



Despair and Hope: China's Energy and Environmental Challenges in its Great Social Economic Transition

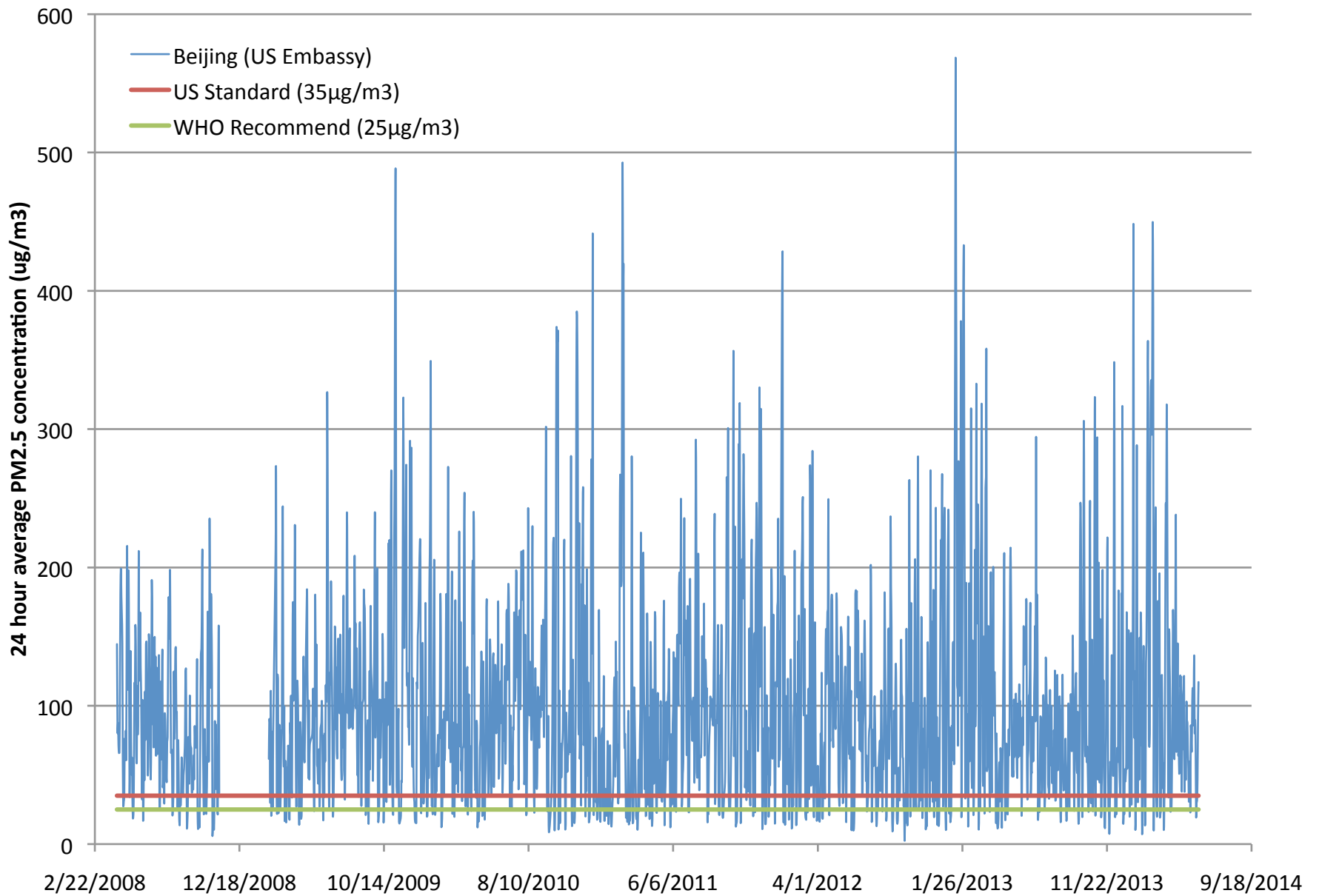
Gang He

Energy and Resources Group
University of California, Berkeley
China Energy Group
Lawrence Berkeley National Laboratory

August 04, 2014 1990 Institute



Credit: Li Feng, Xinhua.



Source: Compiled by Gang He using data from US Embassy in Beijing, EPA, WHO.



Note: Zhangbei 10GW Scale Wind Farm.

变
Change

转型
Transition

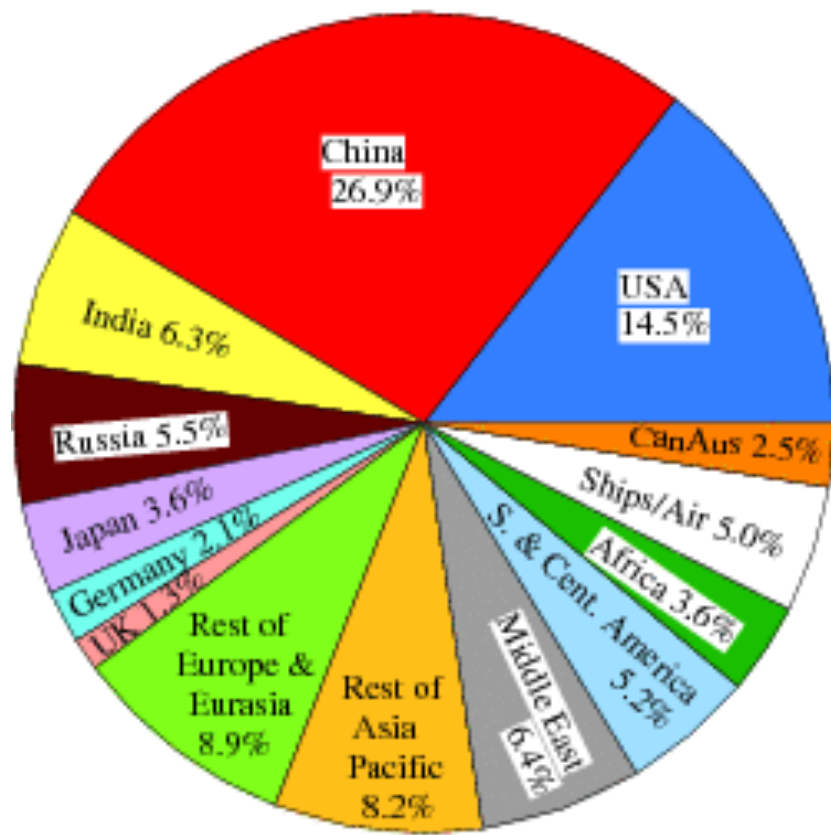
Rising China's greatest social economic transition

- Great transition
- Four major social socio-economic transition
 - Industrialization
 - Urbanization
 - Motorization
 - Modernization
- General socio-economic targets
 - 2000, well off society
 - 2020, all round well off society
 - 2050, middle developed countries level

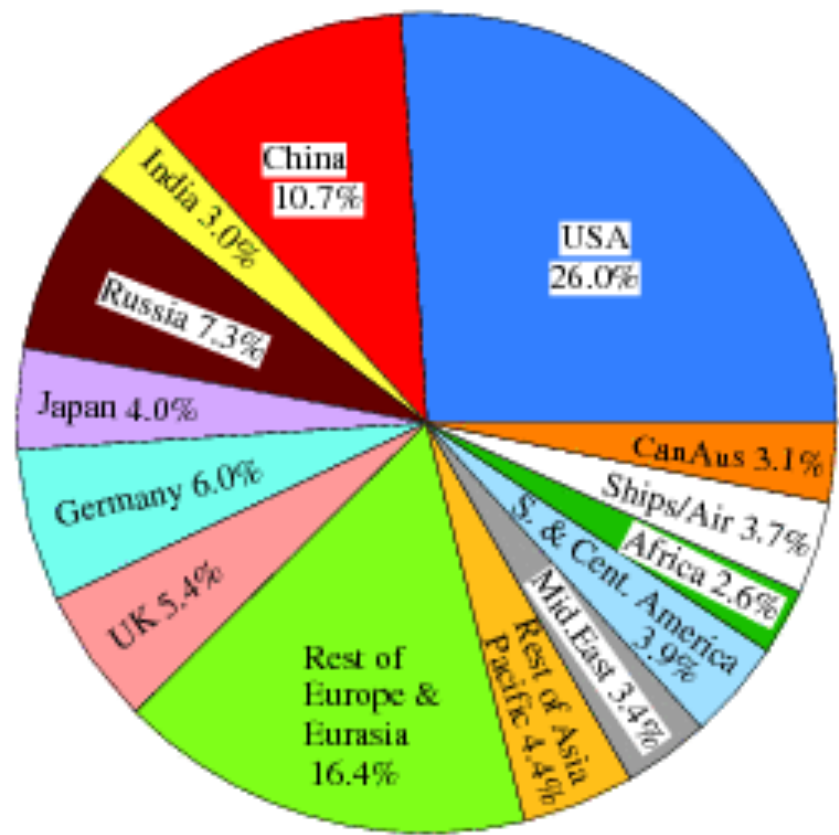
Starting point: huge population with limited resources

- 1.3 billion (0.3 billion in US)
 - Former Premier Wen Jiabao's famous quote:
 - Since China has 1.3 billion people, any small individual shortage, multiplied by 1.3 billion, becomes a big, big problem. And any considerable amount of financial and material resources, divided by 1.3 billion, becomes a very low per capita level.
- "Turning Your Eyes to China"--Speech by Premier Wen Jiabao at Harvard University (10 December 2003)

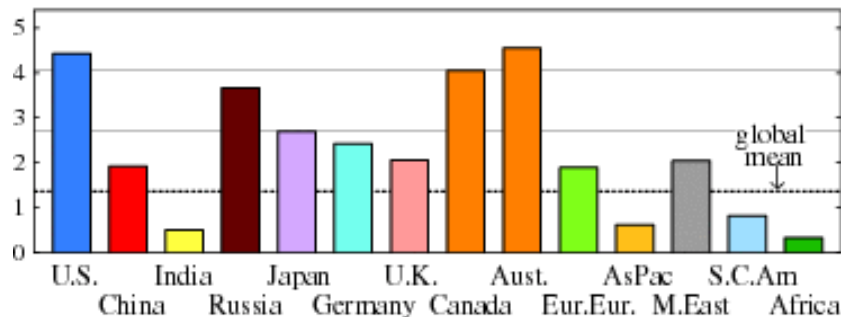
A 2012 Annual Emissions (9.6 GtC/yr)



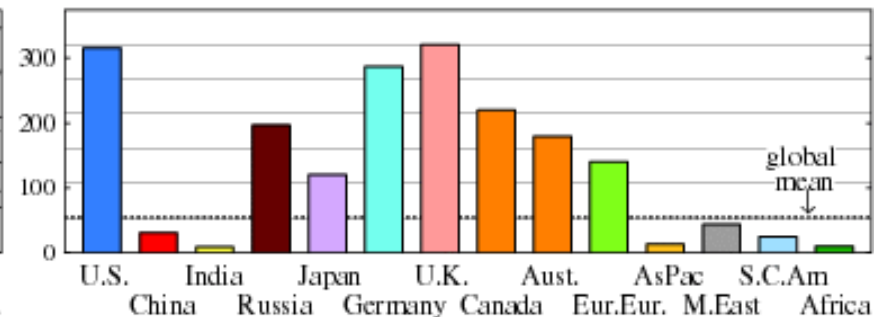
B 1751–2012 Cumulative Emissions (384 GtC)



A 2012 Per Capita Emissions (tons Carbon/yr/person)

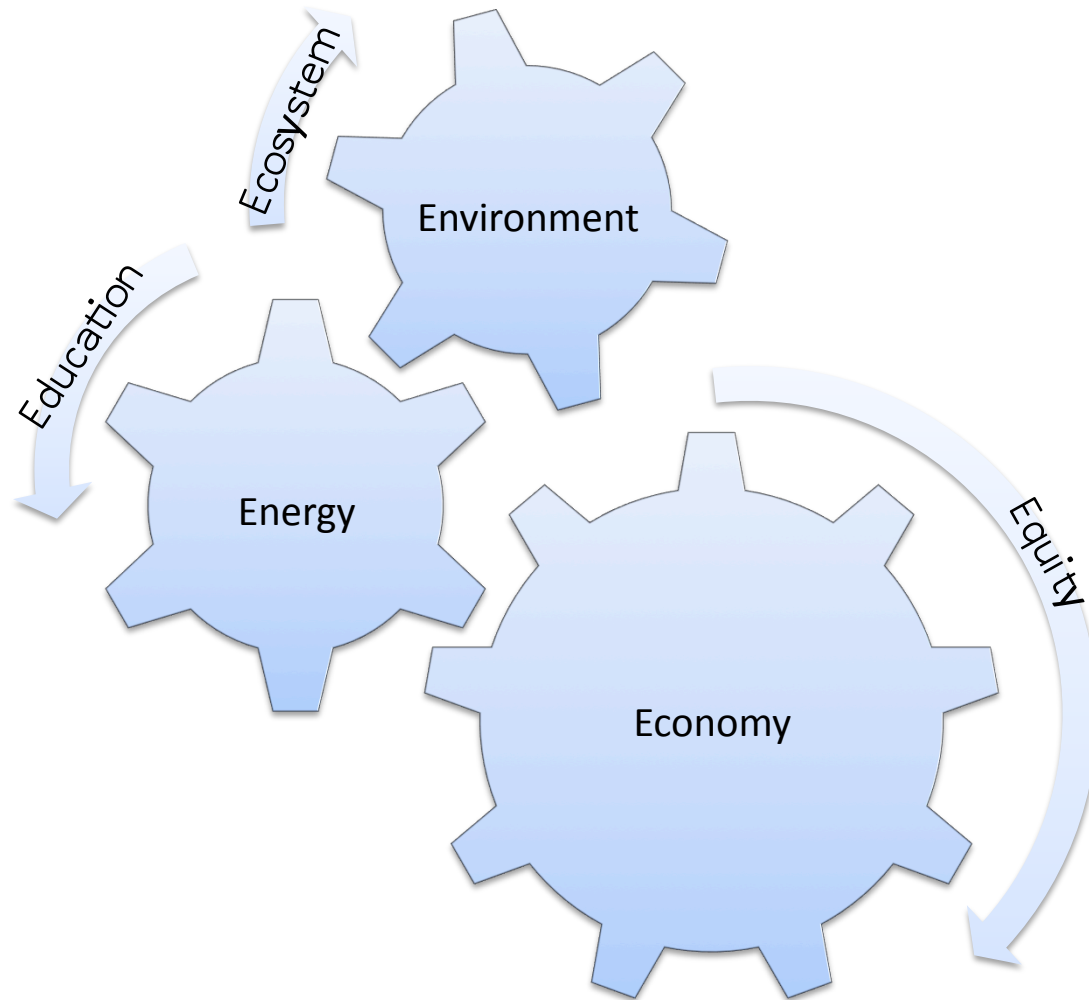


B 1751–2012 Cumulative Emissions (tons Carbon/person)



Source: Hansen 2013, <http://www.columbia.edu/~mhs119/UpdatedFigures/>

The “3E” framework of the interactive challenges



Economy: export oriented and energy intensive

- Export-oriented
- Labor intensive
- Energy intensive
- Resources intensive

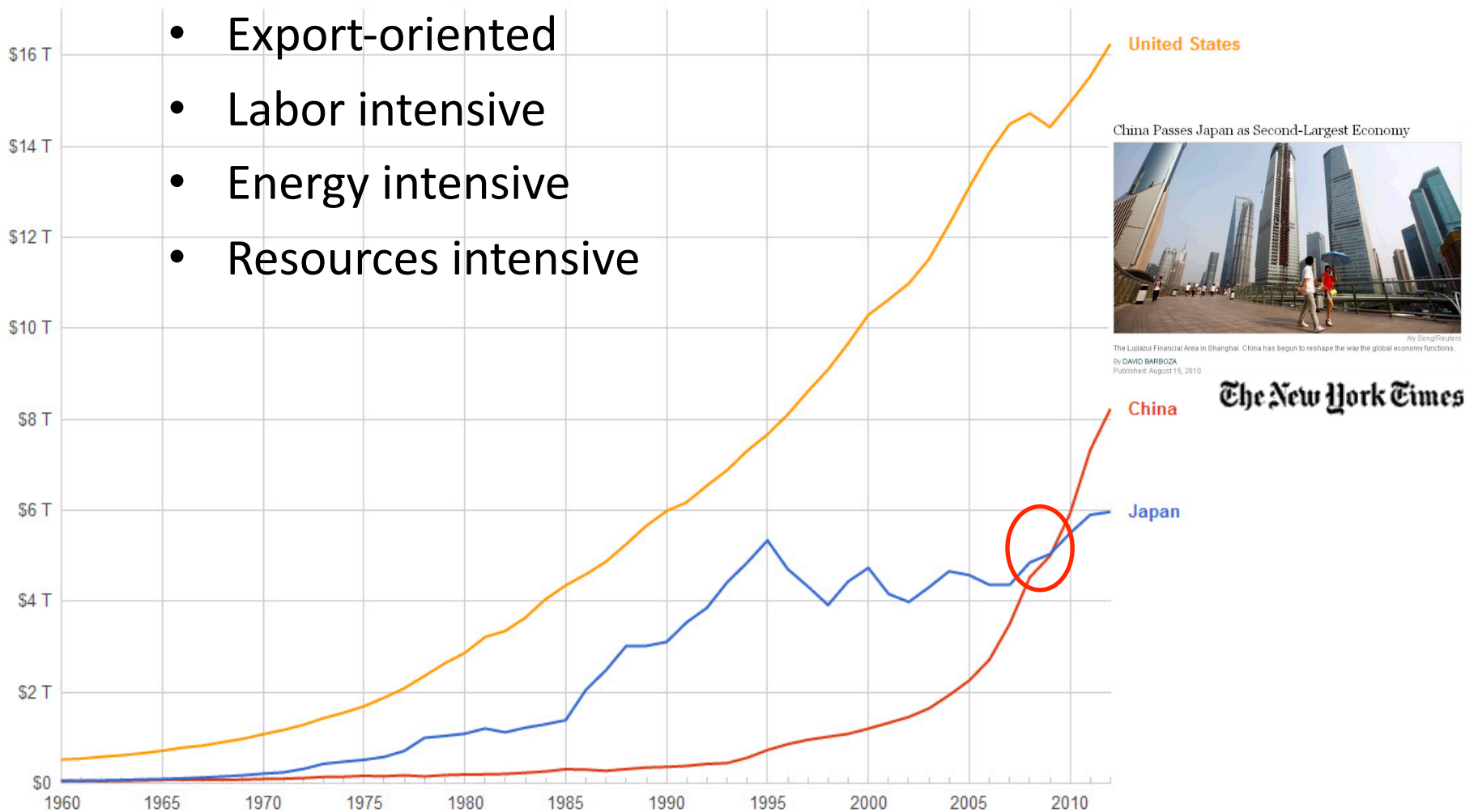
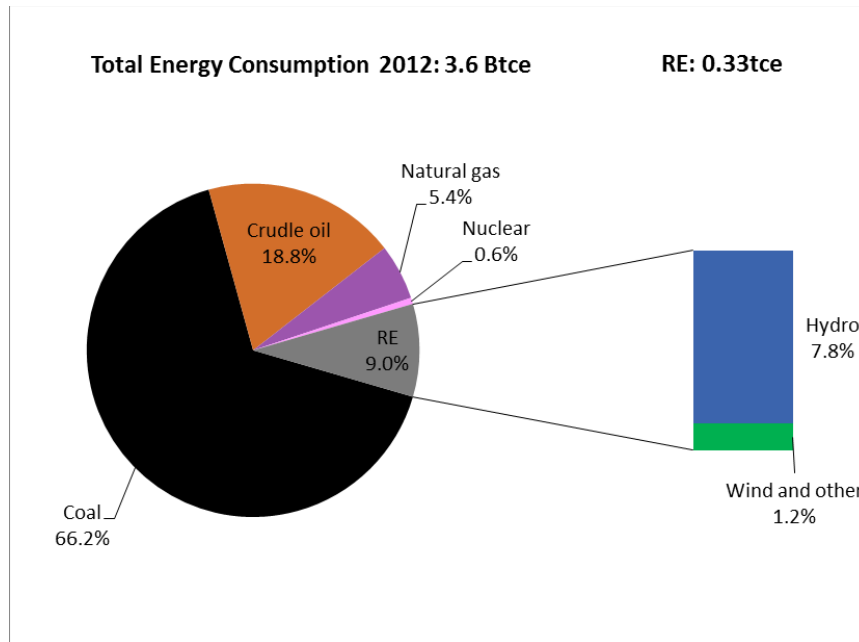


Chart source: Google Public Data. News source: <http://www.nytimes.com/2010/08/16/business/global/16yuan.html>

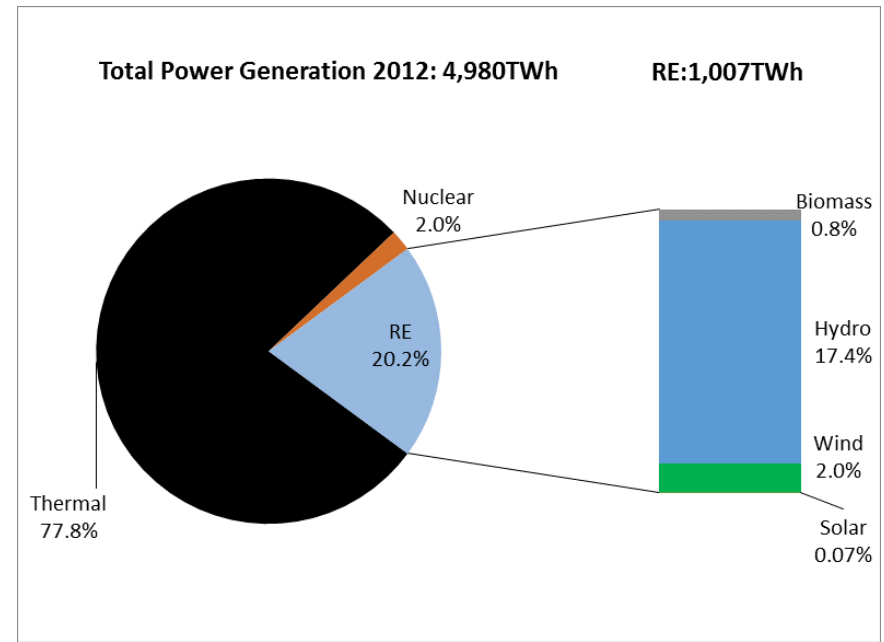
Energy: Coal dominates China's energy use



Total: 3.6 Btce

66% of China Primary Energy from Coal

Source: 2012 data from ERI.



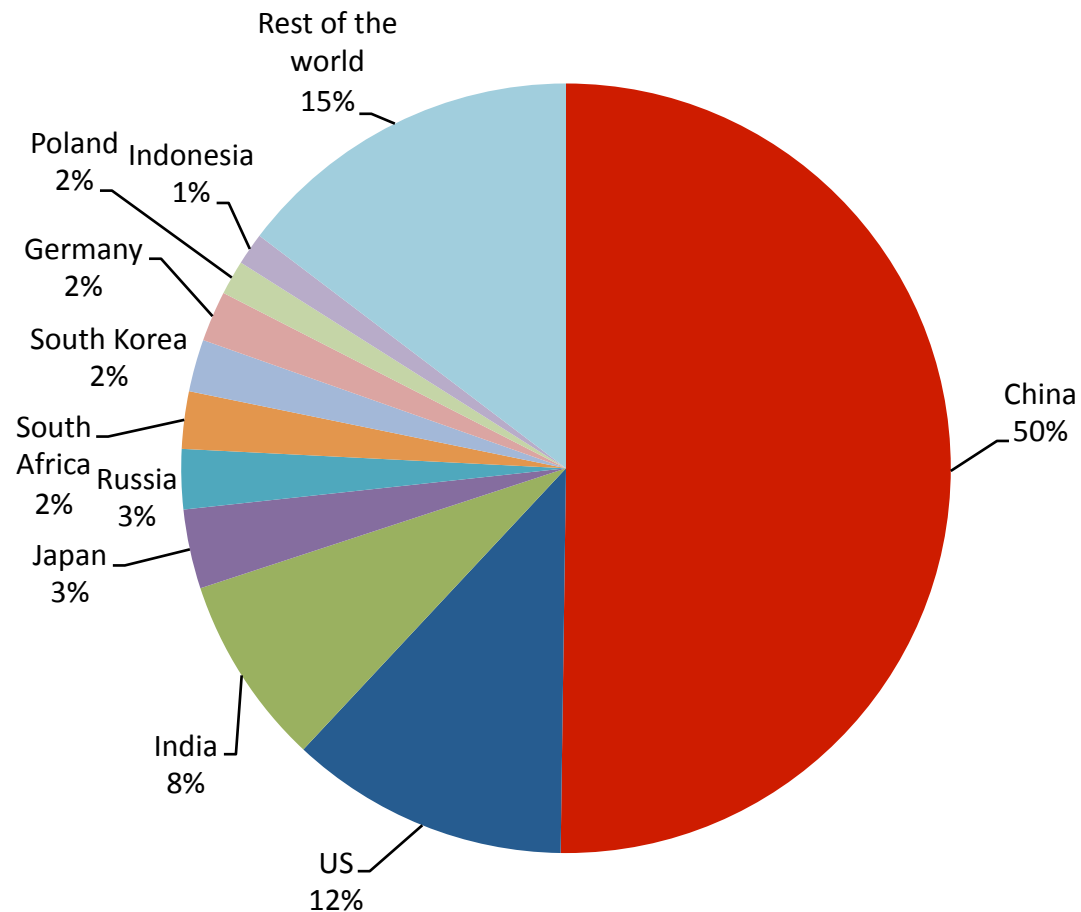
Total: 4,980 Twh

78% Electricity Generated by Coal

Source: 2012 data from China Electricity Council, ERI

China consumes more coal than all other countries combined

2012 World Total Consumption
3,730 Mtoe



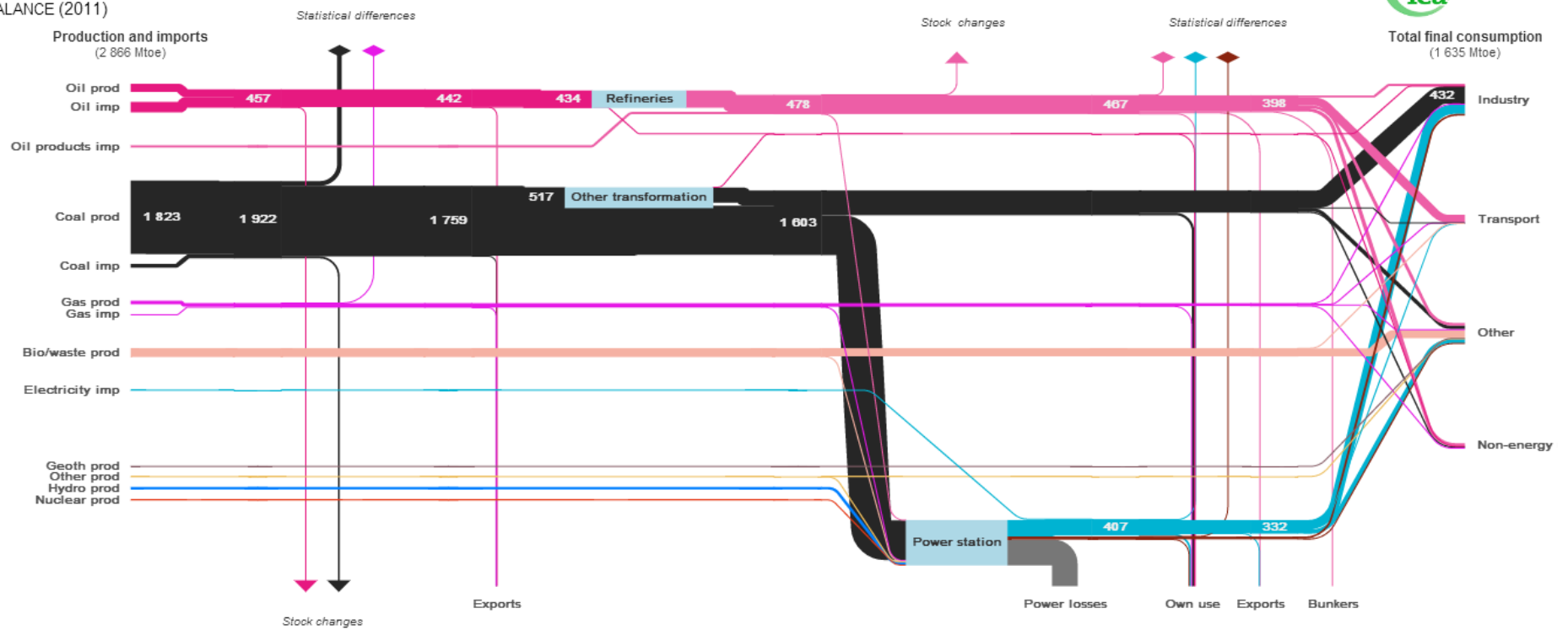
Source: BP Energy Statistical Review 2013.

Where does the energy/coal go?

People's Republic of China

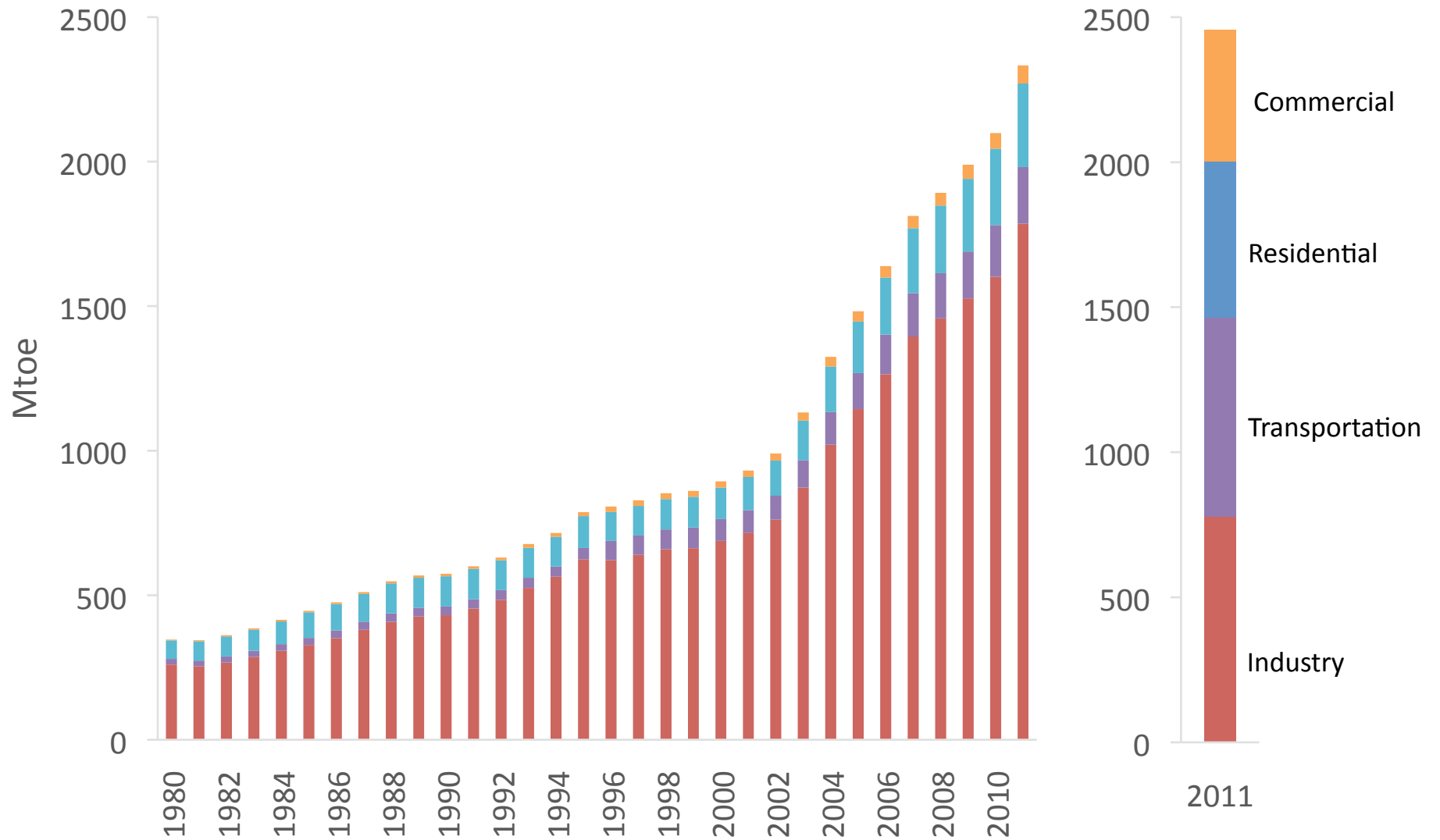
BALANCE (2011)

Millions of tonnes of oil equivalent



<http://www.iea.org/Sankey/index.html>

Industry dominates energy use but transportation and building are catching up



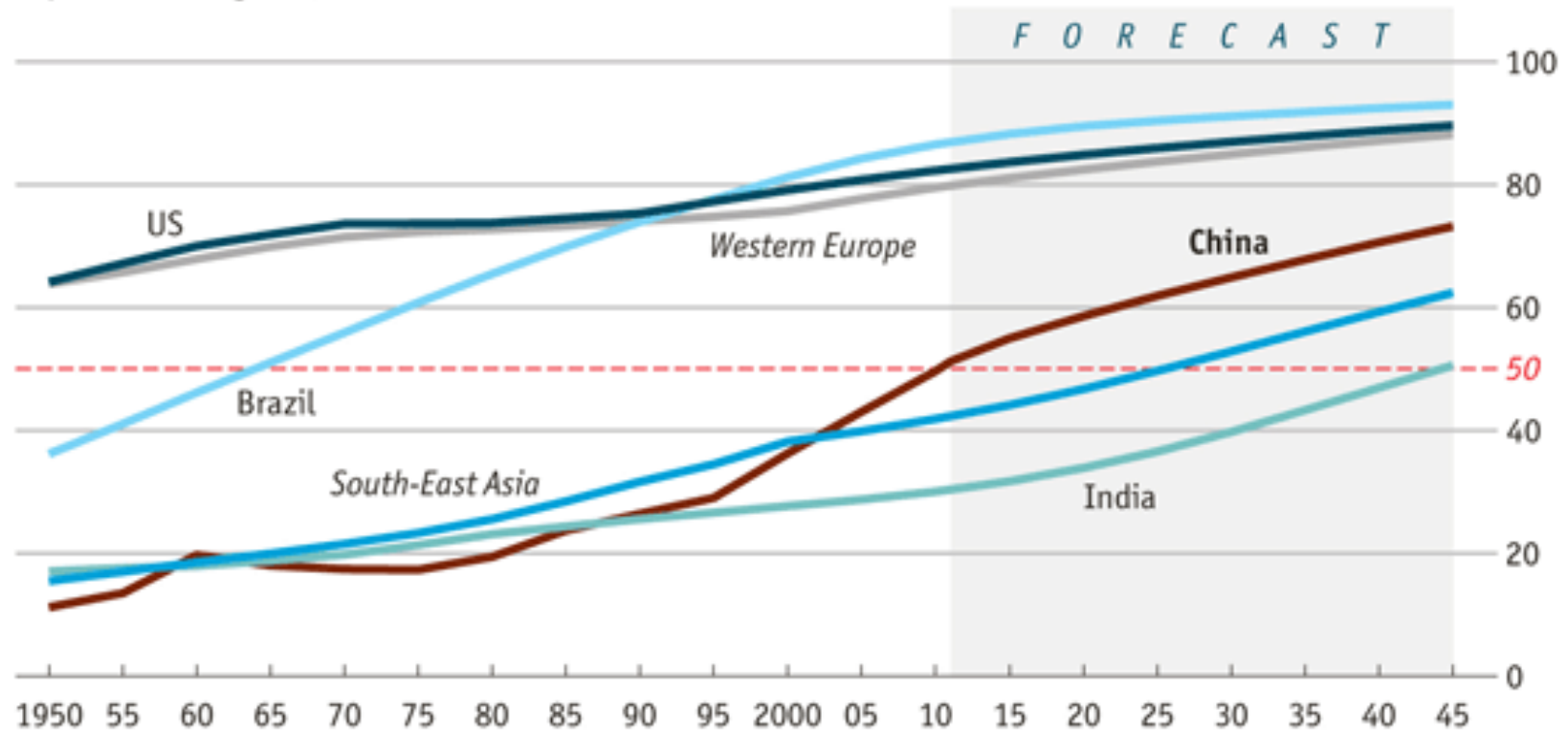
Source: LBNL, China Energy Databook. EIA.

Urbanization



Urbanisation

Population living in urban areas, % of total

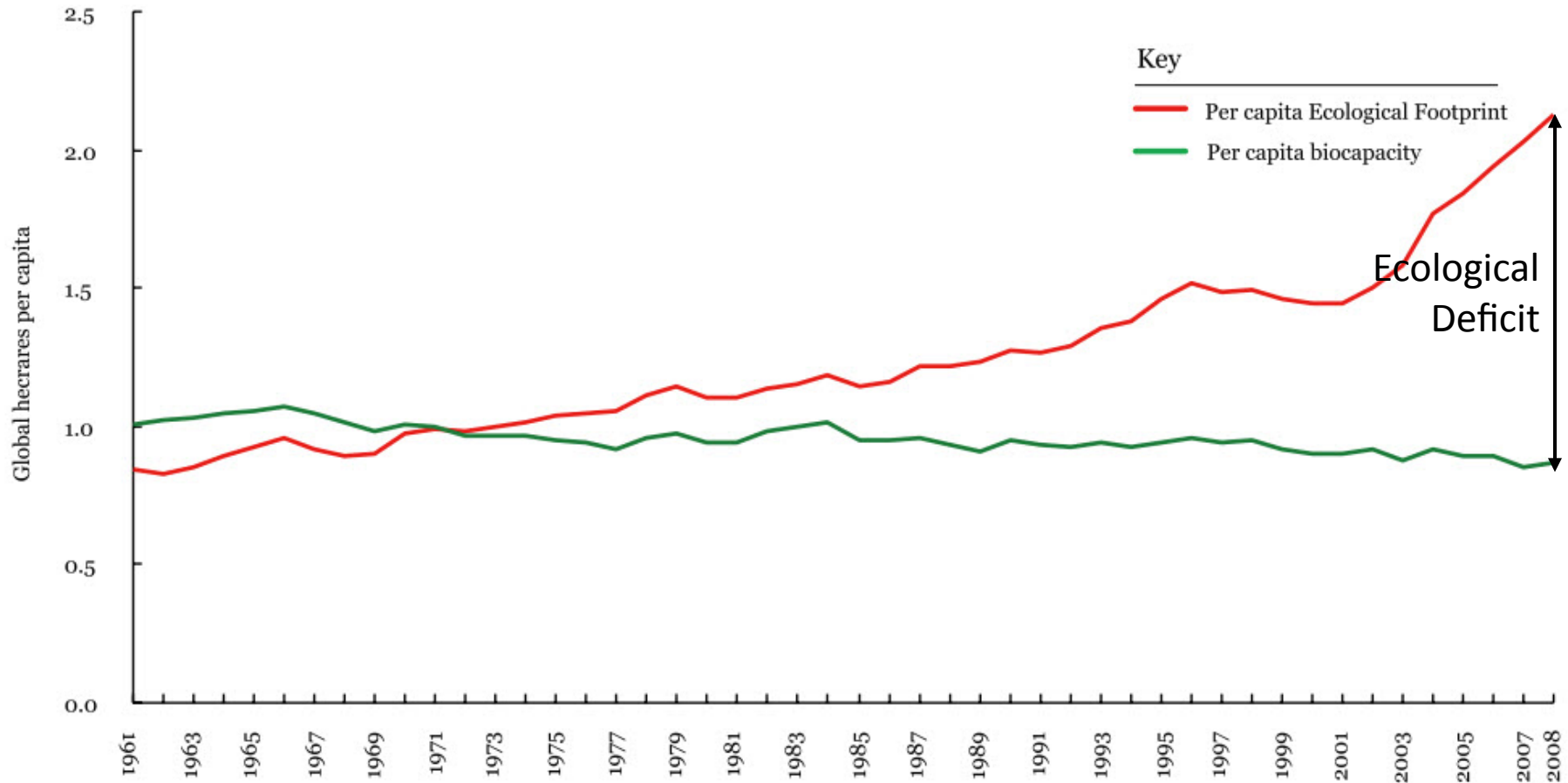


Sources: CEIC; UN Population Division; *The Economist*

Environment: concentrated in 30 years

- Traditional environmental pollution concentration
 - Air
 - Water
 - Solid waste
- Ecosystem wide environmental degradation
- Environment problem as a source of social instability
- Current situation
 - Improvement in some areas
 - Overall degradation failed to be controlled
 - The situation remains grave
 - Pressure continues to increase

Eco-system: China's ecological footprint is almost double of its ecological capacity



Source: CCICED, WWF. China ecological footprint report. 2012.

Climate change: No island is an island

- Energy security
- Climate impact
- Common but differentiate responsibilities
- International cooperation
- The more closely these policies are aligned with China's own incentives and the unique context of its energy markets, the better chance they have of realizing the optimal role for China's action in global climate efforts.

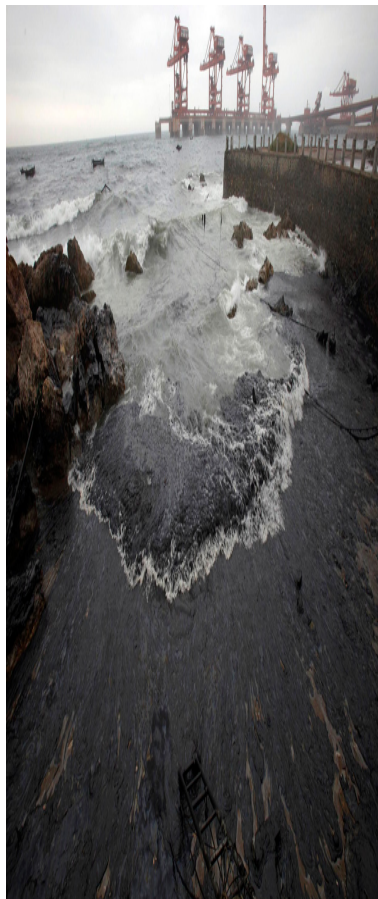
Environment factors are becoming sources of political instabilities



Songhua River Pollution, 2005



Local riot by pollution, 2007



Dalian oil spill, 2010



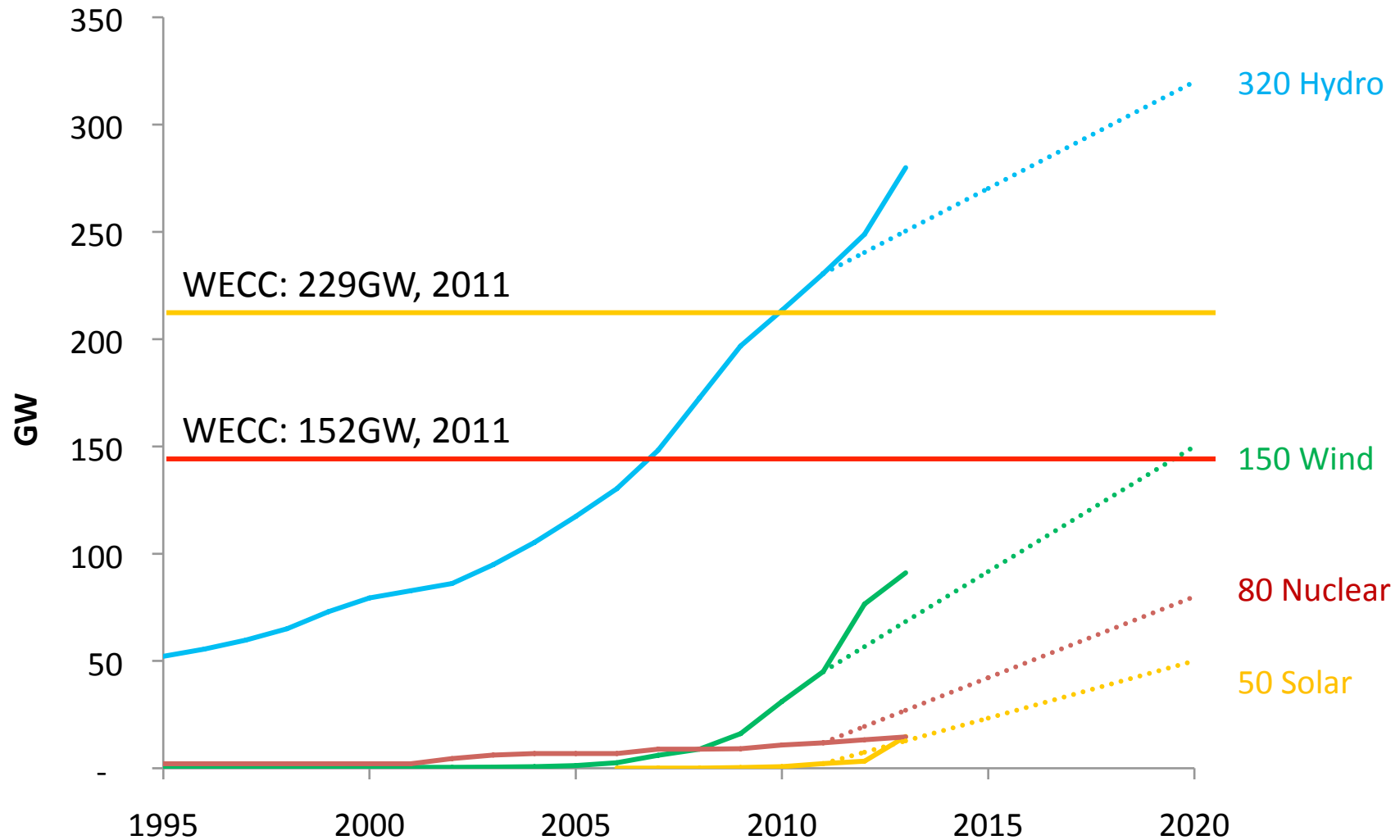
Beijing air pollution, 2013

Source and photo credits: Xinhua News; Greenpeace China.

Not all bad news

- Stronger pollution control
- Expanding natural reserves
- Integrated water resources management
- Clean energy
 - Solar
 - Wind
 - Nuclear
 - Others

China is on track to achieve its short-term energy targets



Source: China Energy Statistical Yearbook, various years.

High speed train and high voltage transmission lines



A CRH train departs Shanghai station. Source: Xinhua.



Source: Ministry of Railway, 2008

China to build ginormous buses that cars can drive under

- [Shenzhen](#) Huashi Future Car-Parking Equipment
- Beijing's Mentougou district will commence building its first 186km of track at year's end

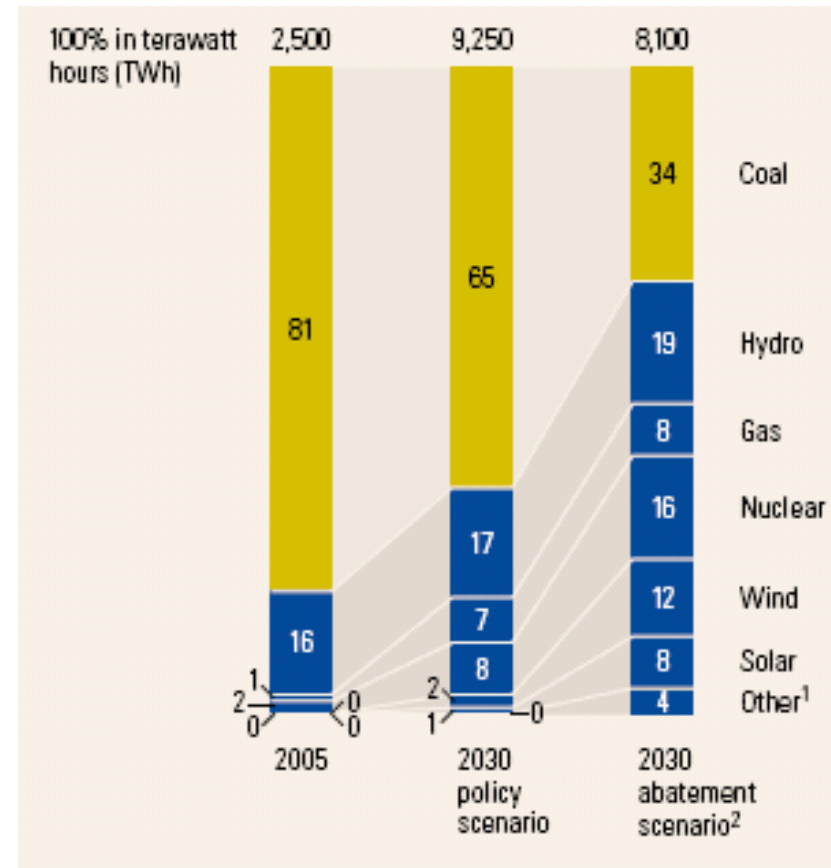


Source: Beijing News May 28, 2010. http://epaper.bjnews.com.cn/html/2010-05/28/content_105596.htm?div=-1

China's green progress and prospective



Source: http://news.xinhuanet.com/english2010/china/2010-03/13/c_13209617.htm



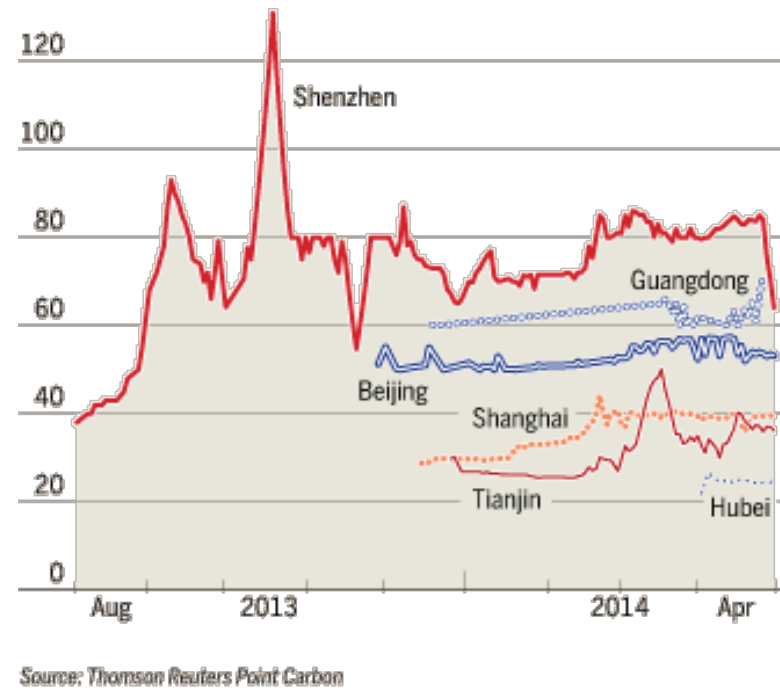
Source: McKinsey, China's green opportunities.

Carbon cap trade pilots and national carbon price?



How prices differ in China's pilot carbon markets

Exchange traded prices (renminbi)



Source: Stockholm Environment Institute. Financial Times: <http://www.ft.com/cms/s/0/c9b0faf8-d9e1-11e3-b3e3-00144feabdc0.html#axzz38L80rIVG>.

Solve the environment in socio-economic transition

- Vision (by CS Kiang)
 - Innovation
 - Interdisciplinary
 - Internationalization
 - Integration
- Implementation
 - Technology innovation
 - Smarter governance
 - Corporate social responsibility
 - Civic society and public participation
 - Education: leadership and greenness of next generation
 - International cooperation: working with China

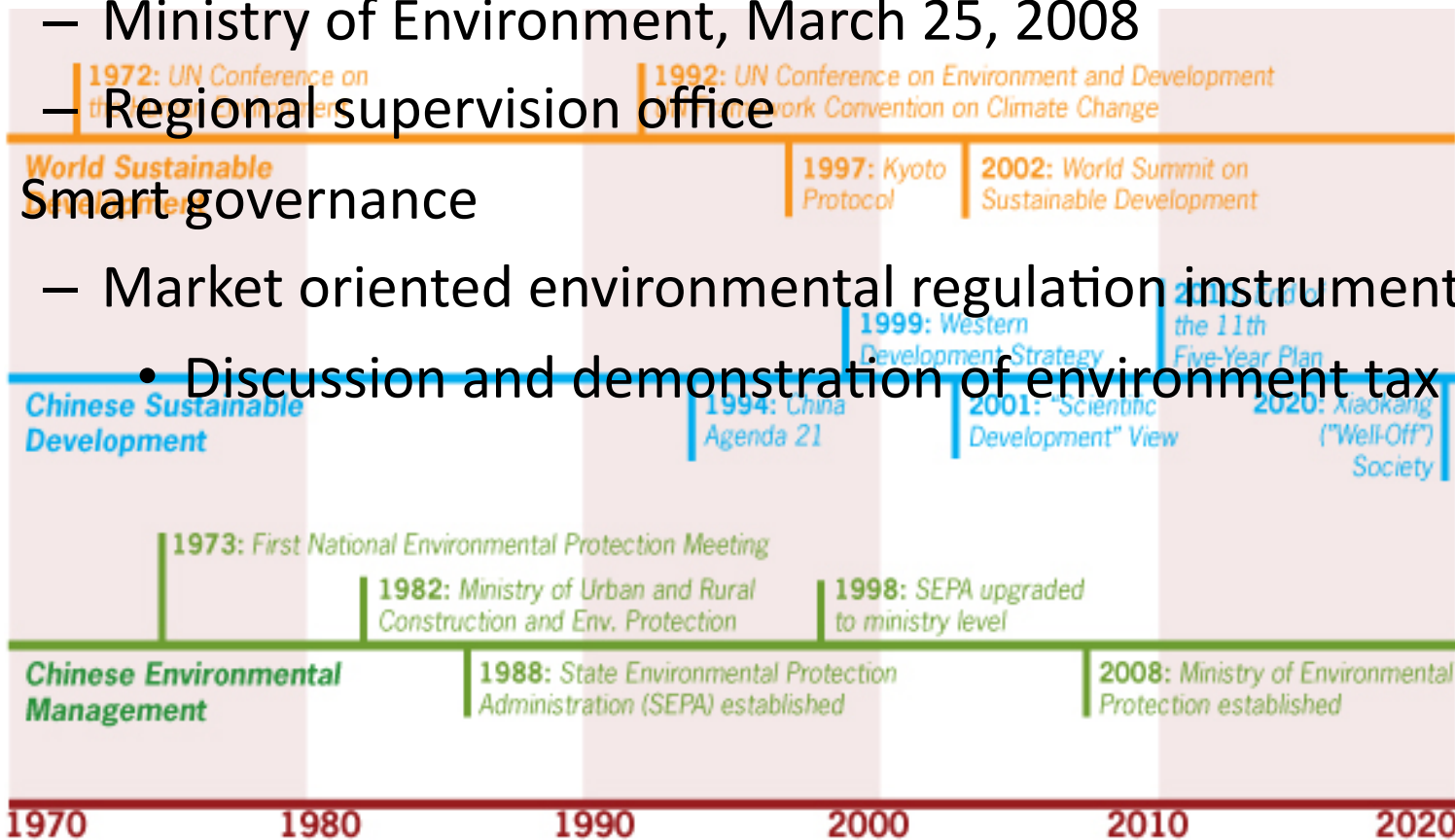
Governance – stronger and smarter

- Strong Environment governance: iron hands

- Ministry of Environment, March 25, 2008
- Regional supervision office

- Smart governance

- Market oriented environmental regulation instruments
- Discussion and demonstration of environment tax



Source: Gang He, China's New Ministry of Environmental Protection Begins to Bark, but Still Lacks in Bite
<http://earthtrends.wri.org/updates/node/321>

Corporate social responsibility (CSR) – corporate citizen

- Emerging CSR
 - Corporate to change
- State owned enterprises
 - Shenhua
 - State Grid
 - Guodian
- Public Private Partnership

Public participation – Political reform

- Xiamen “PX” case
 - “Walking” for a better environment
- Guangdong Foshan case
- Yuanmingyuan public hearing case
- Shifang, Qidong, Ningbo PX case
- Guangdong Jiang anti-nuclear movement
- Environmental NGOs – climate change as an example
- Weibo, Wechat and the access of information
- Environment challenges can not be addressed and deployed without major political reform

Source: Gang He. Chinese society and climate change. China Perspectives. 2007.

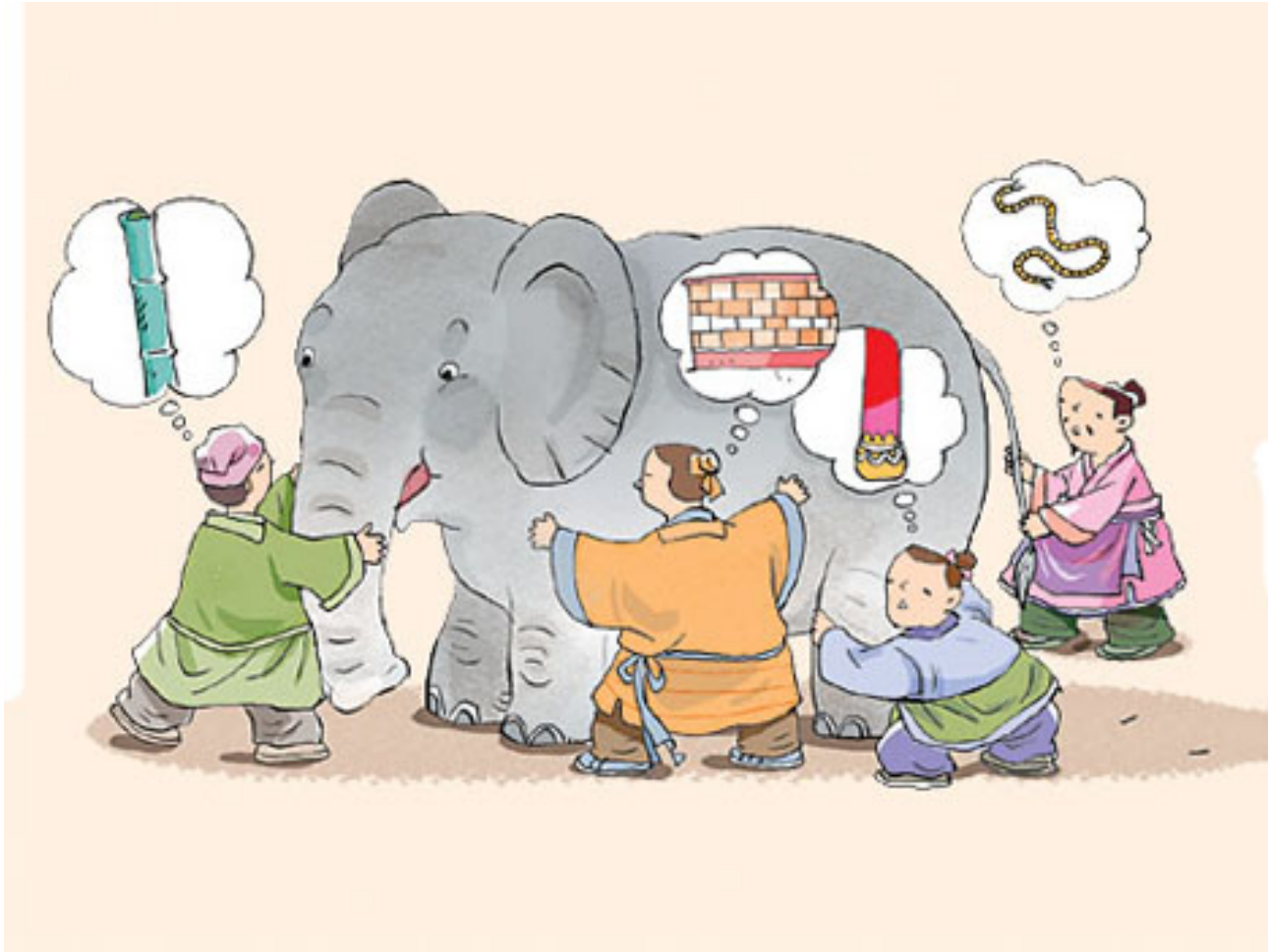
Things to watch:

- Economic restructure and deep reform
- Energy conservation and emission reduction
- Two major targets by 2020:
 - 40-45% emission intensity
 - 15% renewable energy
- Booming of new energy
 - Wind, solar, nuclear...
- Others
 - Low carbon cities demonstration
 - Environment exchange, carbon cap and trade, setting up the infrastructure of market oriented tools
 - Carbon tax, environment tax

Conclusions and take home messages

- China is under its greatest social economic transformation and the opportunities lie with challenges
- Population matters: 1.36 billion population is the start point of China's economy-energy-environment problem
- China's environment challenges is unprecedented: if we can solve China's problems, we will learn how to solve the world's problems
- Black cat and/or white cat, all need to be green cats
- China is undergoing a clean energy revolution which needs the world's cooperation
- Work with China for a better world. And the best way to work with China is engaging China's core interests

Blind men and an elephant



Source: Nie Pan Jing.

References

- CS Kiang. Balancing economy and environment. Sustainable development in China.
- Jia Feng, Zhang Shiqu. Commercialization of Environmental Technologies. Beijing, World Knowledge Press. 2005
- David Victor. Beyond gridlock on global warming. 2010. David Victor, Richard Morse. Living with coal. 2009.
- Gang He. 2014. Engaging Emerging Countries: Implications of China's Major Shifts in Climate Policy, in: Putra, N.A., Han, E. (Eds.), Governments' Responses to Climate Change: Selected Examples From Asia Pacific, SpringerBriefs in Environment, Security, Development and Peace. Springer Singapore, pp. 11–24.
- Gang He, Daniel M. Kammen. 2014. Where, when and how much wind is available? A provincial-scale wind resource assessment for China. Energy Policy. DOI: <http://dx.doi.org/10.1016/j.enpol.2014.07.003>.
- Gang He, Richard Morse. Addressing Carbon Offsetters' Paradox: Lessons from Chinese Wind CDM. Energy Policy. 63(2013): 1051-1055. DOI: <http://dx.doi.org/10.1016/j.enpol.2013.09.021>.
- Richard Morse, Gang He. The World's Greatest Coal Arbitrage: China's Coal Import Behavior and Implications for the Global Coal Market. PESD. 2010.
- Asia Society, Common Challenge, Collaborative Response: A Roadmap for U.S.-China Cooperation on Energy and Climate Change, 2008
- Asia Society, Center for American Progress, A Roadmap for U.S.-China Collaboration on Carbon Capture and Sequestration, 2009.
- Lawrence Berkeley National Lab, China Energy Group.
- China Council of International Cooperation on Environment and Development (CCICED).
- Ministry of Environment al Protection. Chinese Academy of Environmental Planning.
- National Development and Reform Commission (NDRC).
- News from New York Times, Times, China Daily, WSJ, Caixin, etc.

Thank You!

Email: ganghe@berkeley.edu
URL: <http://www.ganghe.net>