessment Agency;
Chinese Renewable Energy Industry Association (CREIA);

Low carbon cities



Source: IEA, 2011, China National Statistic Yearbook 2011

Low carbon city pilot programmes: low carbon city planning

- Target setting: short and long term
- measures
  - ✓Energy efficiency measures
  - ✓Renewable energy utilization
  - ✓Forest sinks
- Policies: cap & trade, incentives, regulation
- Consumer behavior

Conclusions: the way forward

- **Climate compatible development for climate security: urban planning and management**
- **Transforming the energy system for securer energy supply: affordable, sustainable, and reliable**
- **Consumption ethics: sustainable and low carbon, respect for nature, away from wasteful and luxurious consumption**
- **Integration: pollution control, low carbon, ecological restoration**
- **Working together: global efforts**