

Understanding the Rise of China's Energy Markets and Governance



From Self-Sufficiency...
(Guizhou Thermal Coal Mine)



...to Import Tolerance
(Indonesian Thermal Coal to China)

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May 7, 2012

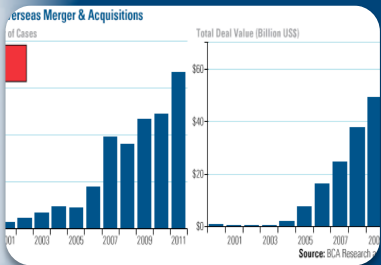
Outline



The Past: The World Energy Order
(sectoral analysis)



The Present: China's Energy Governance and Energy Security
(national analysis)



The Future: A Redefinition and Its Implications
(global analysis)

The Past: World Energy Order

1. Before 2002, what were the World's Top 2 Energy Producing Nations?
2. How long had they remained #1 and #2?
3. How long had #1 remained #1?

The Past: World Energy Order

1. Before 2002, what were the World's Top 2 Energy Producing Nations?

→ US and USSR/Russian Federation

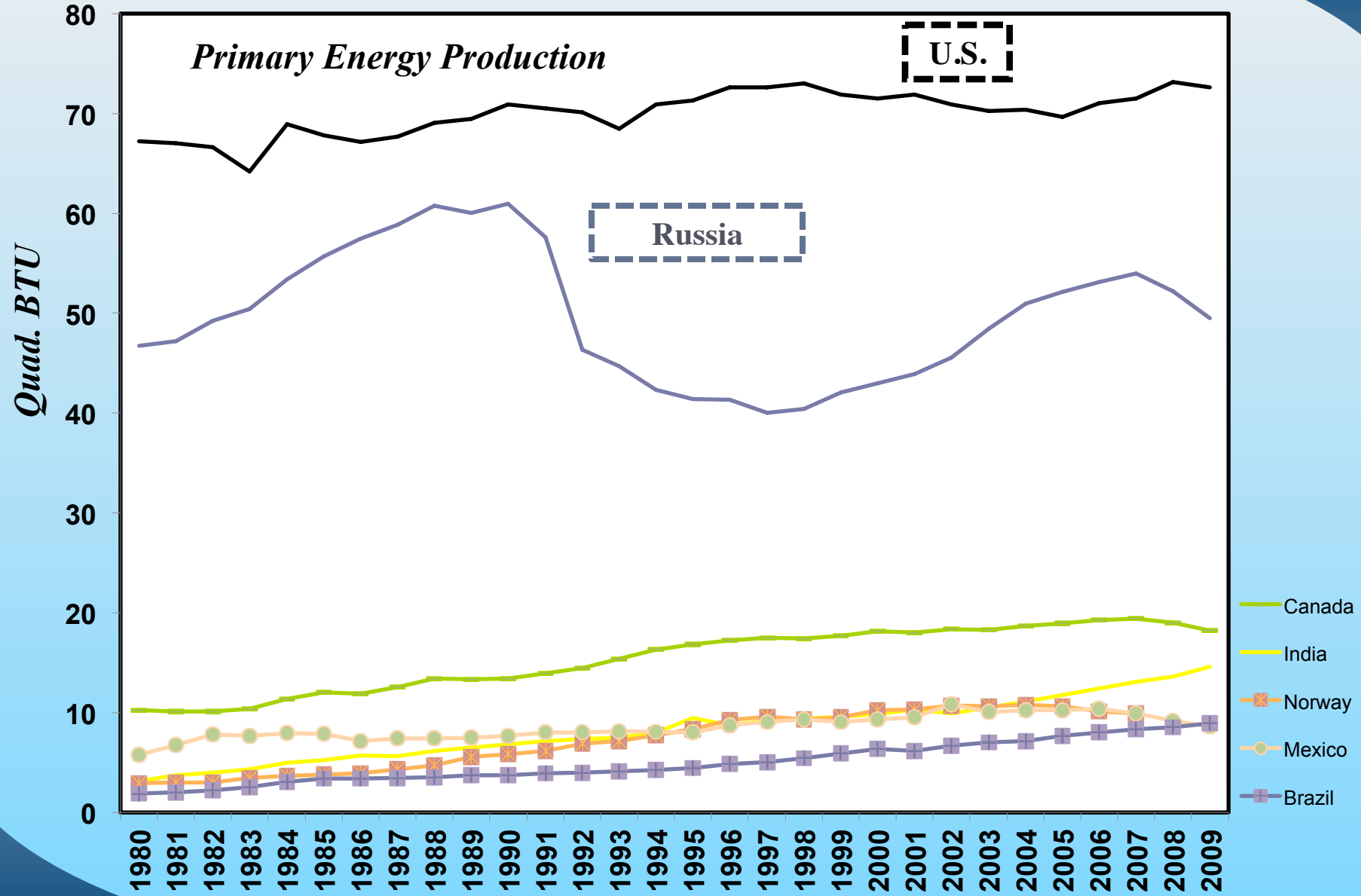
2. How long had they remained #1 and #2?

→ 53 years. USSR surpassed UK in 1949, China surpassed Russian Federation in 2002

3. How long had #1 remained #1?

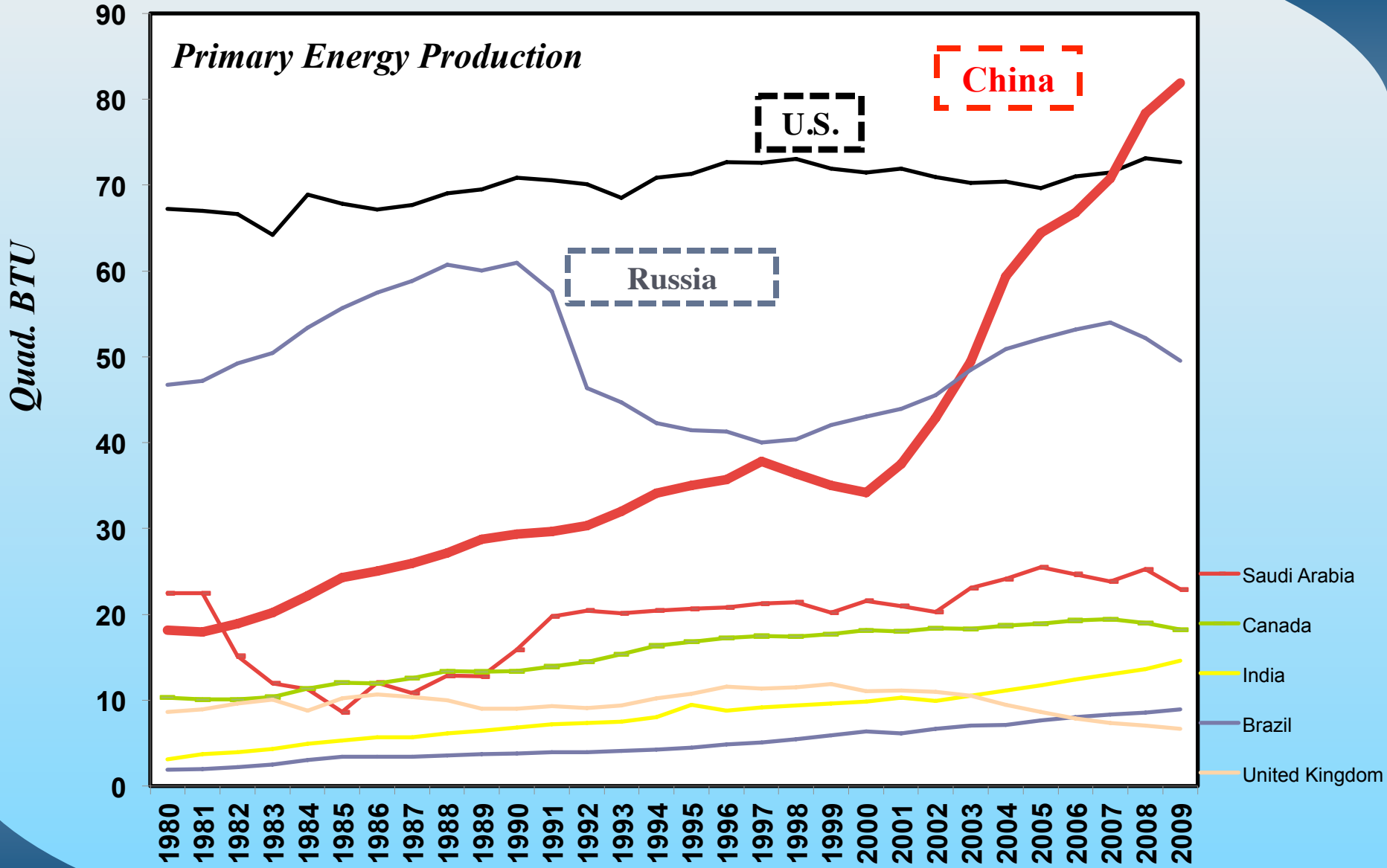
→ 113/14 years. USA surpassed UK in 1895, China surpassed USA in 2008/9

World Energy Supply Order: US led for 100+ Years



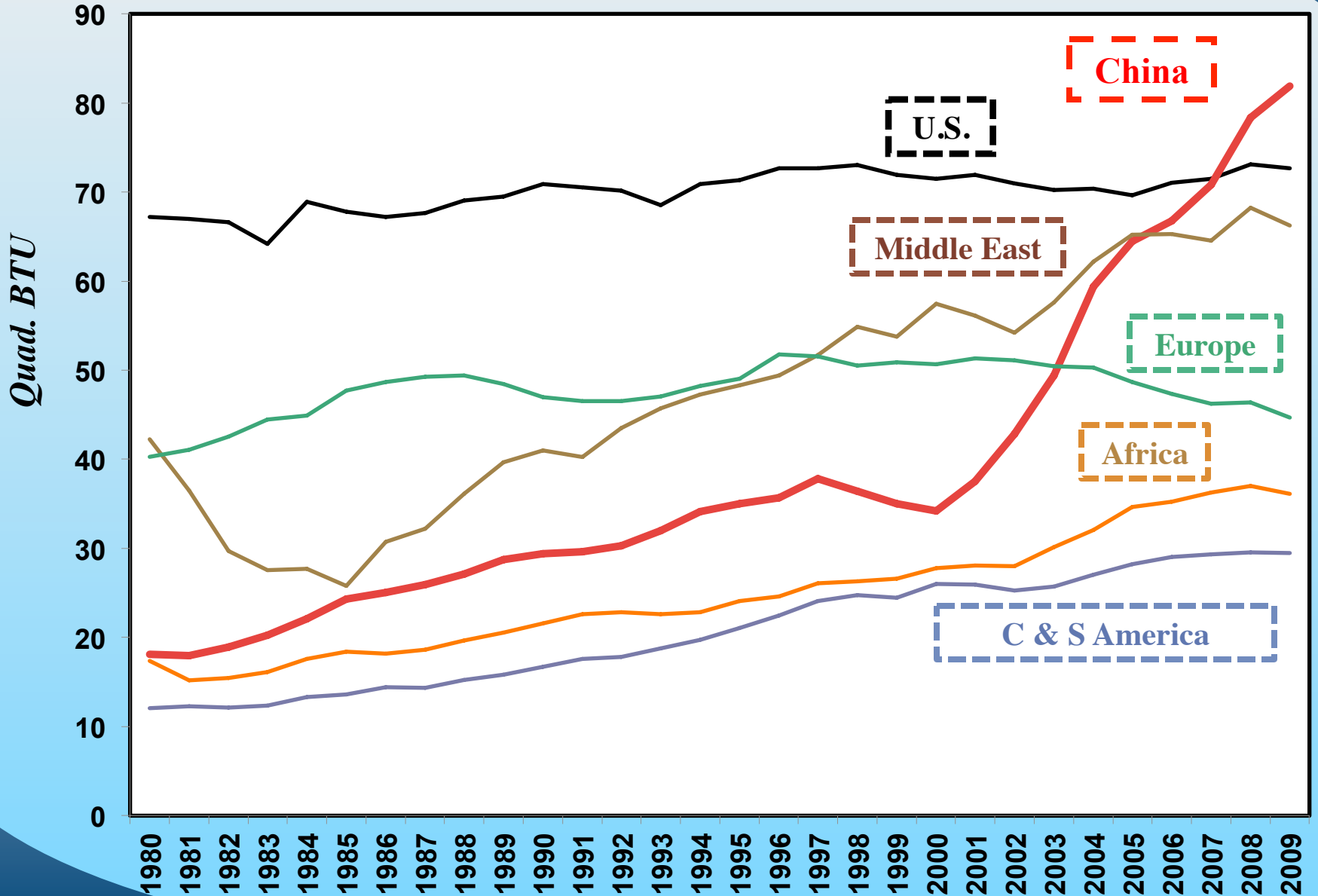
Source: EIA
Russia data in revision by EIA

This Order Overturned in 3 Decades



Source: EIA
 Russia data in revision by EIA

Regional Energy Supply Order Overturned



Source: EIA
Russia data in revision by EIA

The “China Share” - Demand Side

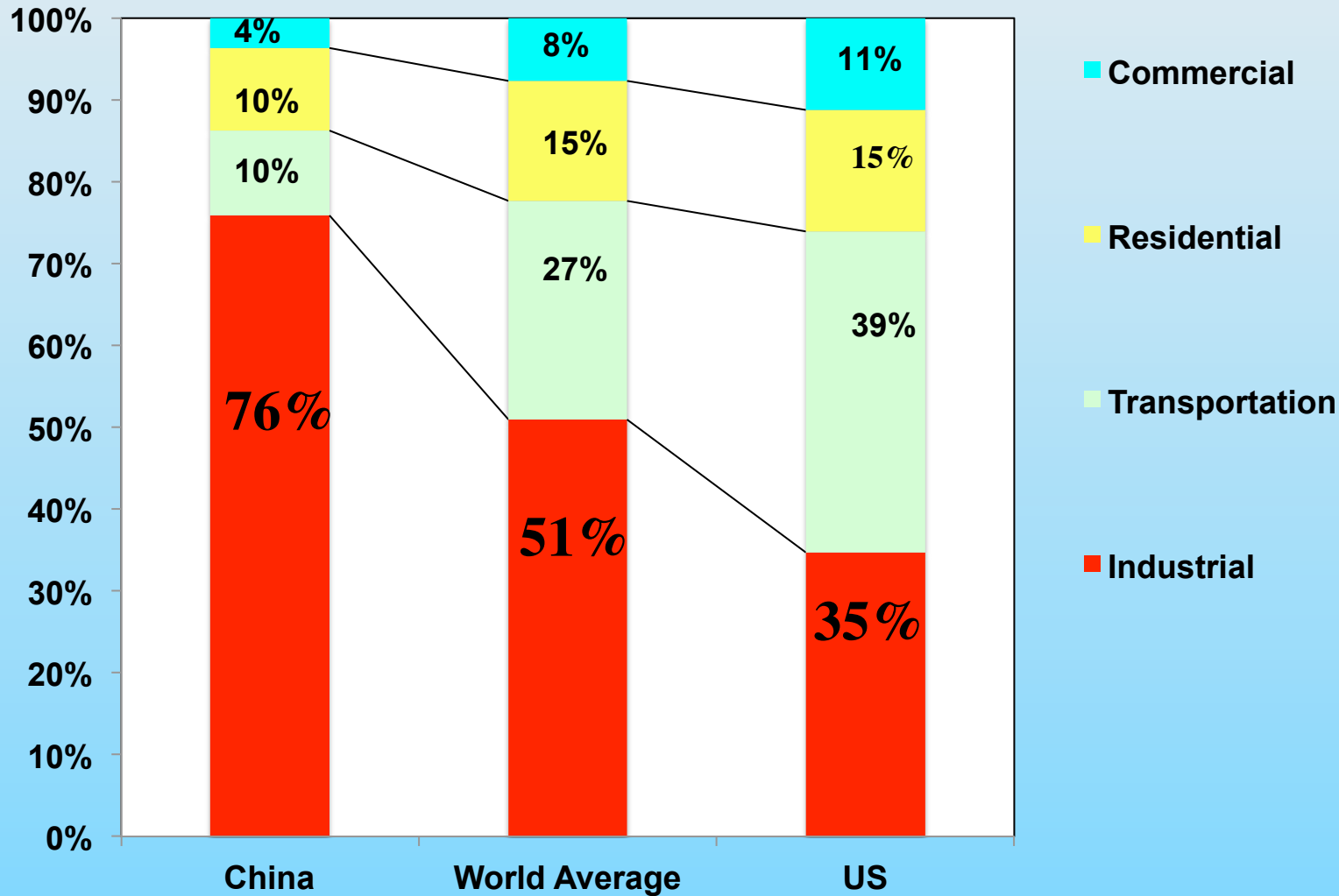
China’s Commercial Energy Consumption as % of World Consumption

		1973	1983	1993	2009	2000-9
Oil	China	2%	3%	4%	10%	<u>57%</u>
	US	30%	26%	25%	22%	
Gas	China	0.6%	0.8%	0.8%	3%	12%
	US	53%	33%	29%	22%	
Coal	China	14%	18%	28%	47%	<u>86%</u>
	US	21%	21%	23%	15%	

4 - 5x

Energy Demand Driven by Industry

Delivered Energy Consumption, 2006



Two Market Structures

Top Firm

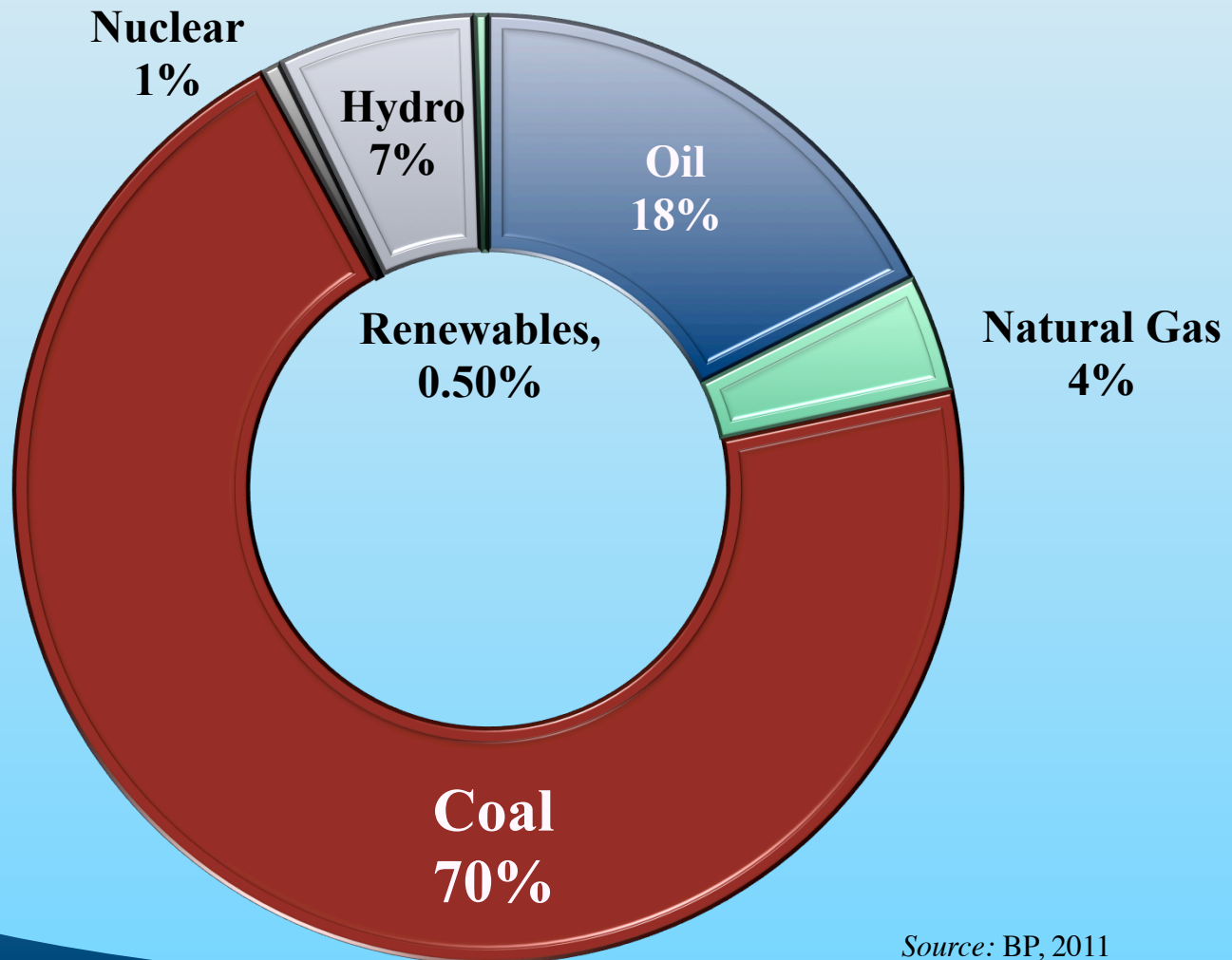
Share of Production in Respective Industry

	<u>1998</u>	<u>2003</u>	<u>2010</u>
CNPC (Crude Oil)	67.3%	64.5%	61.4%
CNPC (Natural Gas)	70.8%	72.9%	74.9%
Huaneng (Electricity)	2.4%	9.7%	11.8%
Shenhua (Coal)	0.6%	5.1%	6.9%

Source: Cunningham, "Fueling the Miracle: China's Energy Governance and Reform", in Fewsmith (ed.) *China Today, China Tomorrow* (2010).

The Present: Demand Met by Coal

Primary Energy Consumption
2010



Total Installed Generating Capacity 2011

Wind 2% Solar 2% Nuclear 1%

Hydro
22%

Thermal
73%

Total Generation 2011

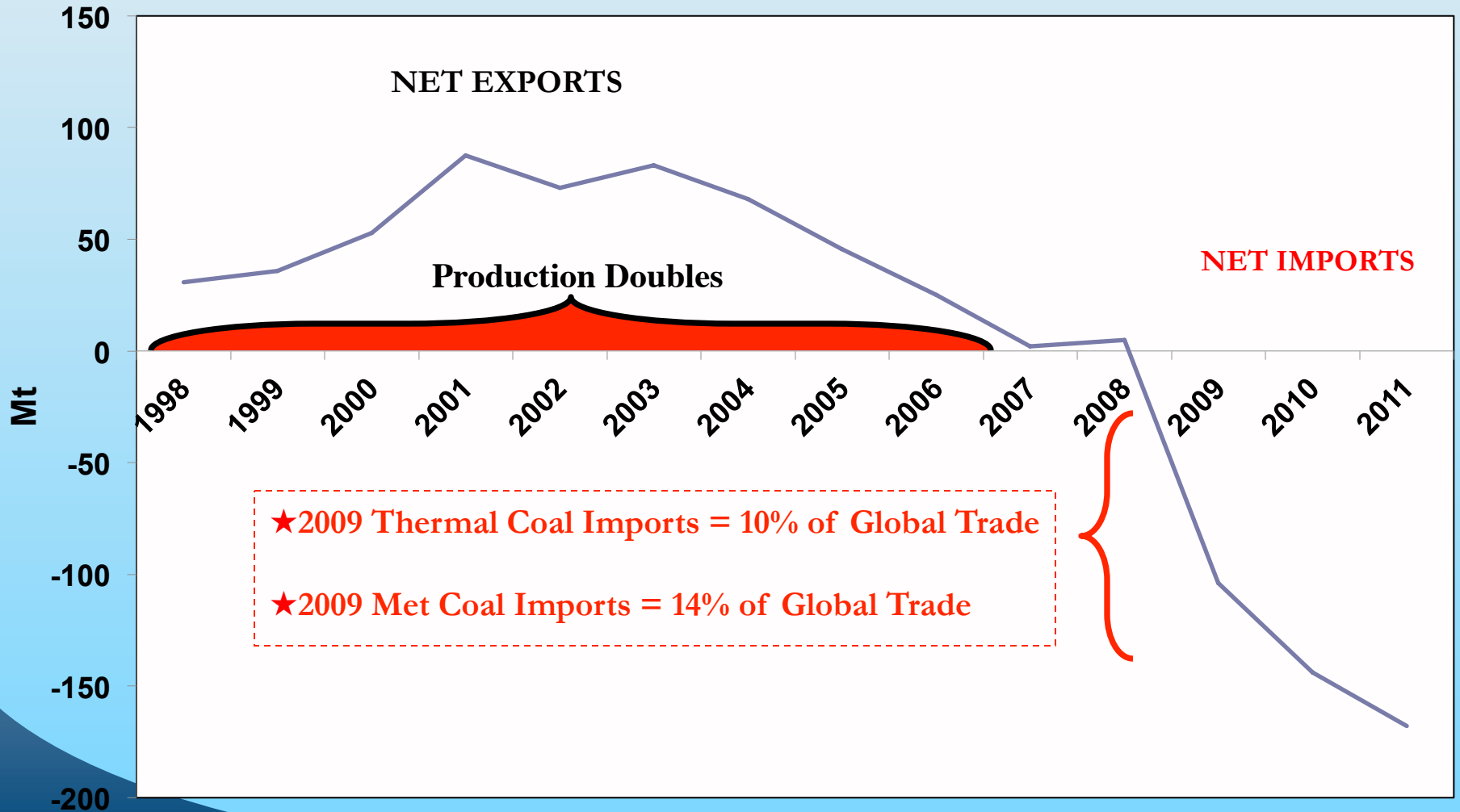
Nuclear 2% Wind 1%

Hydro
14%

Thermal
83%

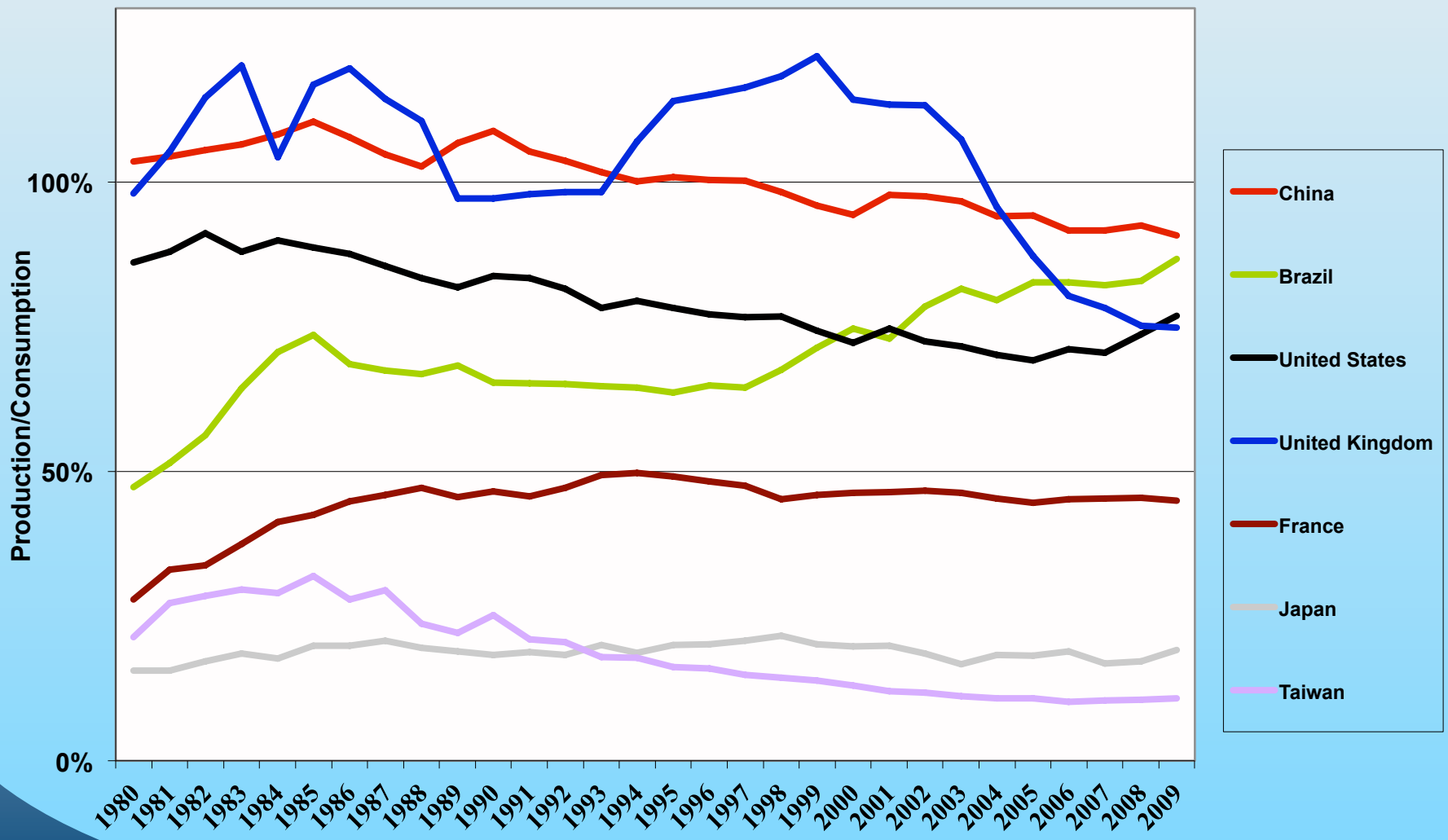
Such Growth Requires Imports...?

- In fact, China had been a net coal exporter 1966 – 2008
- Transformed from largest coal exporter to largest coal importer



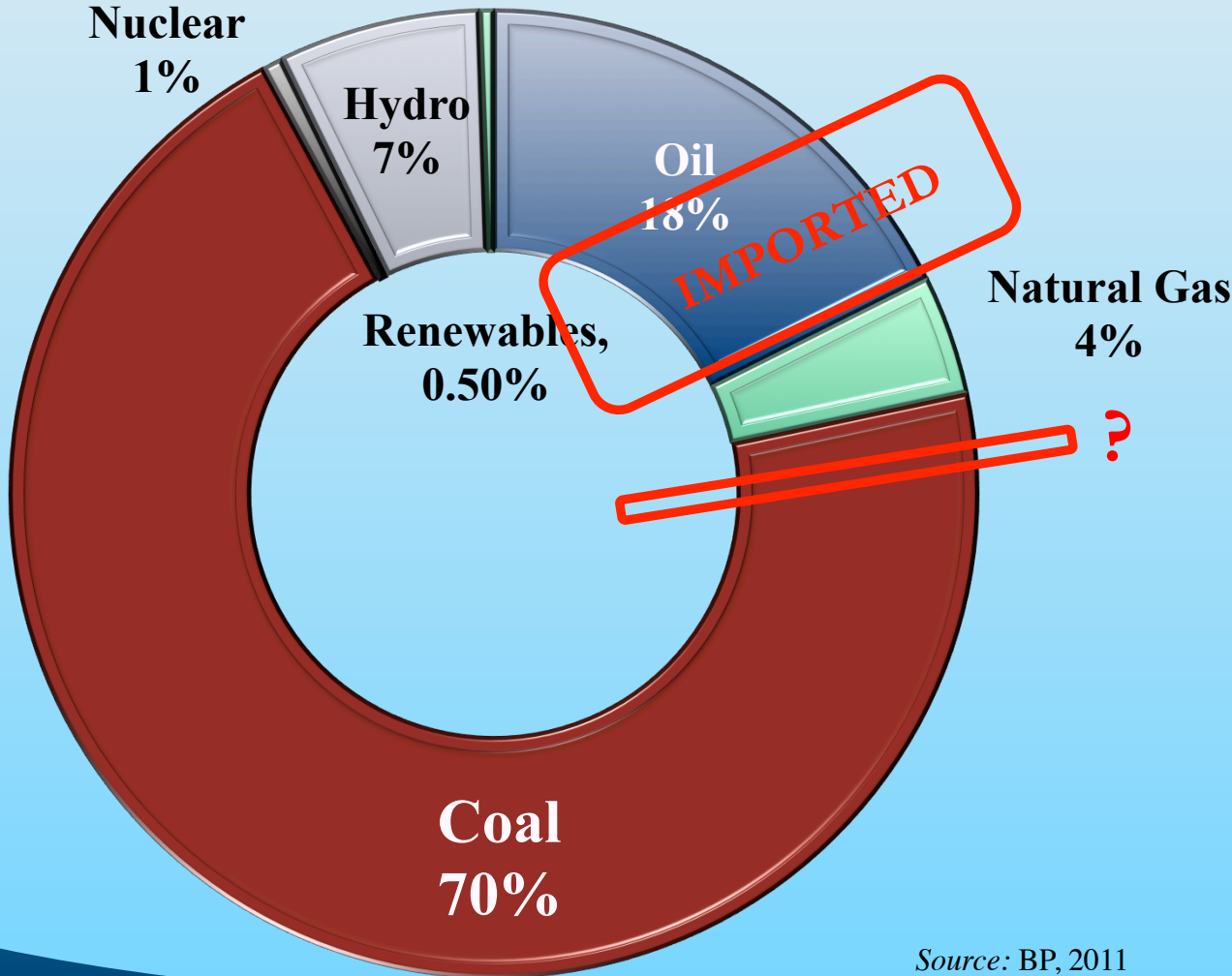
China Historically Energy Self-Sufficient

China remains > 90% Energy Self-Sufficient



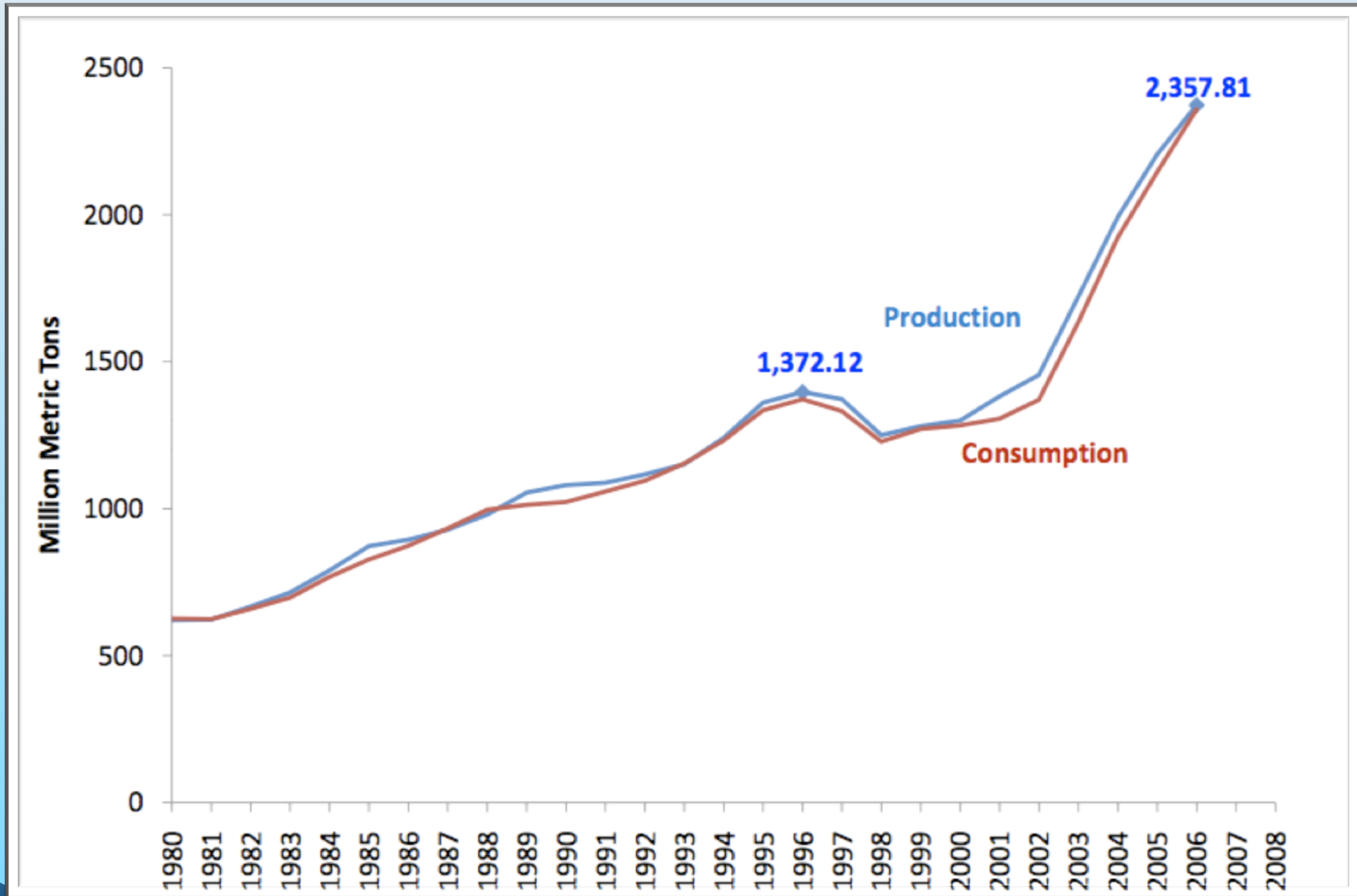
The Present: Demand Met by Coal

Primary Energy Consumption
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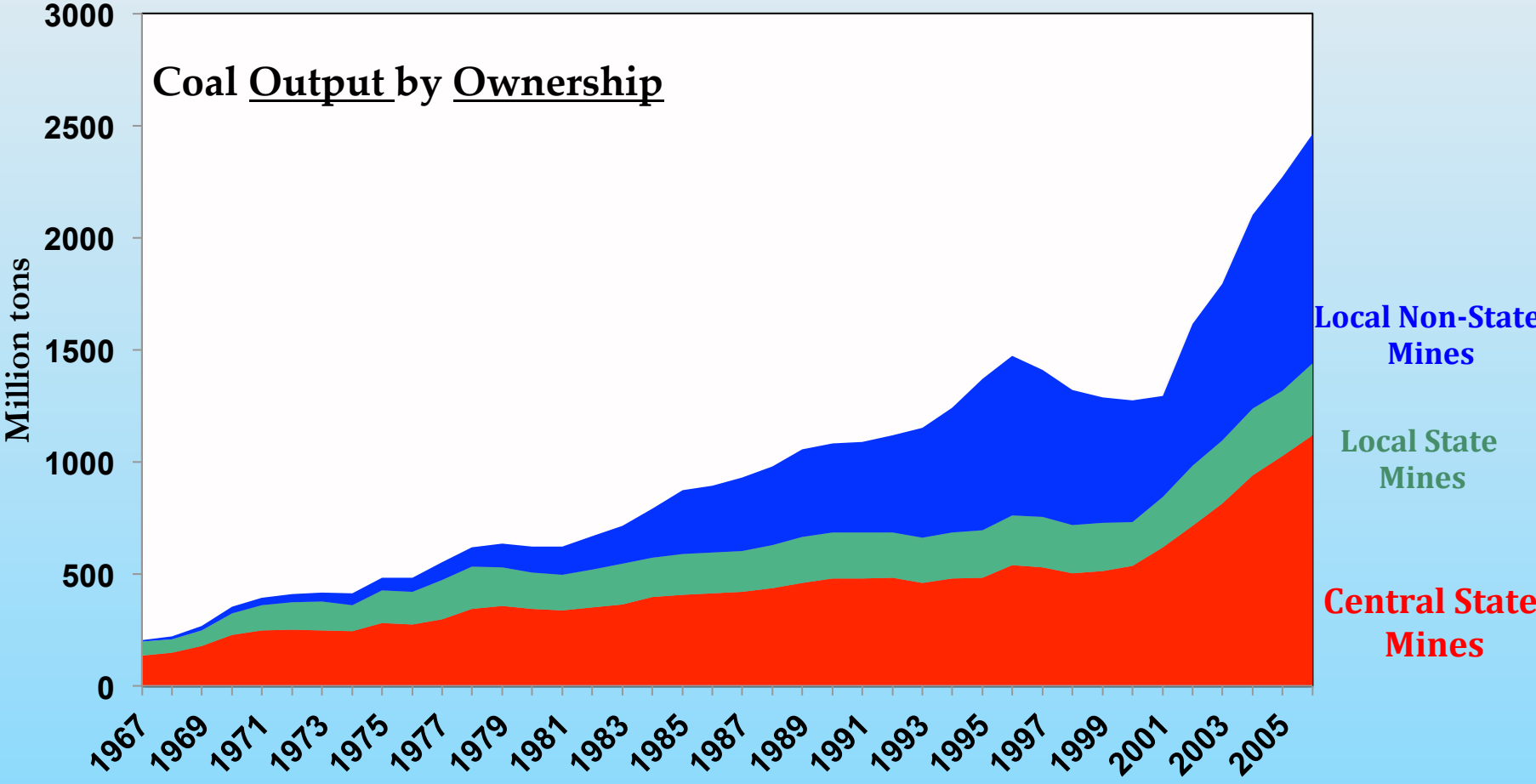


Source: BP, 2011

Coal Production has Historically Kept up with Demand – How?



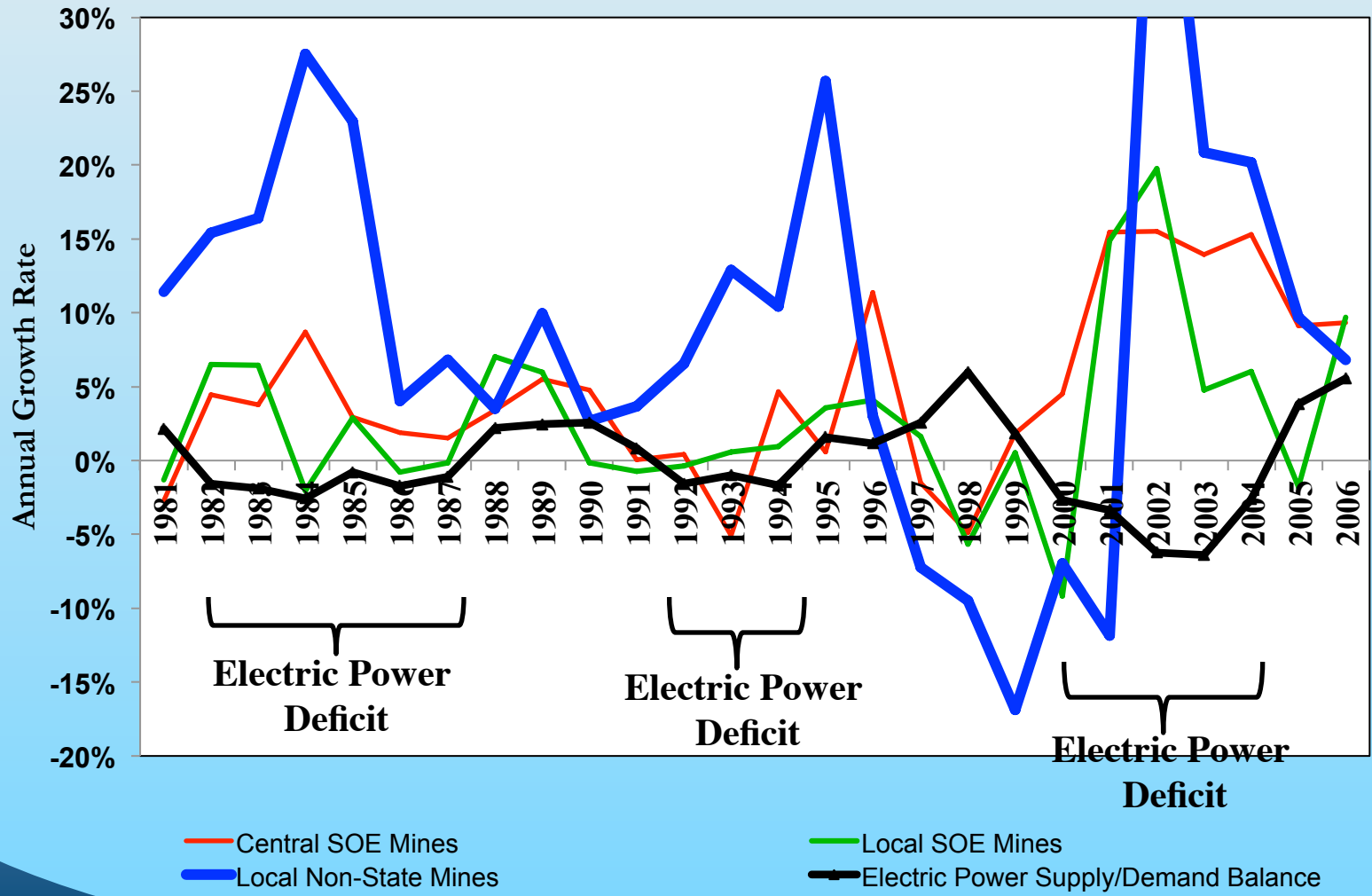
Majority of Energy Market Fragmented



Source: Supplemented by NBS and LBNL, China Energy Databook, 2008. NB: Data from 1998-2002 accounts for estimated unreported coal production from LNSM. See Kevin Tu, "Statistical Distortion and Value Chain of the Chinese Coal Industry", 2009.

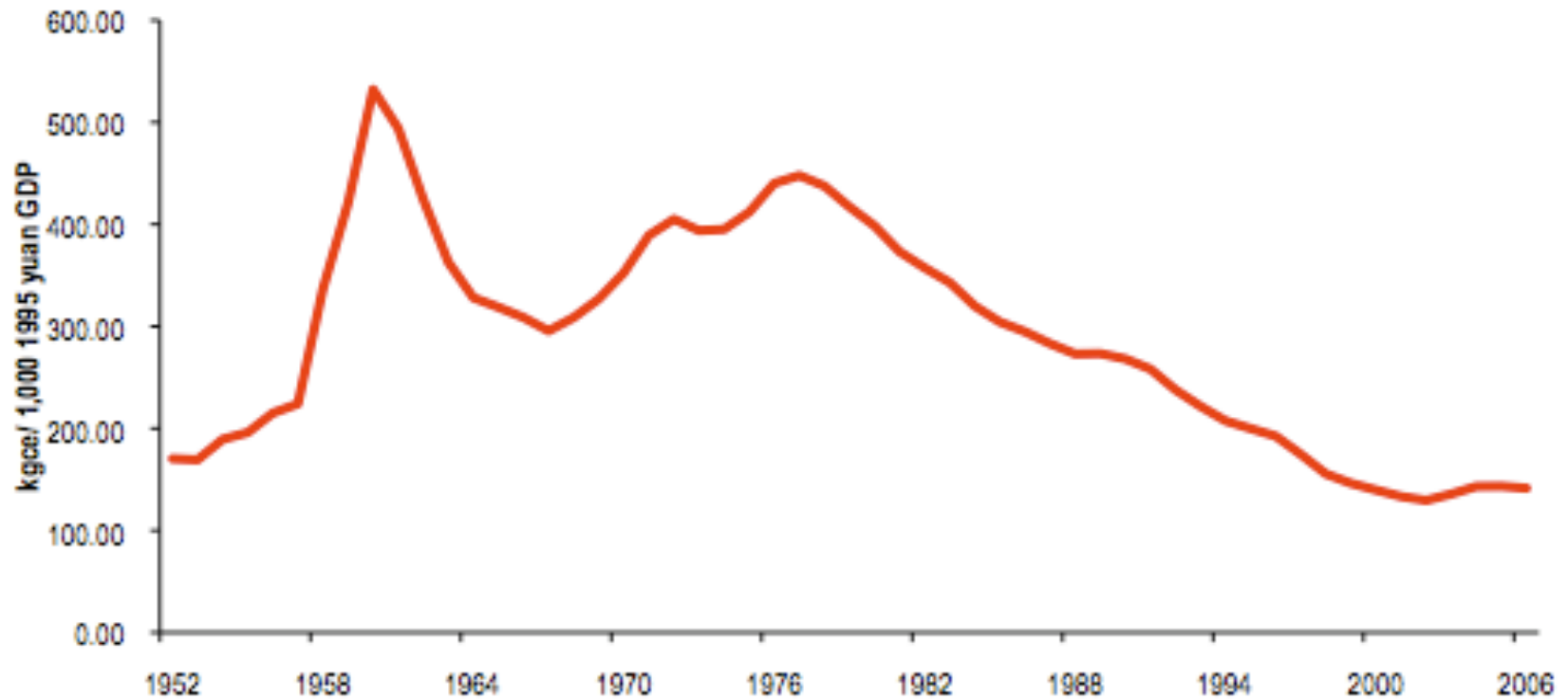
Local Non-State Mines as Cyclical “Shock Absorbers” during Demand Volatility

Electric Power Supply/Demand Balance and Coal Mine Growth by Ownership



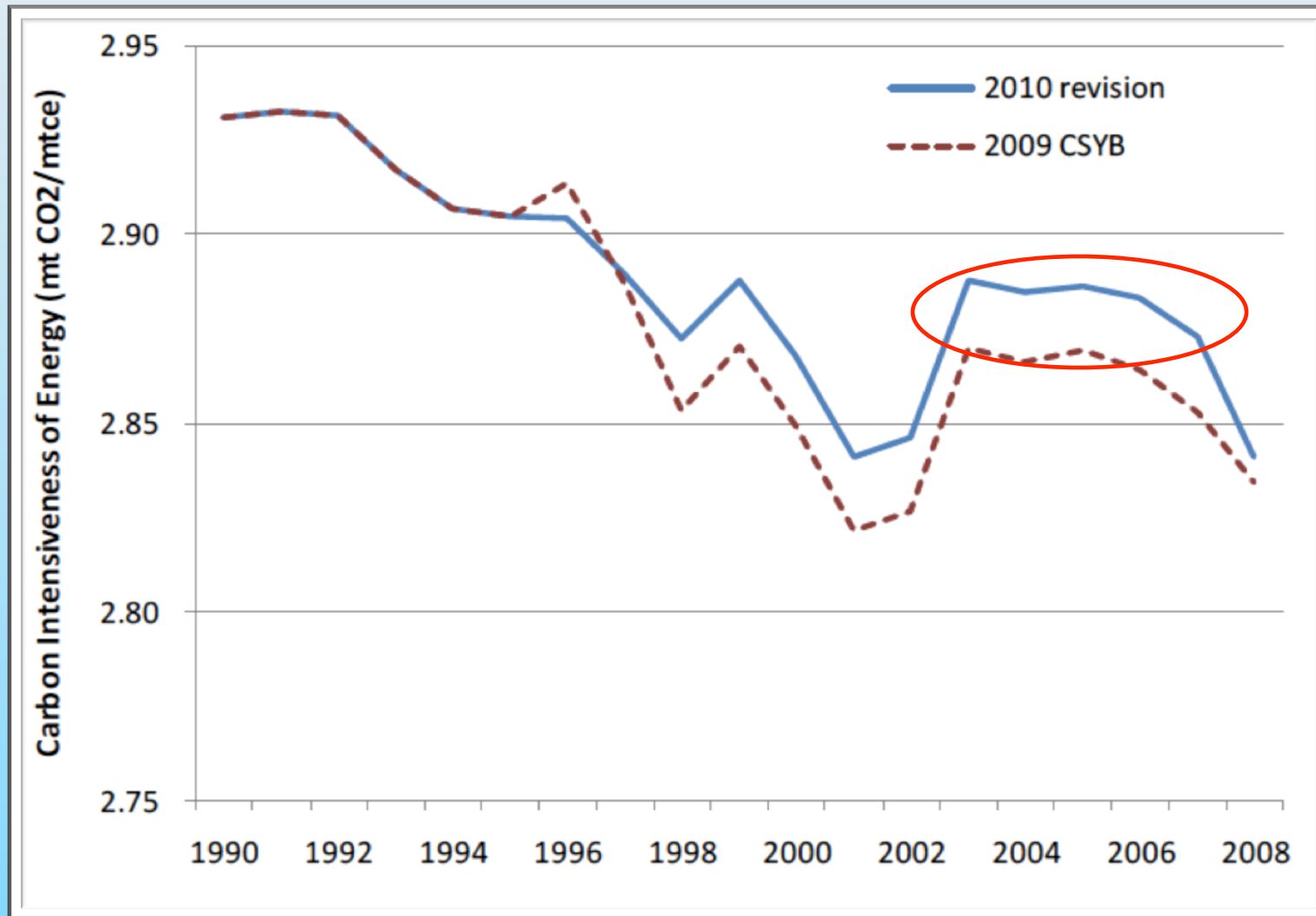
Source: LBNL, China Energy Databook, 2008; NBS Energy Yearbook, various years.

Energy Intensity Trend Change?



Source: LBNL, China Energy Databook 2008

Carbon Dioxide Intensiveness of Chinese Primary Energy Production



Source: Nathaniel Aden, "Initial Assessment of NBS Energy Data Revisions", LBNL 2011.

The Future:

A Redefinition of Energy Security

- Proved Reserves as % World Total (2009)
 - Coal: 14% (US: 29%)
 - Oil: 1% (US: 2%)
 - Gas: 1% (US: 4%)
 - R/P Ratio: Coal = 38 yrs; Oil = 11; Natural Gas = 29
- Shift to Coal Net Importer Status in 2008 (2011 >150 mt)
 - Energy Intensity Trend/Fiscal Stimulus
 - 11th FYP plant shutdown (60GW) = China's Capacity 1985/size of Mexico Capacity/13th largest nation
 - Estab. Strategic Coal Reserves (Wuhan)
 - Removal of Export Incentives beginning 2008
 - Oil Import Diversification viewed as Successful
- 12th FYP: Re-evaluation of US Model, Focus on Energy Imports and "Protective Resource Policy"

Summary

1. China's definition of energy security has changed

Self-Sufficiency being replaced by market exposure. In turn, China is enabling coal to become an increasingly global commodity, potentially reinforcing this shift

2. Reinforcing Trends

- RMB appreciation (recent interest rate hike)
- Concern re: Shifting Coal Reserve Composition
- Closing of small mine production
- Continued stagnation in Europe and US coal markets – lowered price
- Significant port expansion, Rising input costs in sector
- Oil import patterns viewed as security success

3. Moving forward, China has tested world oil supply lines, and is testing world coal supply lines, which have proven surprisingly flexible

- China accounted for 3% of Australia's met coal exports in 2008 (4 mt), and 17% in 2009 (34 mt). Value jumped from \$500 million to \$5 billion.

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As a research-based collaboration among the Ash Center, the Belfer Center, and the Sustainability Science Program, AESI marshals the expertise of three preeminent Harvard Kennedy School research centers to study the drivers of change in energy markets and energy sustainability in Asia. In particular, the Initiative leverages the Ash Center's depth in the study of governance and policy innovation in Asia, the Belfer Center's expertise in energy technology and energy policy, and draws on the Sustainability Science Program's system-based analysis of sustainable development.

Asia: The Major Player in the Global Energy Market

The Asian region is home to the majority of the world's population and several of the world's most rapidly developing economies. Economic development at such scale and speed has required the related development of considerable energy supply. Asia as a region now dominates the global



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