



# China's Energy Challenge: Setting the Scene

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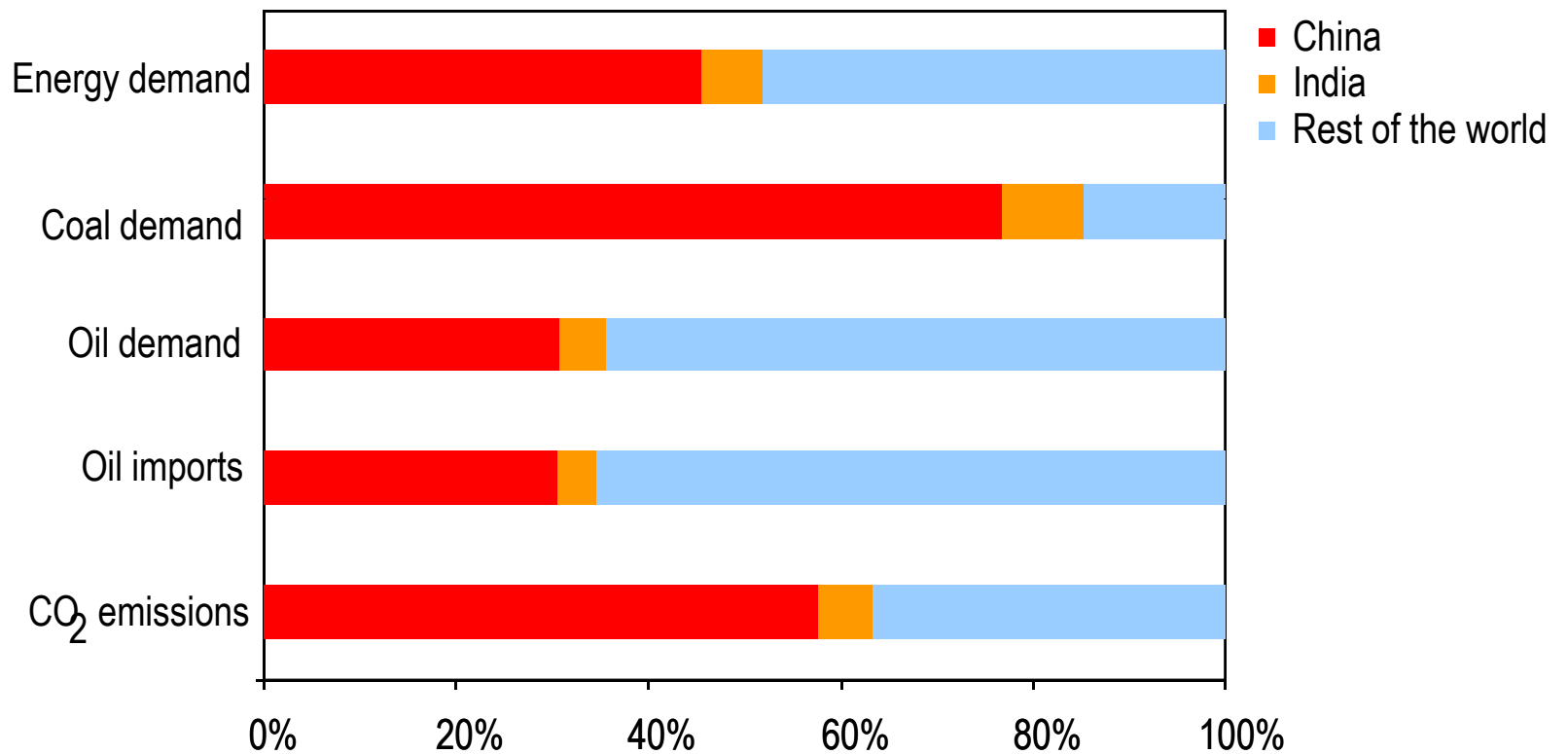
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Senior Fellow, Council on Foreign Relations

# China Dominates New Demand for Energy, Coal and Oil

Increase in World Primary Energy Demand, Imports & Energy-Related CO<sub>2</sub> Emissions in the Reference Scenario, 2000-2006

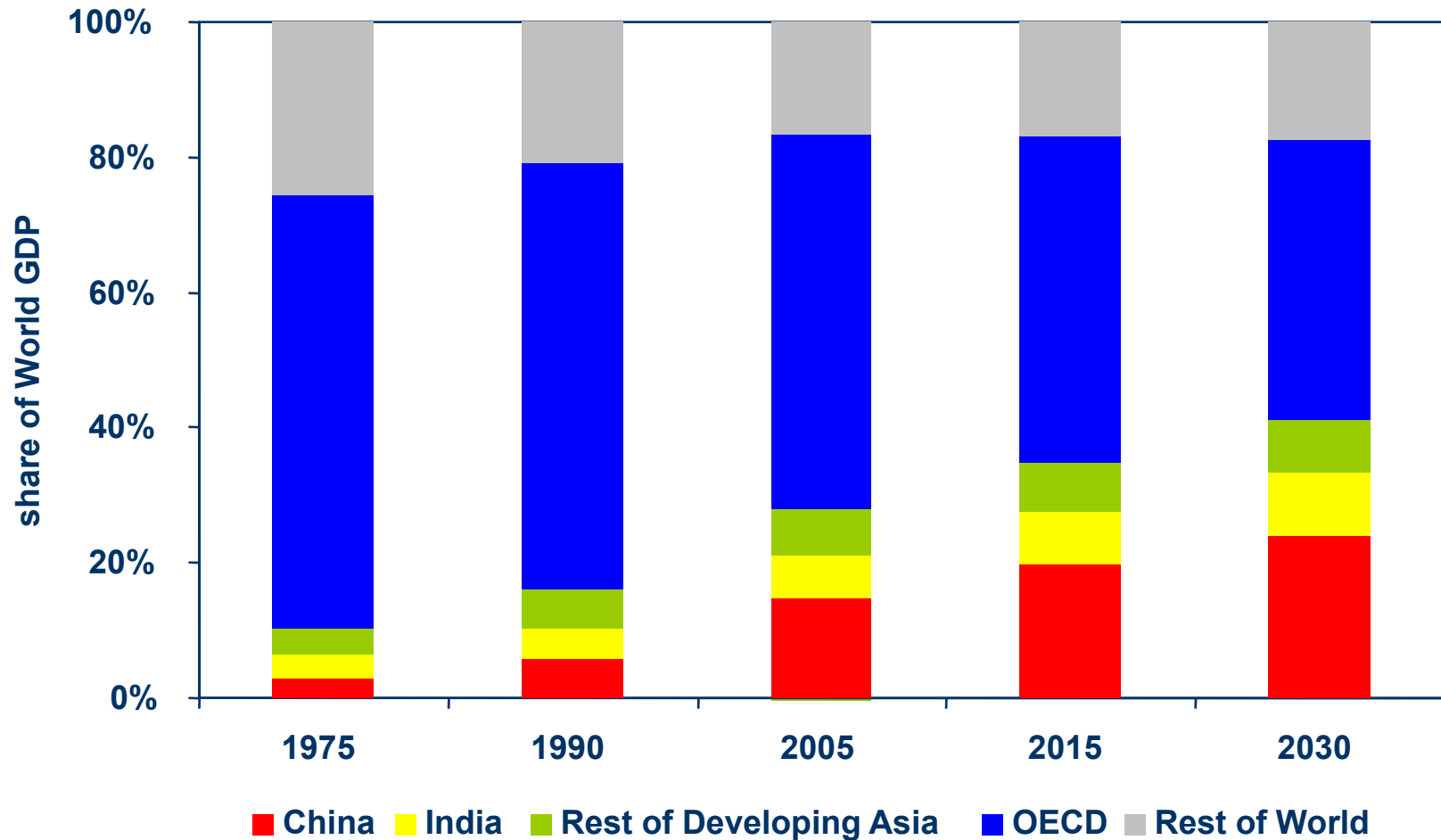


Source: IEA (2007)

# China's National Energy Profile

- Population: 1.3 billion (1.5 billion by 2020)
- 9% annual economic growth rate since 2000
- Urbanization reached 40.5% in 2007 from 17.9% in 1978 and will be 55% by 2020
- Car ownership growing 15% annually since 2000
- Forecasted 3.2 billion tons annual coal production by 2020
- 1000 GW increase in power generation capacity by 2020
- 60% of oil consumption will be imported by 2020

# China's Increasing Share of World GDP

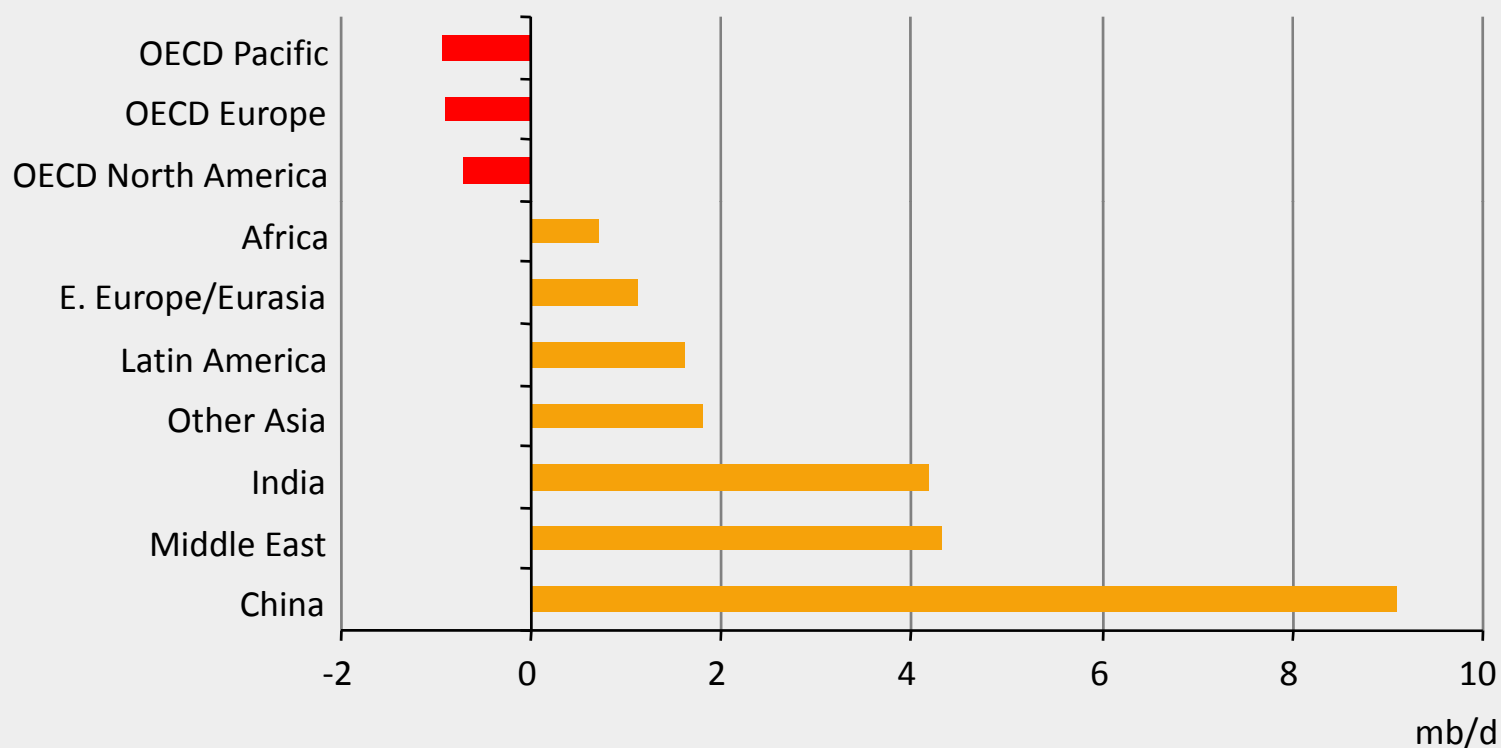


Developing Asia will account for more than half of the GDP growth between now and 2030, China alone for one-third

Source: IEA, WEO 2006

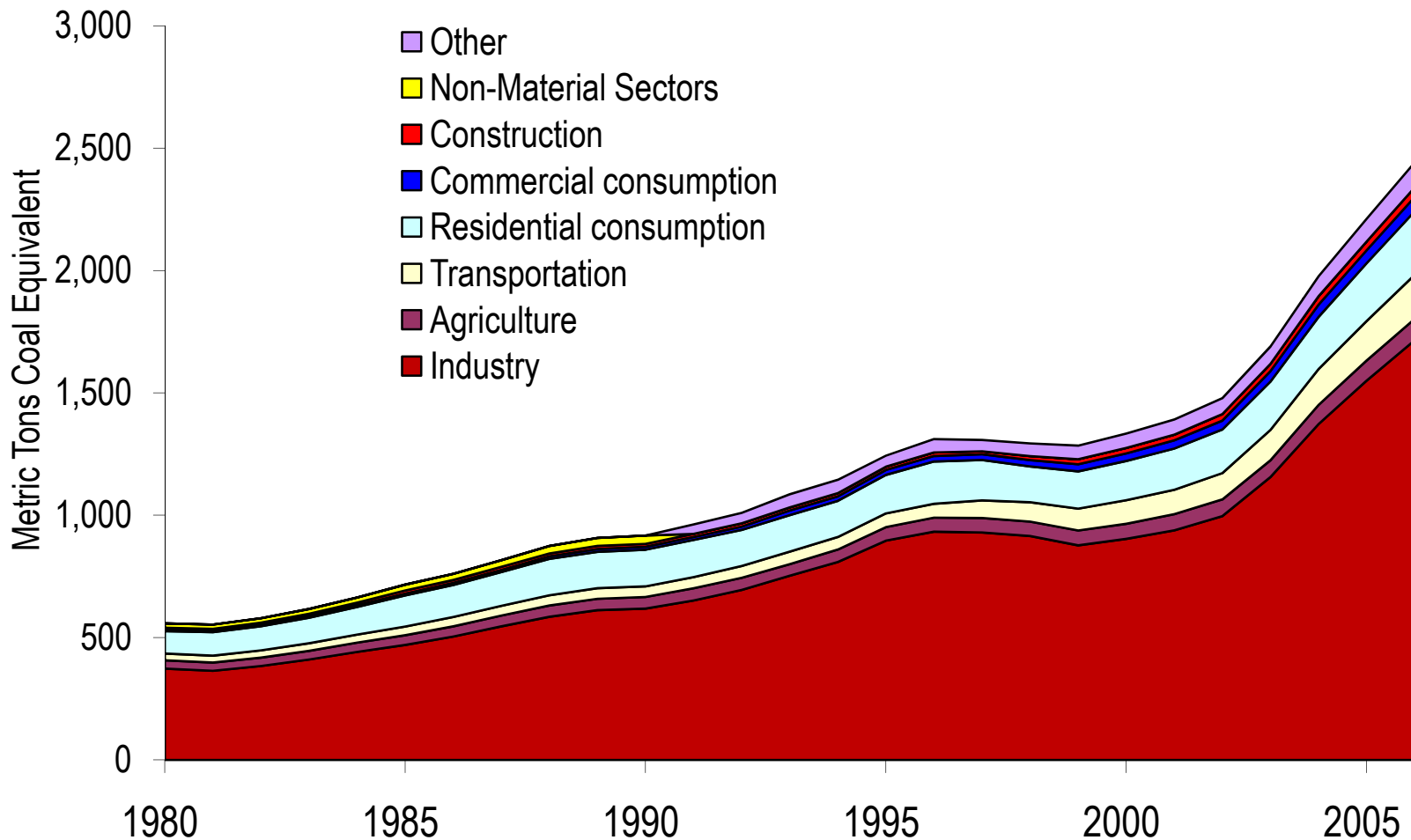
# Change in oil demand by region in the Reference Scenario, 2007-2030

World  
Energy  
Outlook  
2008



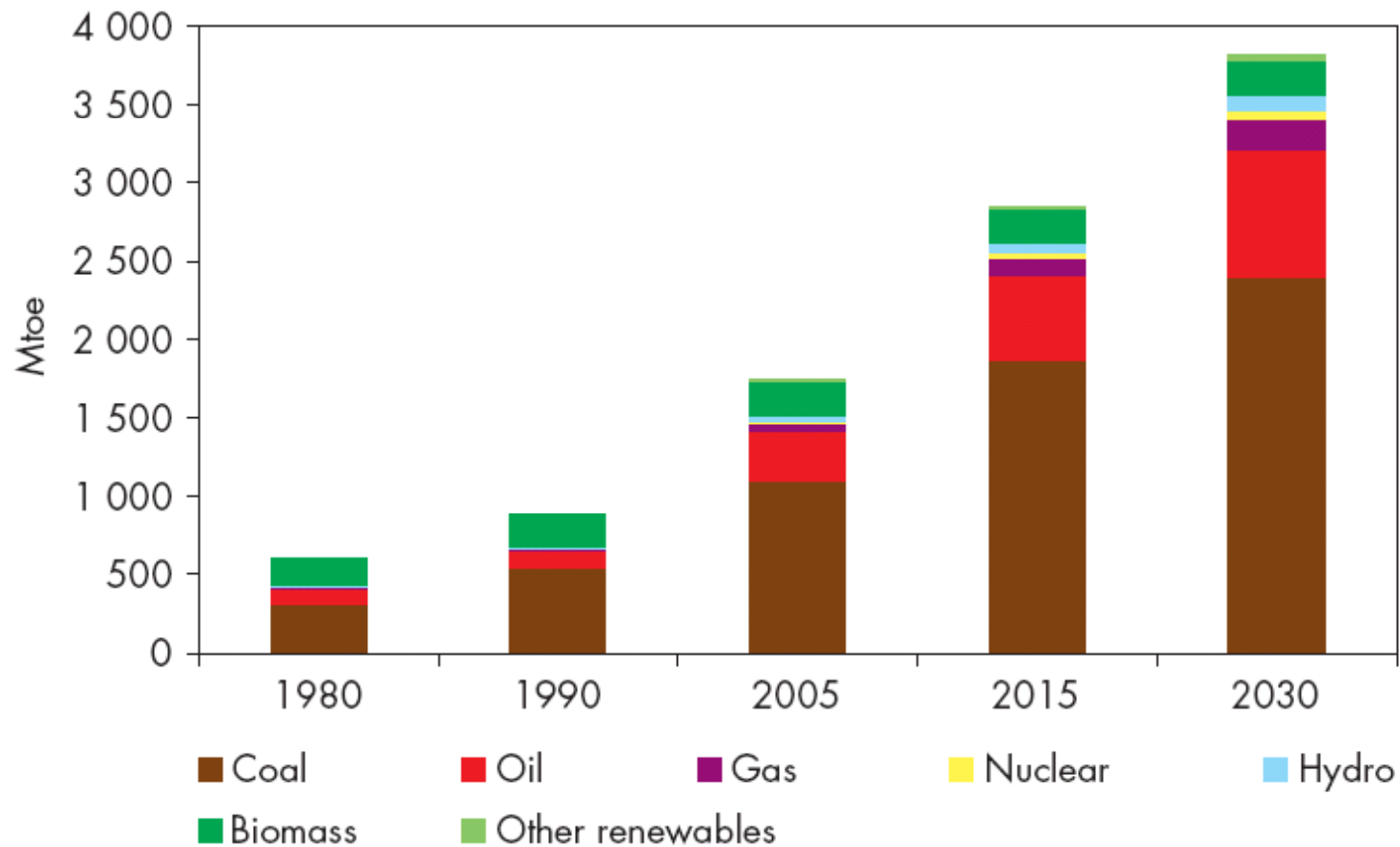
*All of the growth in oil demand comes from non-OECD, with China contributing 43%, the Middle East & India each about 20% & other emerging Asian economies most of the rest*

# Industrial Users Drive China's Booming Energy Demand



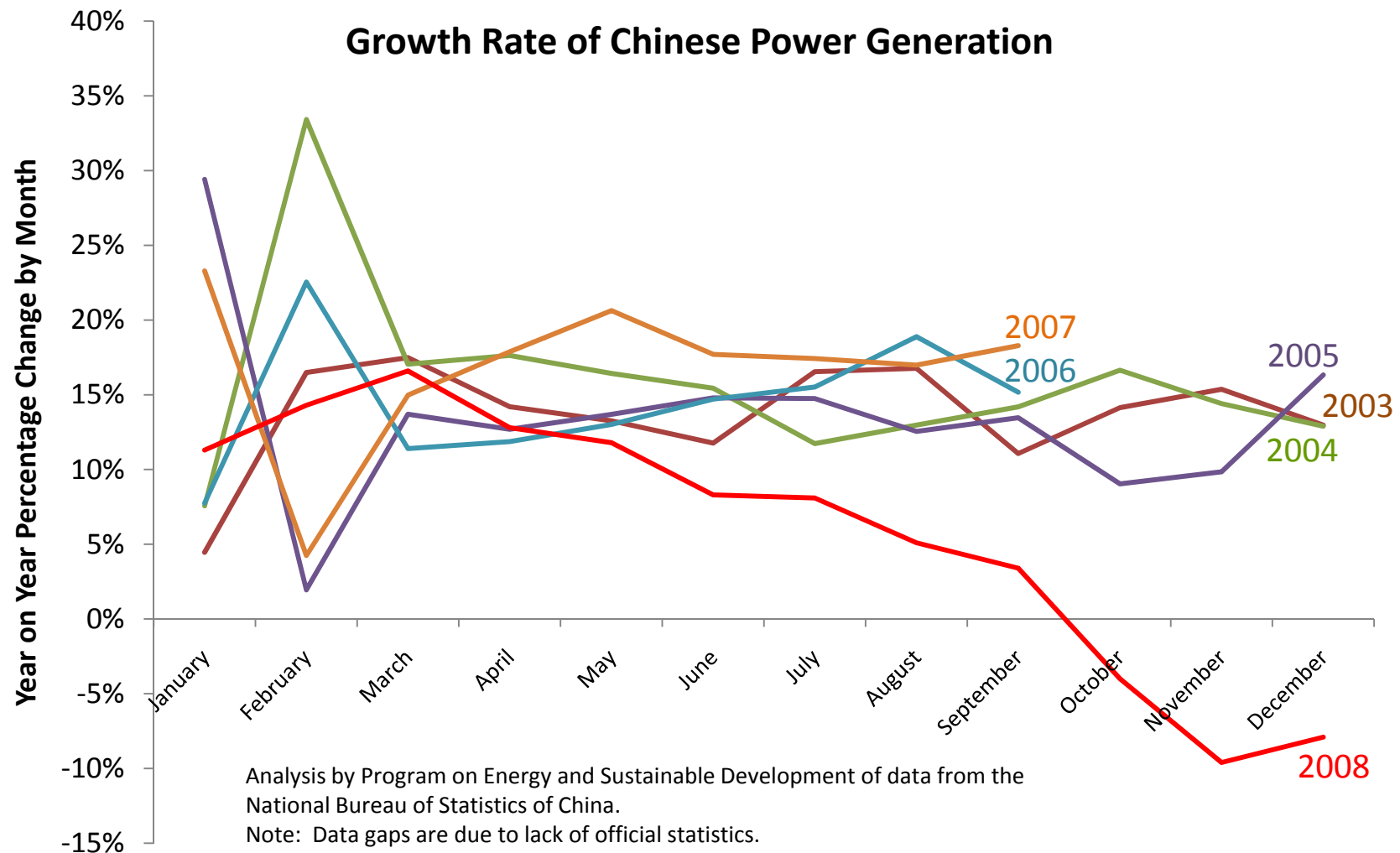
Source: LBL China Energy Databook 2007, total energy use by sector 1980-2006.

# China's Primary Energy Demand



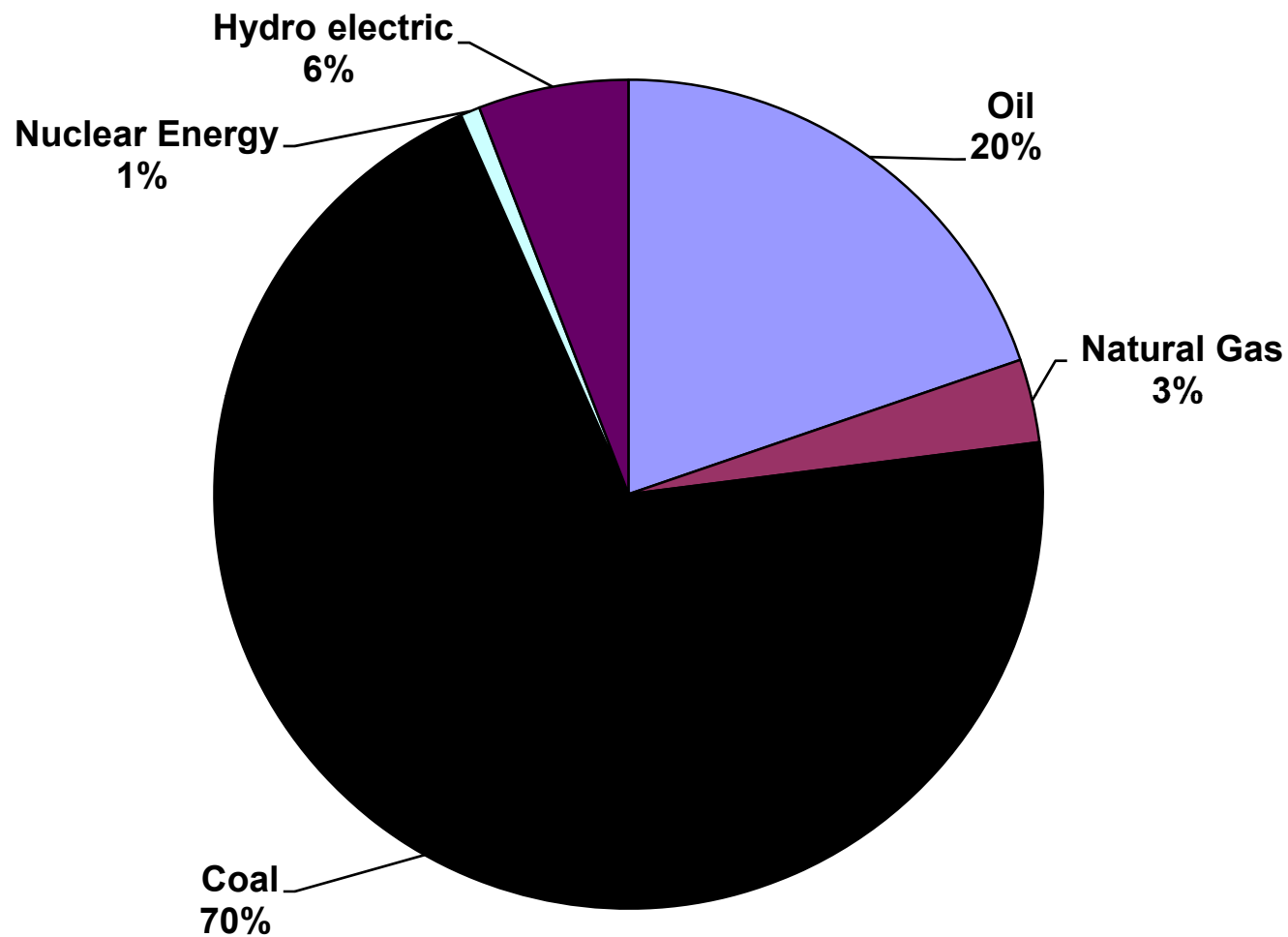
Source: IEA WEO2007 Reference Scenario

# Global Recession Brings Unprecedented Declines In the Growth of Chinese Power Generation



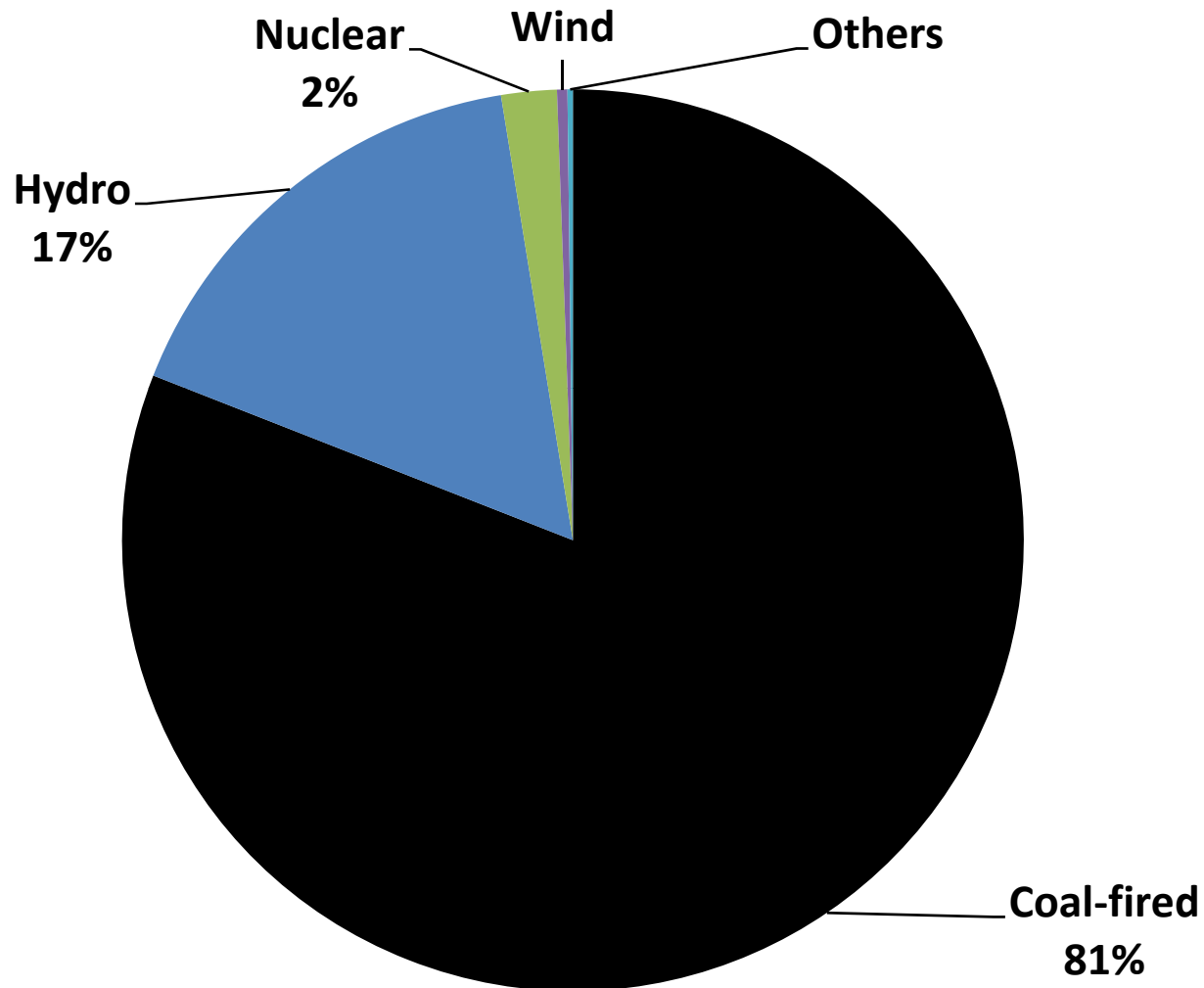


# China's Primary Energy Consumption by Fuel



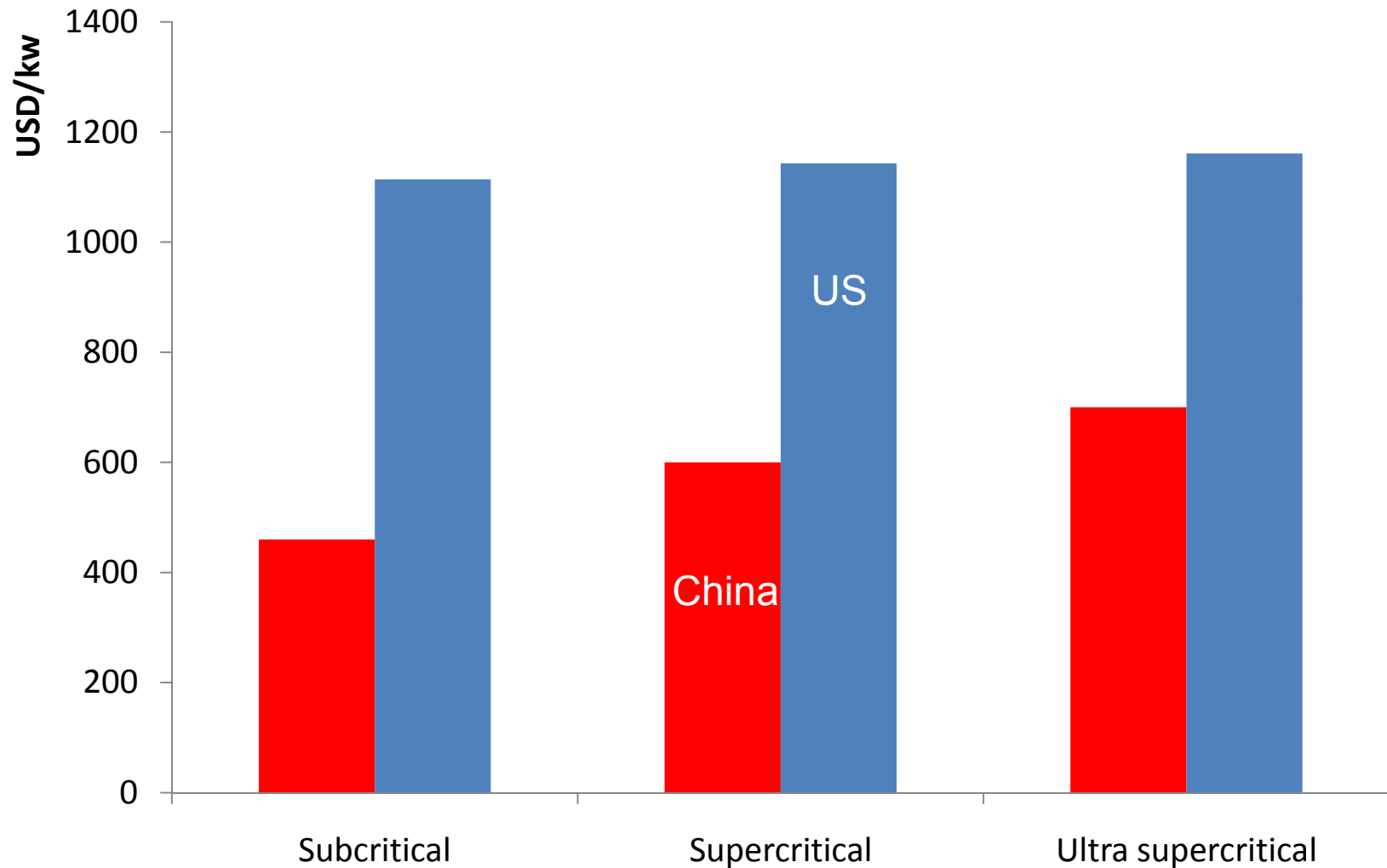
Source: 2007 data from China National Bureau of Statistics, 2008

# Coal is the Dominant Source of Electricity in China



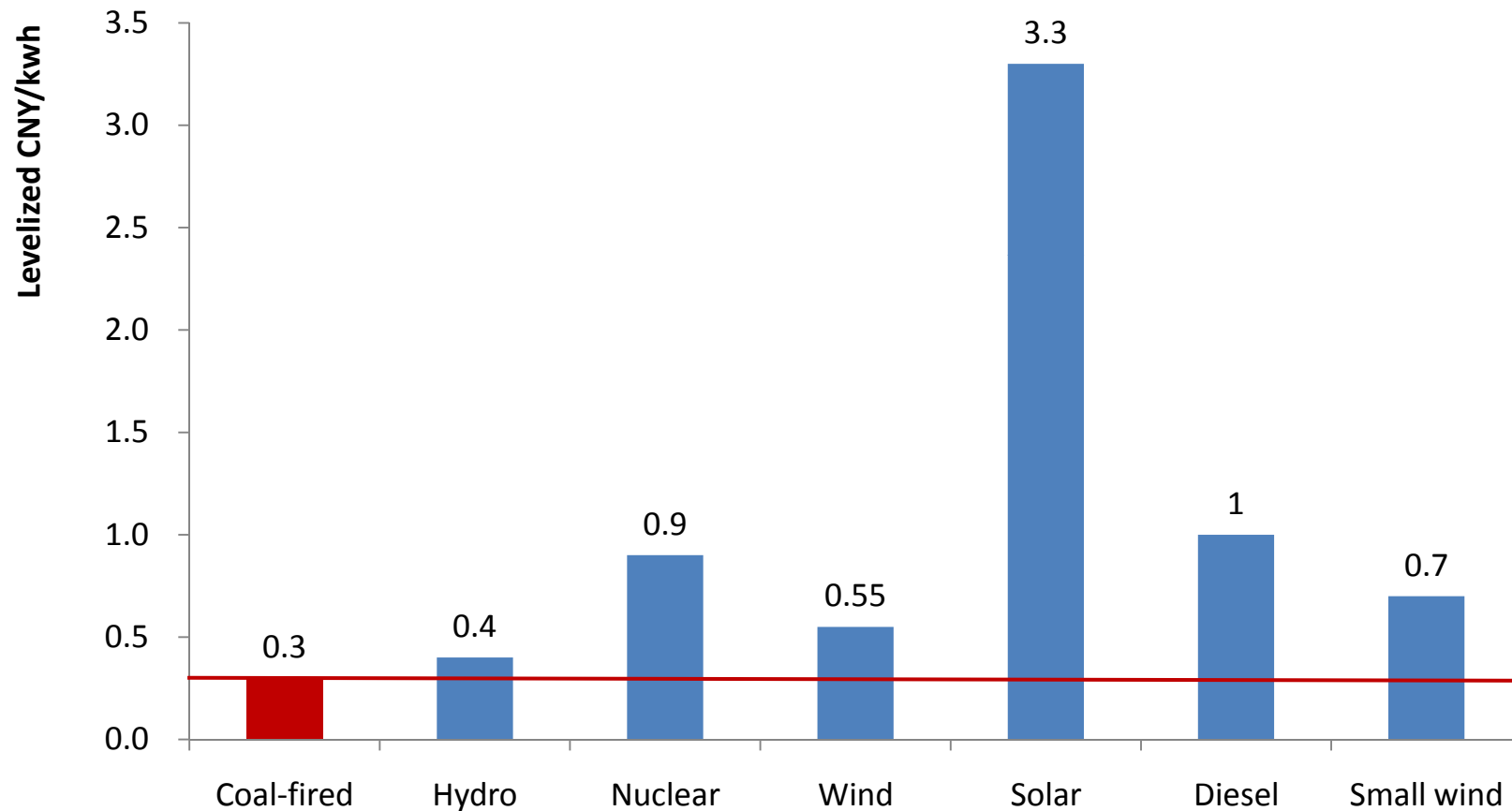
Source: 2008 data from China Energy Council, 2009

# Capital cost of building a Coal-fired power plant in China vs. U. S.



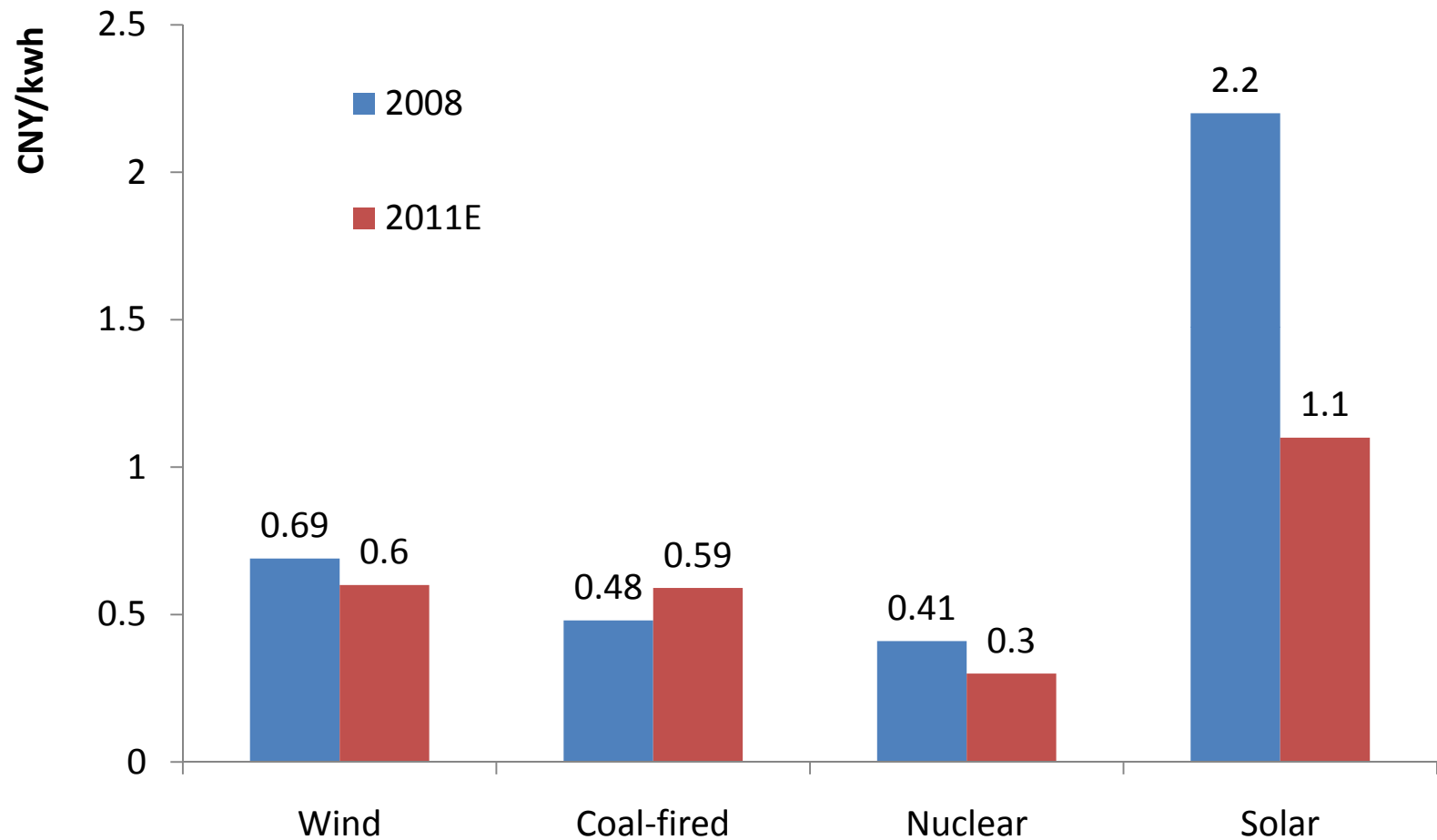
Source: PESD's interview with experts, not for citation.

# Cheap Coal: Average Power Generating Cost of Different Energy Sources in China



Source: China Wind Net, 2008

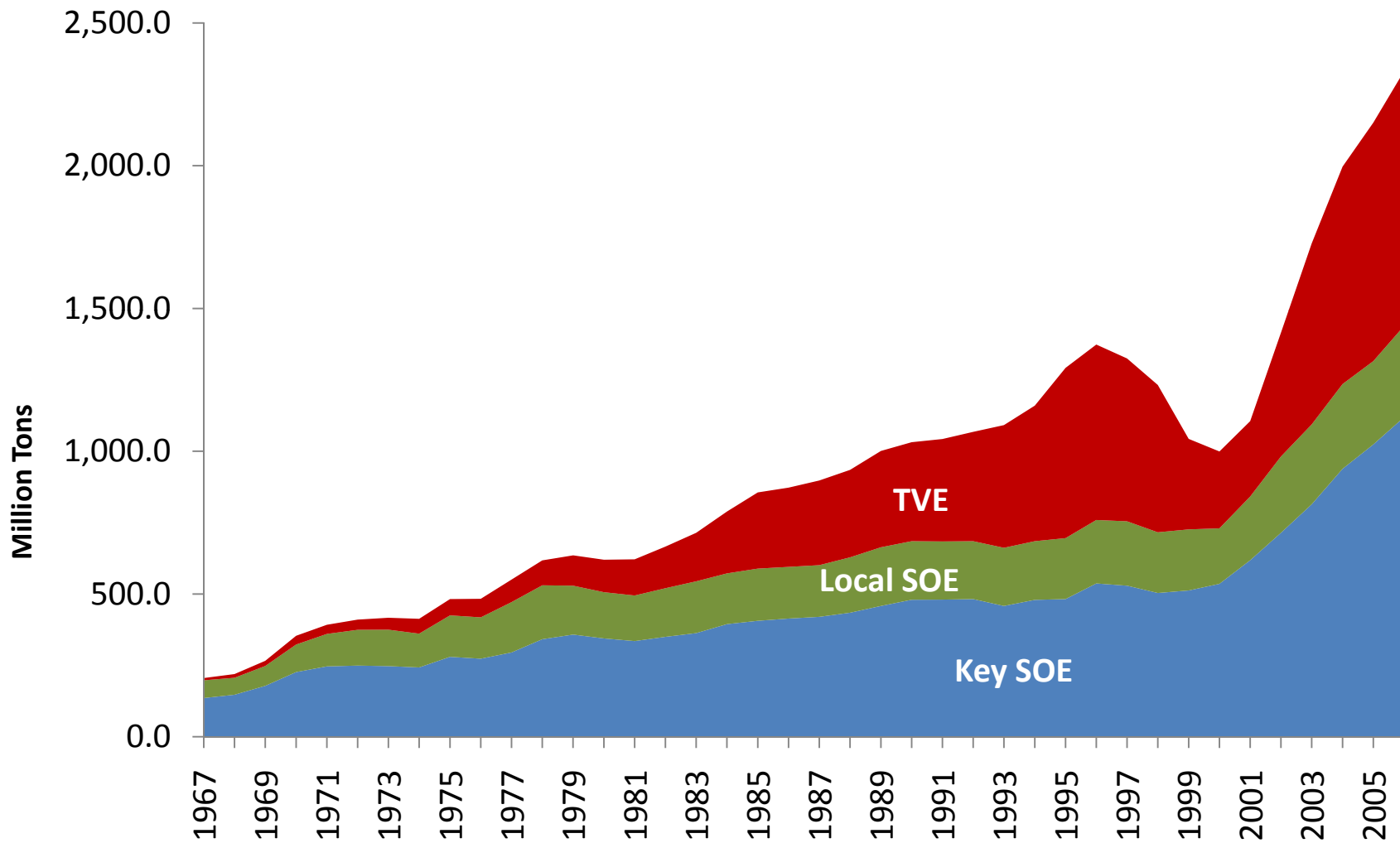
# Cheap Coal Compare to Other Energy Source in Guangdong Province of China



Source: China Security Journal, 2008, with 2011 Estimate. The capital cost is not included.

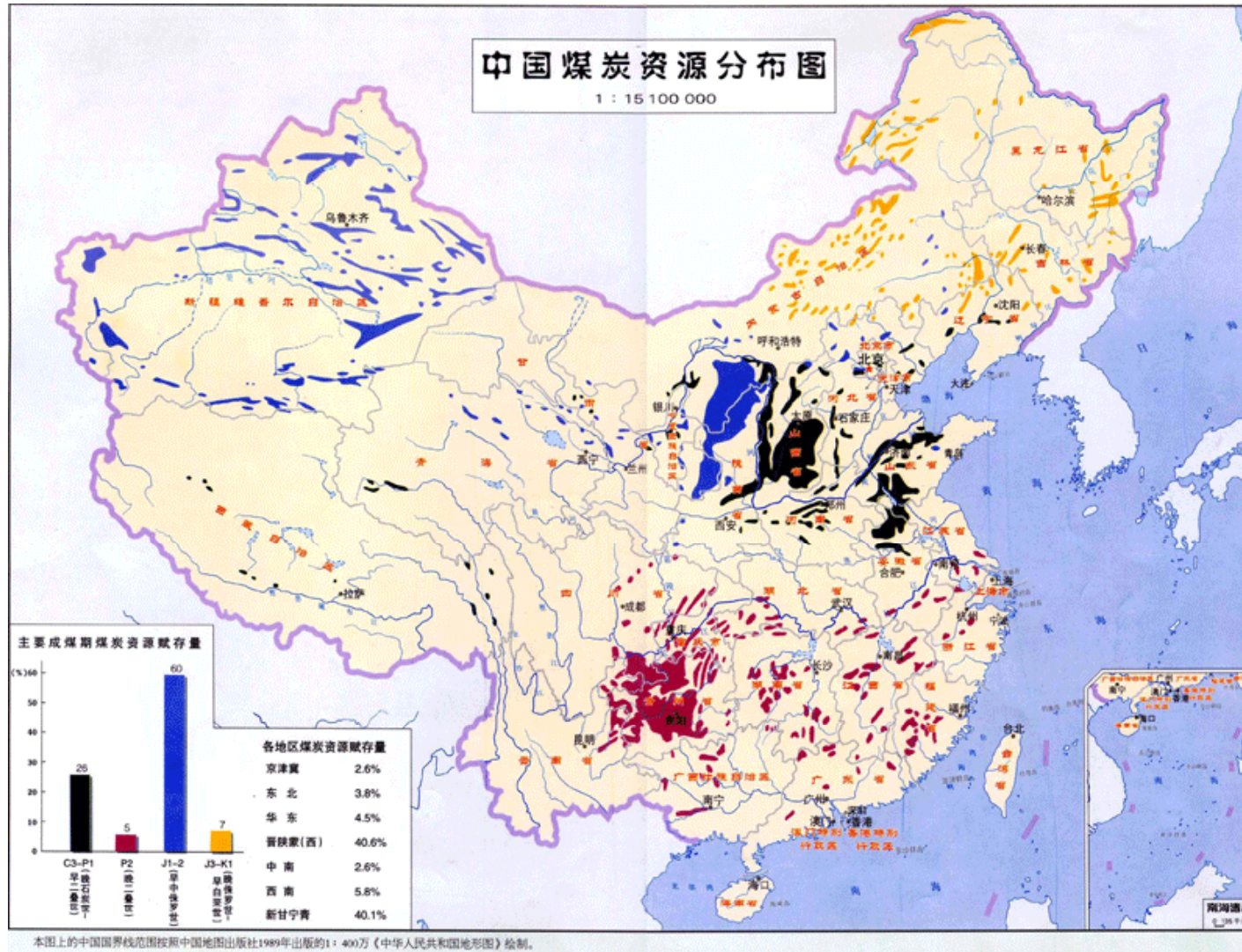
# China's Coal Production

## China's Coal Production by Type of Mine



Source: 1967-2006 data from LBL China Energy Databook 2008 v.7

# Main Coal Production Regions of China



Source: Ministry of Land Resources of China

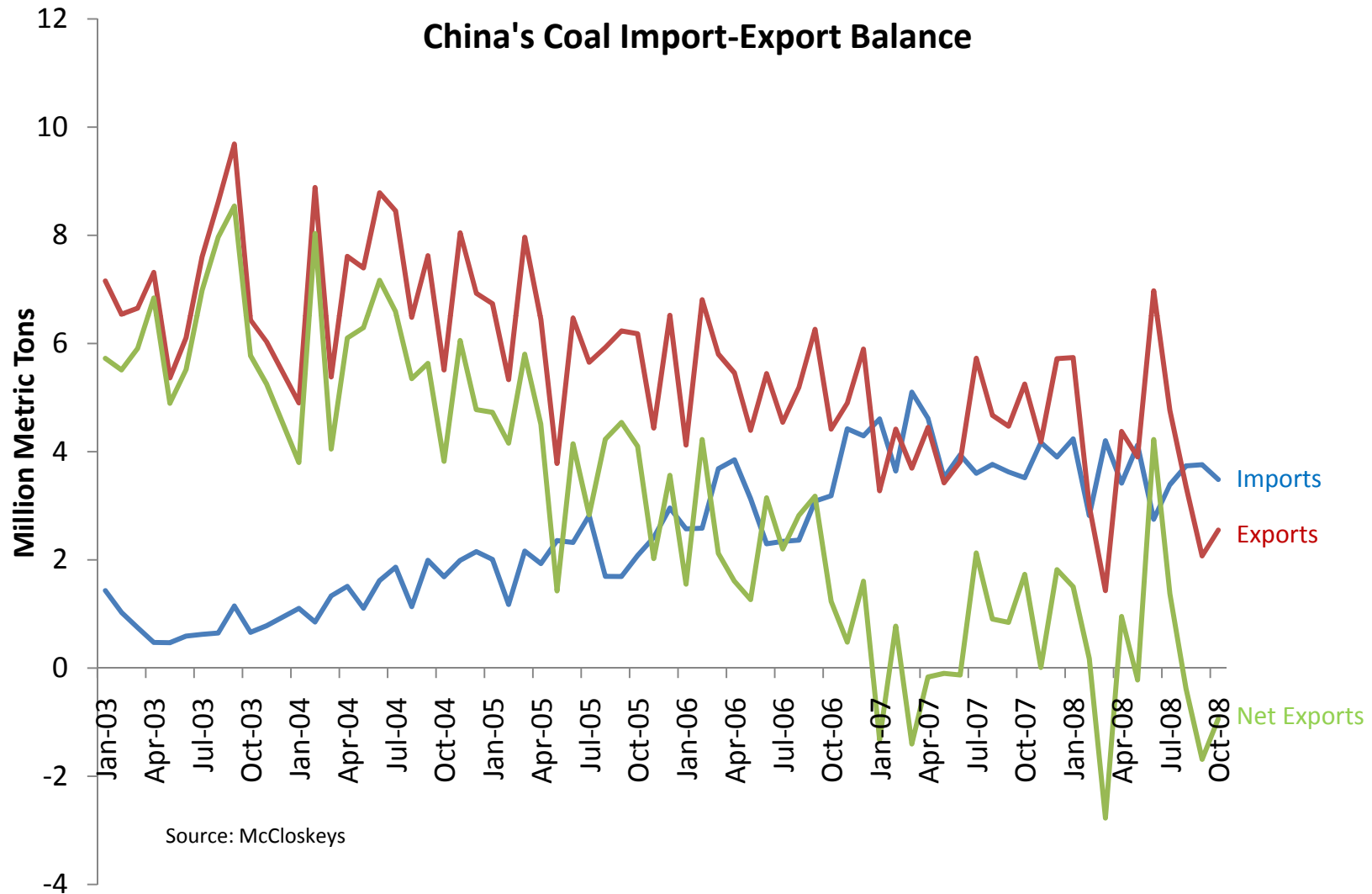
# Coal Flow in 2000 of China



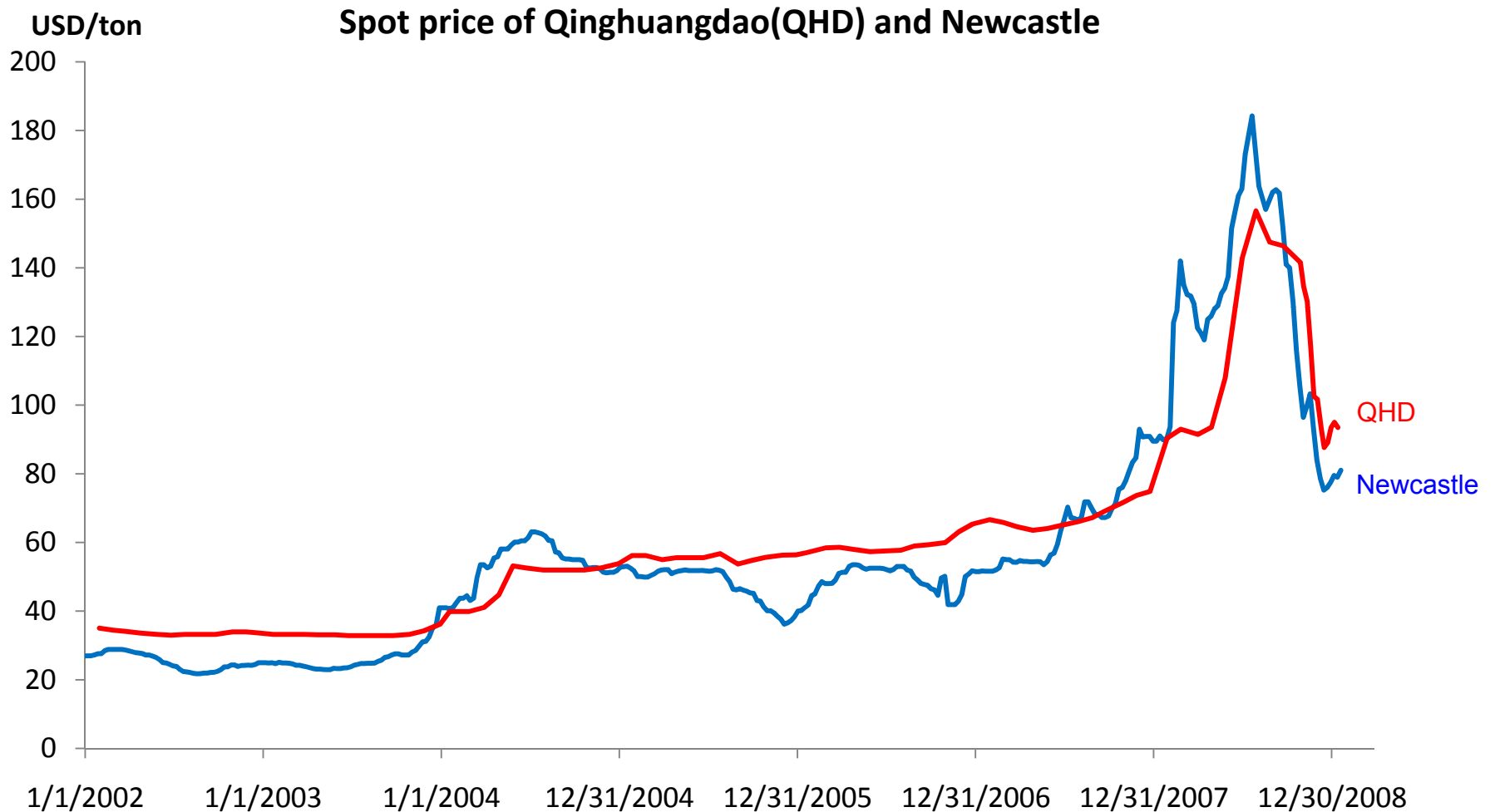
Source: IEA Clean Coal Centre, Coal Supply of Challenges of China, 2007.



# China is Increasingly Become a Net Importer

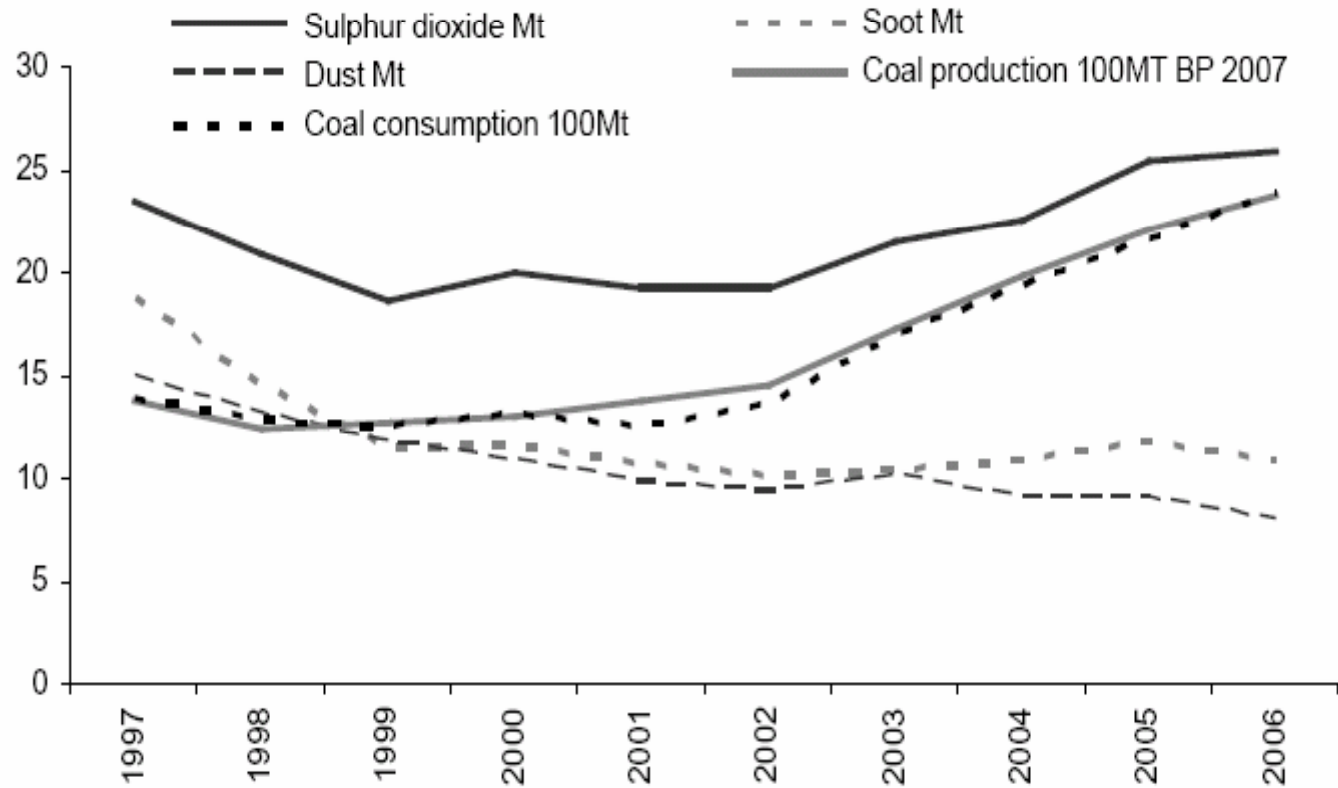


# China's Coal Market Increasingly Linked with International Market



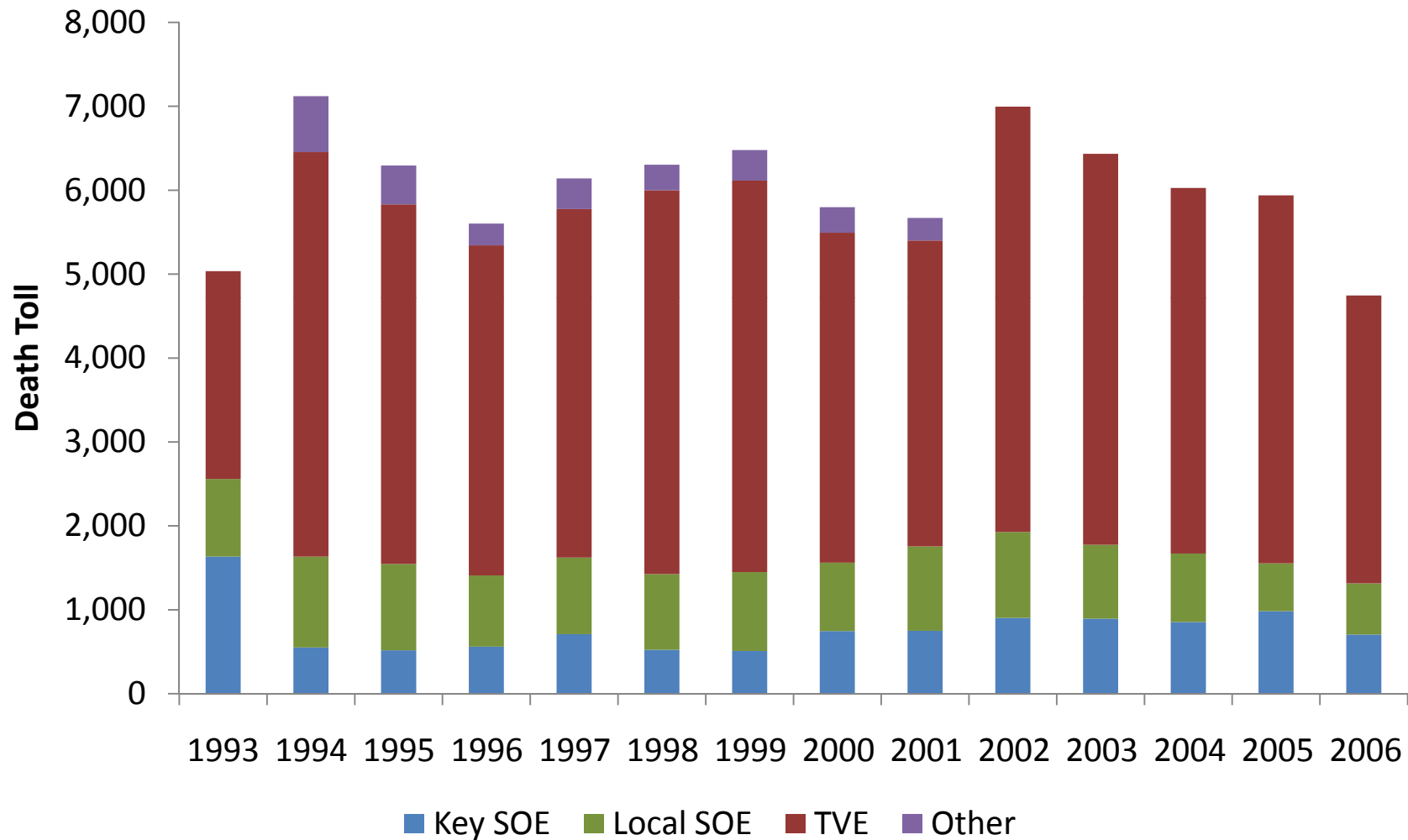
Source: Newcastle data from Reuters; Qinhuangdao Data from CCTD converted with exchange rate data from NY Fed.  
Newcastle coals are 6700 kc/kg , QHD coals are 5800kc/kg

# China Coal Industry and Air Pollution



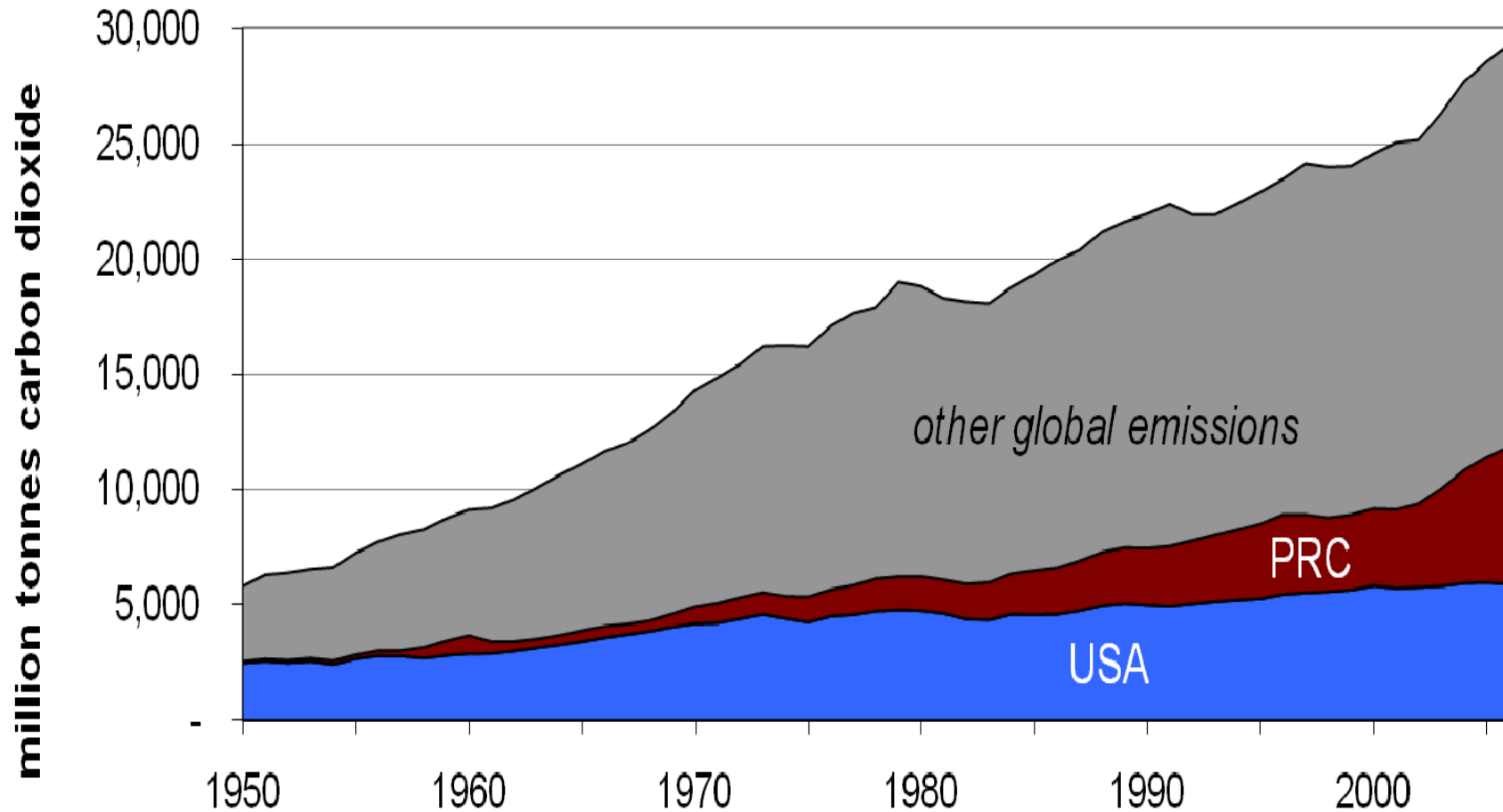
Source: X. Shi, Can China's Coal Industry be Reconciled with the Environment, China Dilemma, 2007

# High Death Tolls in China's Mines



Source: LBL China Energy Databook V7, 2008.

# Annual Energy-related Carbon Emissions in China have been Growing Rapidly since 2001

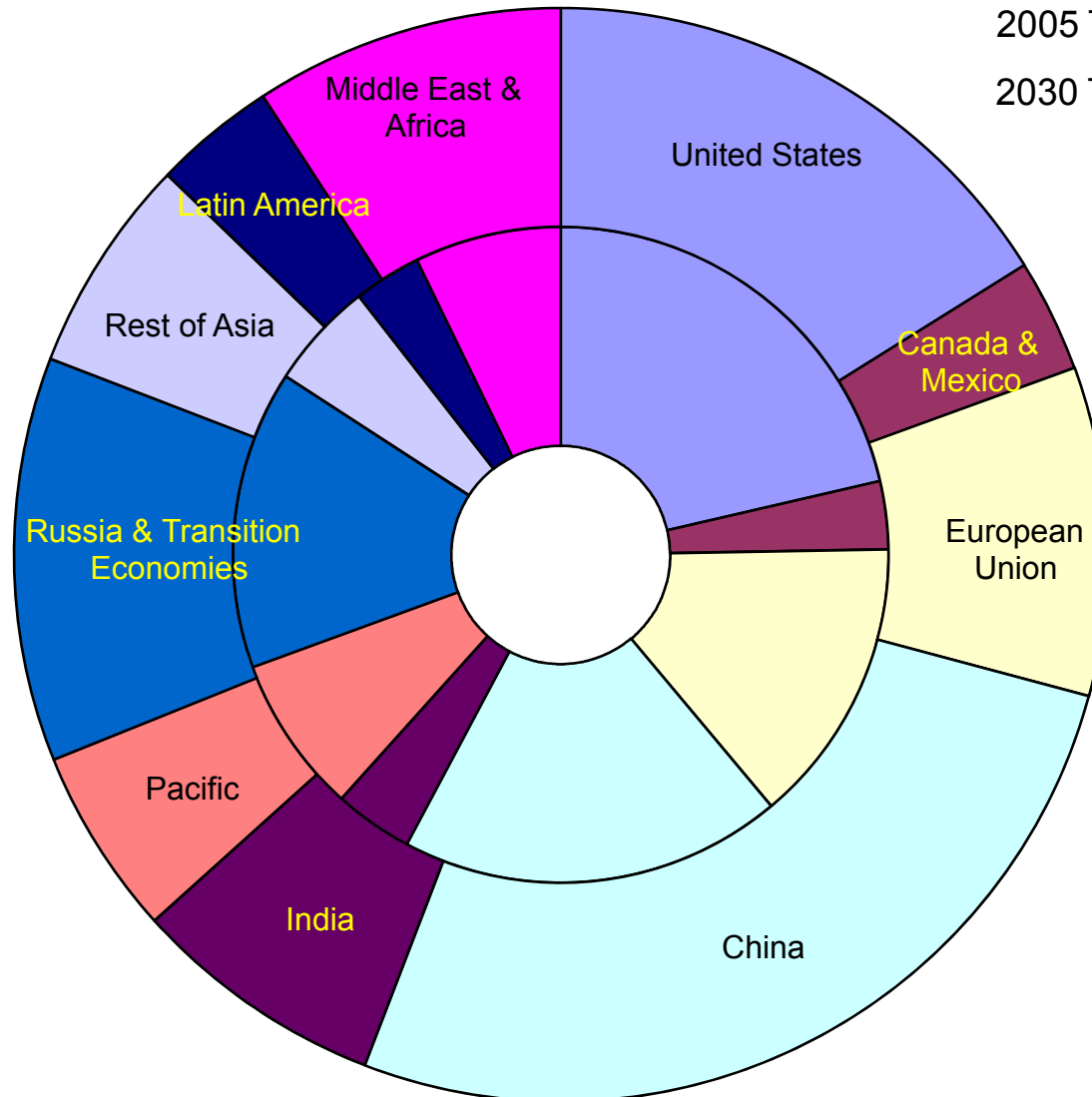


Source: Mark Levine, Myths and Realities, 2008.

# Projected Global CO<sub>2</sub> Emissions by Region

2005 Total (inner): 26.6 GtCO<sub>2</sub>

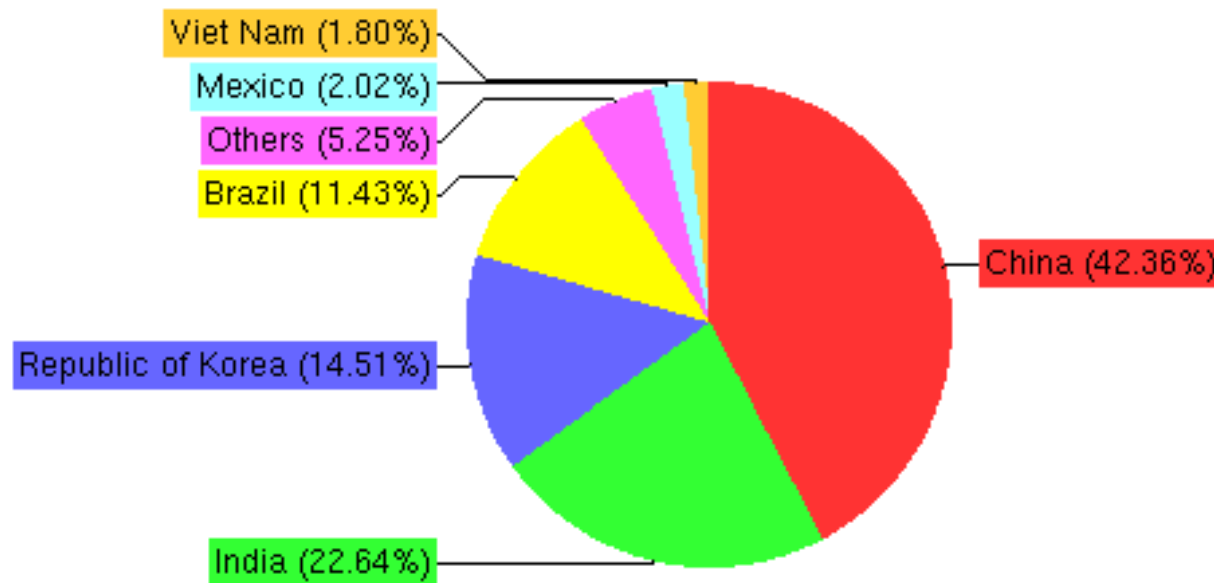
2030 Total (outer): 41.9 GtCO<sub>2</sub>



Source: IEA WEO 2007

# CERs Issued by Host Party

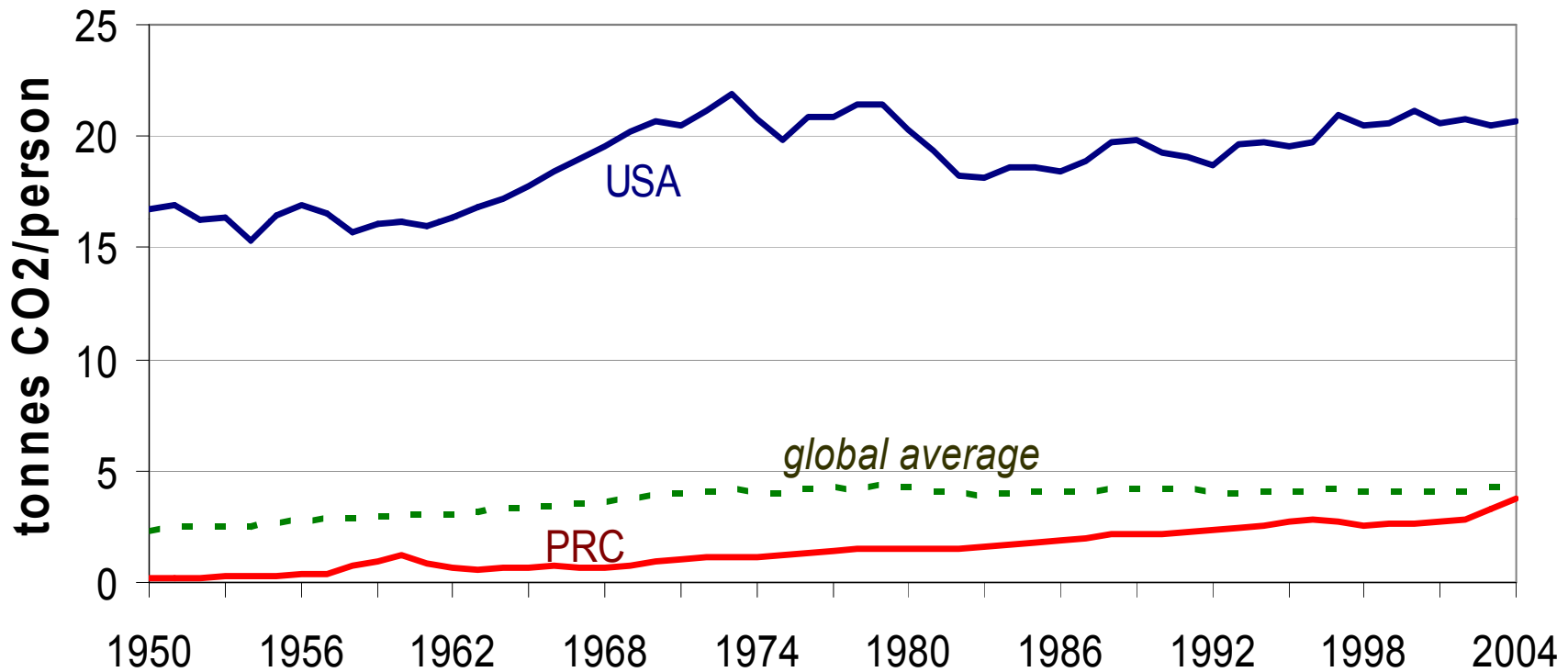
CERs issued by host party. Total 249,764,597



<http://cdm.unfccc.int> (c) 23.01.2009 14:55

Source: <http://cdm.unfccc.int/Statistics>

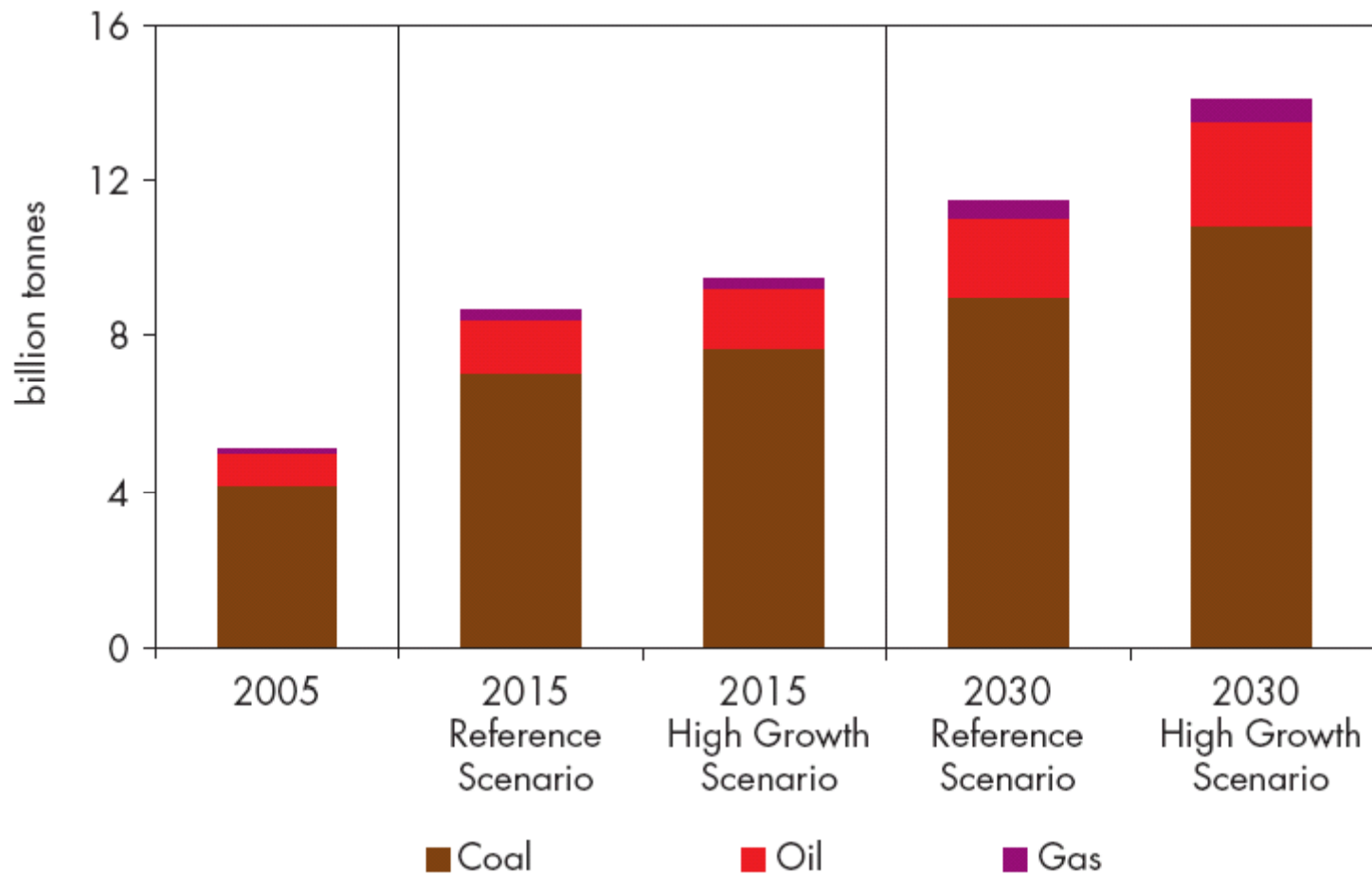
# Per-capita, China is Still About Average; U.S. is >4x Average



Source: Mark Levine, Myths and Realities, 2008.



# China's CO2 Emission in Reference and High Growth Scenarios



Source: IEA WEO2007

# What can the United States do to “engage” China?

- Trade and Technology: Engagement already very high
  - WTO; “clean tech” trade; power plant technologies
- China already single largest player in CDM
  - Yet practical impact appears to be very small
- Opportunities for more “deals” on carbon
  - Power plant efficiency; smarter grids; natural gas
- Faltering world economy is poor context for deeper engagement