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# The Power Sector in China: What a difference two years can make ... or not

New England Conference of Public Utility Commissioners  
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Frederick Weston

睿博能源智库

**The Regulatory Assistance Project**

北京市朝阳区建国门外大街19号国际大厦2504室

邮编: 100004

电话: +86-10-8526-2241

[www.raponline.org](http://www.raponline.org)

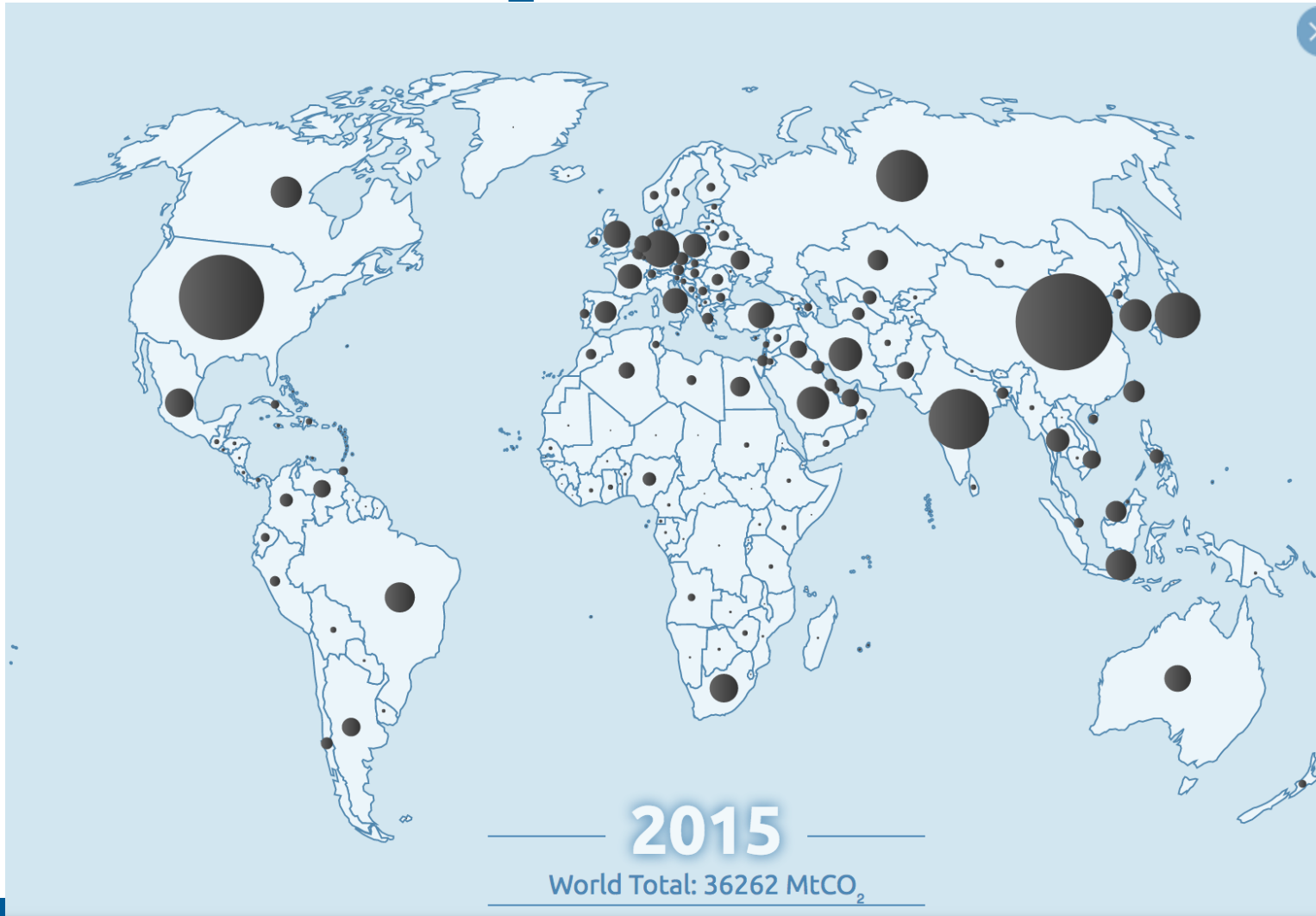
Beijing, 12 October 2007, 2:33 PM



# Cocktail Party Fun Facts

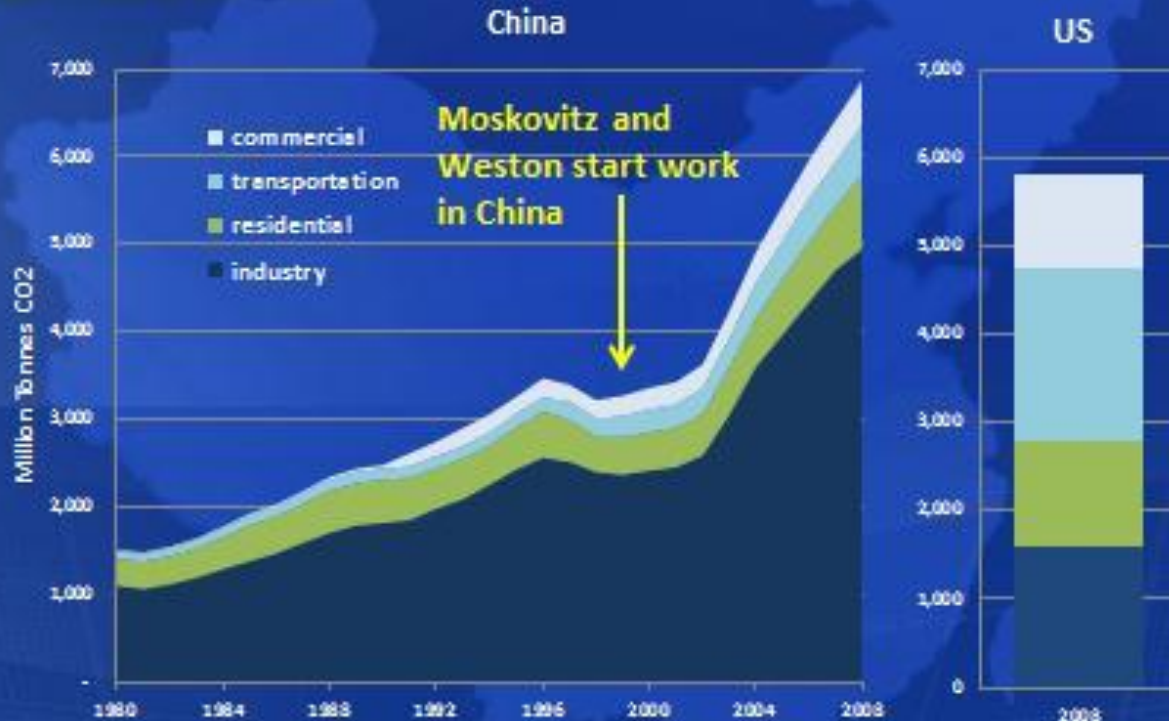
- Annual global coal consumption: 8.7 billion short tons
- 50% in China
  - Half for industry and heating
  - The other half for electricity
- Global CO<sub>2</sub> emissions totaled roughly 36.2 billion tonnes in 2015—virtually the same amount as in 2014 and 61% higher than in 1990.
  - The lion's share of that jump came from increased energy consumption in Asia—in India and mostly China
- China produces 29% of global CO<sub>2</sub> emissions
- The US is number two at 14%
  - We still win when it comes to per capita emissions

# CO<sub>2</sub> Emissions



# Post hoc ergo propter hoc

## Even Faster Growth in CO2 Emissions



Source: EIA, Annual Energy Review, 2008, <http://www.eia.doe.gov/emeu/aer/overview.html>; EIA, Emissions of Greenhouse Gas Report, 2008, <http://www.eia.doe.gov/olar/1605/ggrpt/carbon.html>; NBS, China Statistical Yearbook, various years; The 2009 China Energy Statistical Yearbook; Carbon dioxide emissions of China are calculated based on reported fuel shares of total primary energy consumption and IPCC carbon emission factors; China Energy Databook, v7.



# When last we saw our heroes (June 2015)

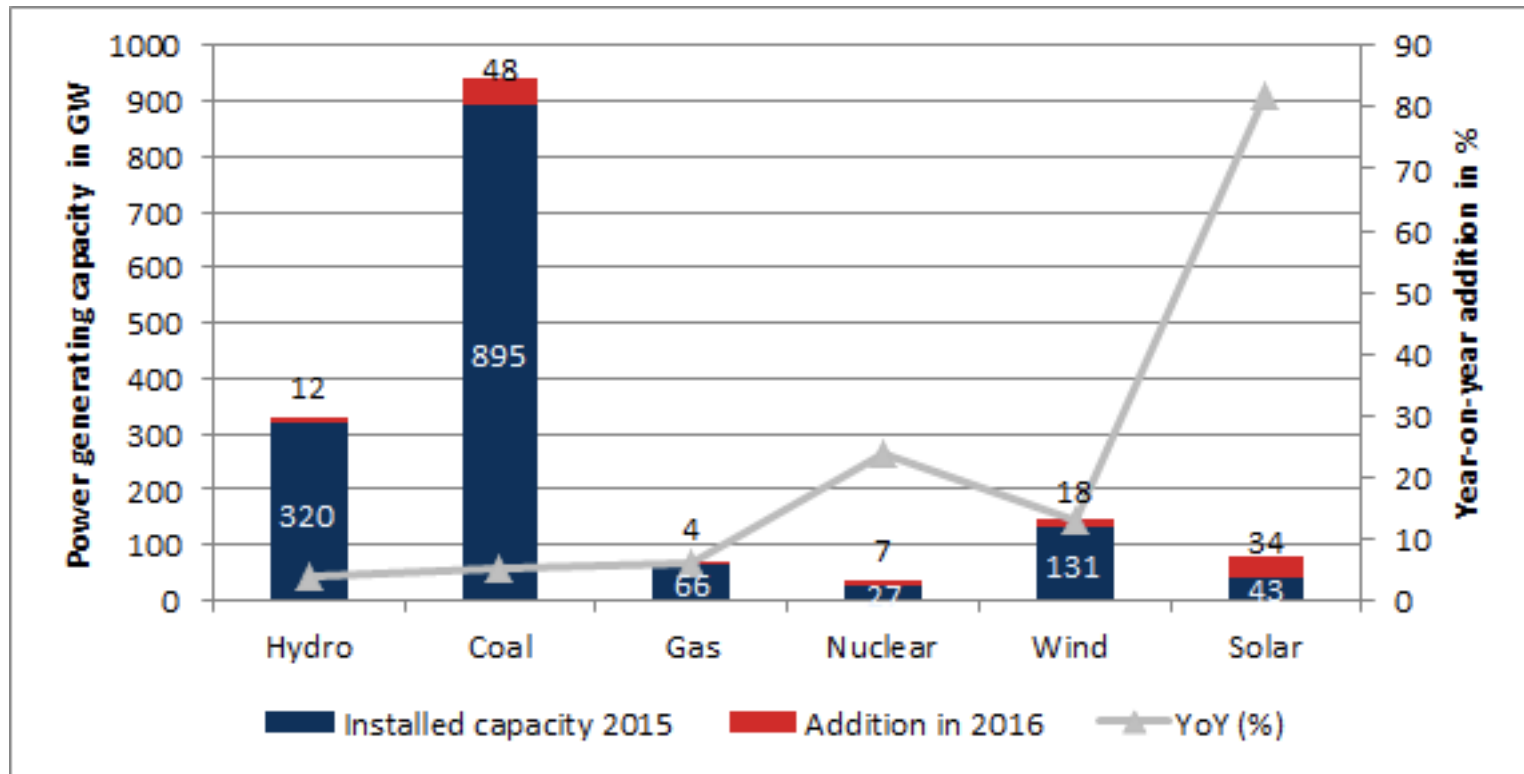


# China's Power Sector:

## Much the same as it was in 2015, only bigger

- Two grid companies: State Grid (85%) and China Southern Grid (15%), both state-owned
- Five major state-owned generators, with 50% of installed capacity
  - The rest belongs to provincial and muni power companies, and to RE developers (also mostly state-owned)
- Total capacity was 970 GW in 2010 and topped out at >1,600 GW at the end of 2016, a 70% increase in six years
  - ~125 GW of new capacity—mostly unneeded—were added in 2016
  - Avg. thermal utilization rates down 200 hours/year, to 4,165 hours/yr
- Total consumption in 2016: 5,920 TWh
  - Industry 70%, households 14%, the rest commercial and agricultural
- Regulatory jurisdiction (both energy and environmental) is split (opaquely) between the provincial and central governments, but the central government has the final say
  - Provinces are given freedom to experiment with reforms, which, if successful, can become national policy

# 2016 Generation Portfolio





# March 2015: Document #9

## “Deepening Power Sector Reform”



- State Council-Communist Party joint statement:
  - The need for reliability;
  - Use of market mechanisms;
  - Protection of residential and agricultural consumers;
  - Energy savings, emissions reductions, and increased use of renewable and distributed generation; and
  - Better governance and regulation, including better planning and strengthened regulatory capacity

# Reform Progress?

- *Regulation*: Revenue-caps piloted in Shenzhen is now national policy
- *Direct access*: Large users bypass gridcos, buy directly from suppliers
  - Buyers & sellers screened for efficiency and environmental performance
  - Monthly & annual contracts give discounts from wholesale tariffs
- *Demand response*
  - Funded by government payments to end-users, not through the market
  - No link to wholesale market prices because there is no economic dispatch or market
- *Dispatch*: “Equal shares dispatch”
  - Unit commitment to assure annual operating hours (e.g., 4,500) and thus capital cost recovery, not to minimize total operating cost
  - No imbalance trading
- *Renewables*: Most investment in solar and wind in the world
  - But very high rates of curtailment (>25%), because of dispatch rules & no interprovincial trading
- *Power sector planning*: No least-cost integrated resource planning

# China's Energy & Environmental Goals

- Carbon intensity reduction by 40-45% from 2005 levels by 2020
- By 2020, 15% of China's primary energy needs will be served by renewable resources.
  - Wind from 31 GW in 2010 to 100 GW in 2015, 150 in 2017, and 200 by 2020
  - Solar from 0.86 GW in 2010 to over 35 in 2015 and 70 GW by 2017.
- China will reduce coal consumption as a percentage of primary energy to below 65% by the end of this year
  - Absolute caps on coal consumption in the three most populated regions of the country: Beijing and environs (Jing-Jin-Ji), Shanghai and the Yangtze River area, and the Pearl River Delta (southern China surrounding Guangdong)

# November 2014: Xi-Obama Agreement

- US to cut greenhouse gas emissions 26-28% below 2005 levels by 2025.
- China to hit a peak in its carbon dioxide emissions by 2030—possibly sooner—and to increase the non-fossil fuel share of energy to around 20% by 2030.
  - Modeling shows that a peak in carbon emissions must be preceded at least five years earlier by a peak in coal consumption

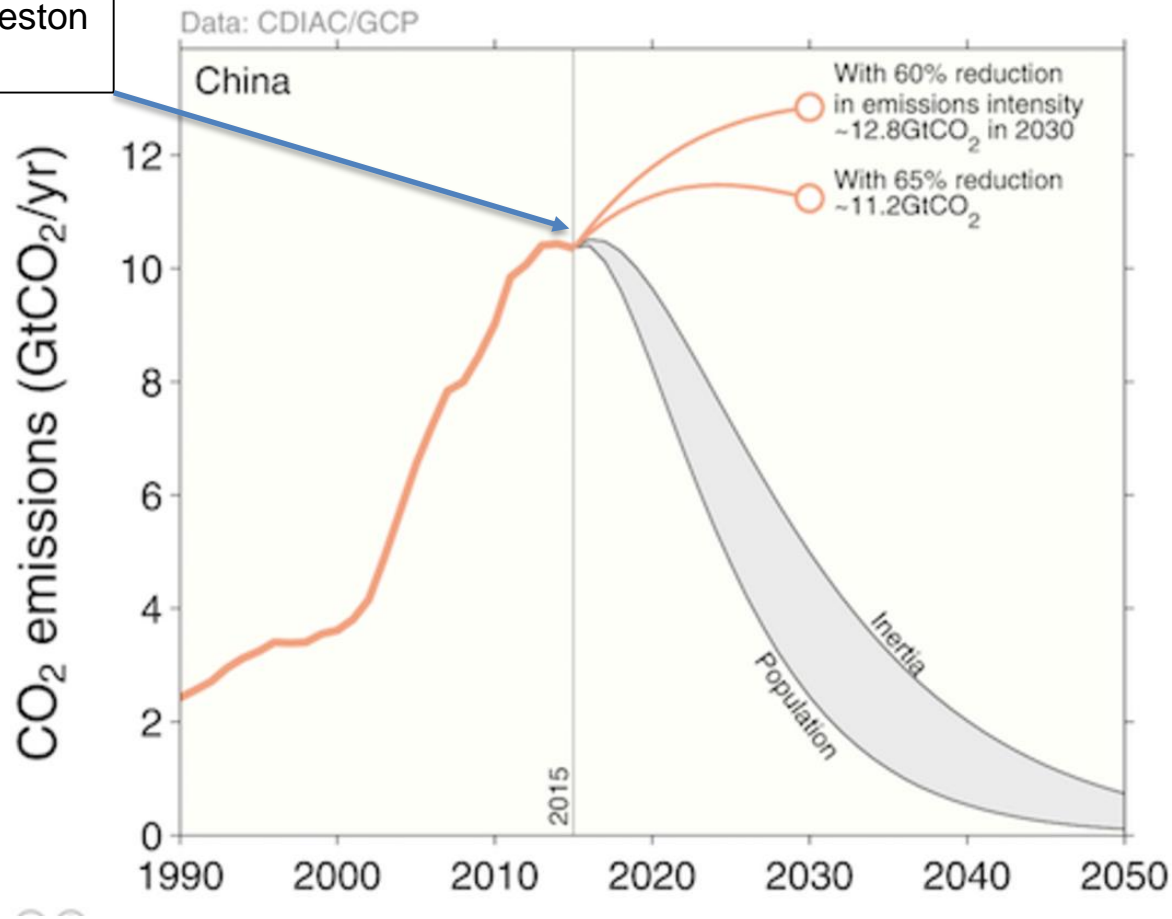
# September 2015: The Second Xi-Obama Agreement

- Reaffirmation of US and Chinese post-2020 commitments to reductions in GHG emissions in lead-up to Paris
- China:
  - National CO<sub>2</sub> emissions trading
  - “Green” dispatch
  - Green buildings
- US:
  - Clean Power Plan



# Et Voila! Chinese CO<sub>2</sub> Emissions: Pledges, Peaks, Needs?

Moskovitz and Weston  
leave China?



# The beginning of a beautiful friendship?

- China and the EU to step into the breach?
- Premier Li Keqiang last Thursday: "Step by step, and very arduously, together with other countries, we will work toward the goals set."
- But on Friday, China and the EU did not release a joint statement on climate change, because of a trade policy dispute.

## FINANCIAL TIMES

THURSDAY 11 JUNE 2017 WORLD BUSINESS NEWSPAPER

### FT view: the safer bet

Theresa May has looked brittle but is best placed to lead Brexit — PAGE 10



No future in plastics  
Financial engineers reformulate big chemical groups — JOHN GAPPER, PAGE 11

### The no-show Parties debate without May

Jeremy Corbyn, second from left, with six other party representatives on last night's live BBC televised debate, which Theresa May refused to join.

The Labour leader confirmed his decision to participate just hours before the debate, according to Sky News' "leading" opinion polls, have shown the Conservative party's lead narrowed. The Tories were represented by Andrew Burt, home secretary. Mrs May said she regretted her failure to participate and wanted to spend the campaign "taking questions from the public".

Electoral experts pages 2 & 3  
Editorial Comment page 10  
Leopard page 10  
Brexit watch news online page 20



## China and EU seal climate pact as doubts rise over US commitment

Resolve to counter any Trump retreat from Paris deal President vows to decide this week

**PLA KANG**  
ENVIRONMENT CORRESPONDENT

China and the EU have forged a green alliance to combat climate change and counter any retreat from international climate activity by Donald Trump.

In a stark realignment of forces, driven by the Paris climate agreement, Beijing and Brussels have agreed measures to accelerate what they call the "irreversible" shift away from fossil fuels and the "historic achievement" of the Paris climate accord.

Their collaboration is to be revealed tomorrow at a summit of EU leaders in Beijing, China's president, in the same week that Mr Trump has said he will end months of indecision over whether to sign the US version of the Paris deal.

The seven countries that signed a

summit in Italy that ended with Mr Trump at Nagasaki with other leaders on the Paris agreement and trade.

The move moved international climate activity by Donald Trump.

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## City watchdog calls on asset managers to outline Brexit contingency strategies

**HADISON HARRIS**

The UK regulator has written to several of Britain's largest asset management companies requesting detailed information on their Brexit contingency plans as concerns mounts over the impact of the EU divorce process on the City of London.

The Financial Conduct Authority's letter contains 20 questions on the firm's Brexit contingency plans, including whether or not UK-based companies are planning the relocation of operations to the EU.

Asset managers have also been asked to explain whether their Brexit contingency plans will affect their capital base, IT systems, whether they have applied for new licenses from foreign regulators and to what extent bond investors are responding to Brexit bond

on how other companies react. "It is important for us as supervisors to understand the plans that our regulated firms have regarding Brexit," the FCA said. "This was a formal data request and was not designed to intimidate any further work."

The firm's letter is a general request for the UK investment industry, with asset managers divided on how best to prepare for the departure from the EU.

Some firms, including British and Continental European banks, plan to set up new entities in mainland Europe in response to Brexit, while International Capital Group and MetLife have already strengthened their presence in Luxembourg.

Other asset managers, including

Shandor and Aberdeen, have held back from making operational changes before receiving more clarity on British financial regulatory rules.

Last week, Martin Gilbert, Aberdeen Asset Management chief executive, said that if leaving of euro securities and pricing of other assets moved from the UK to other EU countries, his group would need to reassess those assets' skills, but he clarified: "This is not a highly significant point. It may be a handful of jobs rather than anything more." The FCA's letter will set 20 contingency questions by the regulator.

The letter was sent out soon after the Bank of England wrote to banks and other large financial services companies in April asking them to outline plans to set out their plans for a hard Brexit.

Additional reporting by Martin Arnold

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STOCK MARKETS		COMMODITIES	
Index	Change	Commodity	Change
S&P 500	+0.20	Oil	+0.15
Nikkei 225	+0.10	Gold	+0.05
DAX	+0.15	Platinum	+0.02
FTSE 100	+0.10	Iron Ore	+0.01
Hang Seng	+0.05	Coal	+0.01
Hong Kong	+0.02	Wheat	+0.01
Shanghai	+0.01	Soybeans	+0.01
India	+0.01	Copper	+0.01
China	+0.01	Aluminum	+0.01
EU	+0.01	Natural Gas	+0.01
US	+0.01	Crude Oil	+0.01
Japan	+0.01	Heating Oil	+0.01
UK	+0.01	Gas	+0.01
Australia	+0.01	Oil	+0.01
South Africa	+0.01	Oil	+0.01
India	+0.01	Oil	+0.01
China	+0.01	Oil	+0.01

World Markets	
Index	Change
S&P 500	+0.20
Nikkei 225	+0.10
DAX	+0.15
FTSE 100	+0.10
Hang Seng	+0.05
Hong Kong	+0.02
Shanghai	+0.01
India	+0.01
China	+0.01
EU	+0.01
US	+0.01
Japan	+0.01
UK	+0.01
Australia	+0.01
South Africa	+0.01
India	+0.01
China	+0.01

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# Air Quality



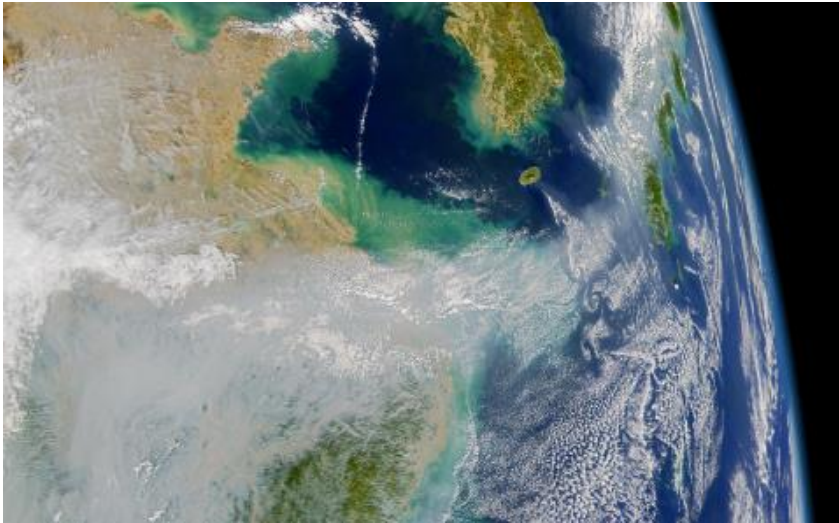
- Since 2011, China has issued progressively more stringent AQ regulations
  - RE and EE recognized as means of avoiding emissions.
- In 2016, revisions to the Air Law went into effect
  - China is now implementing an emissions permitting system modeled in part on the Clean Air Act and in part on European regulations

Beijing, 25 October 2007, 12:30 PM





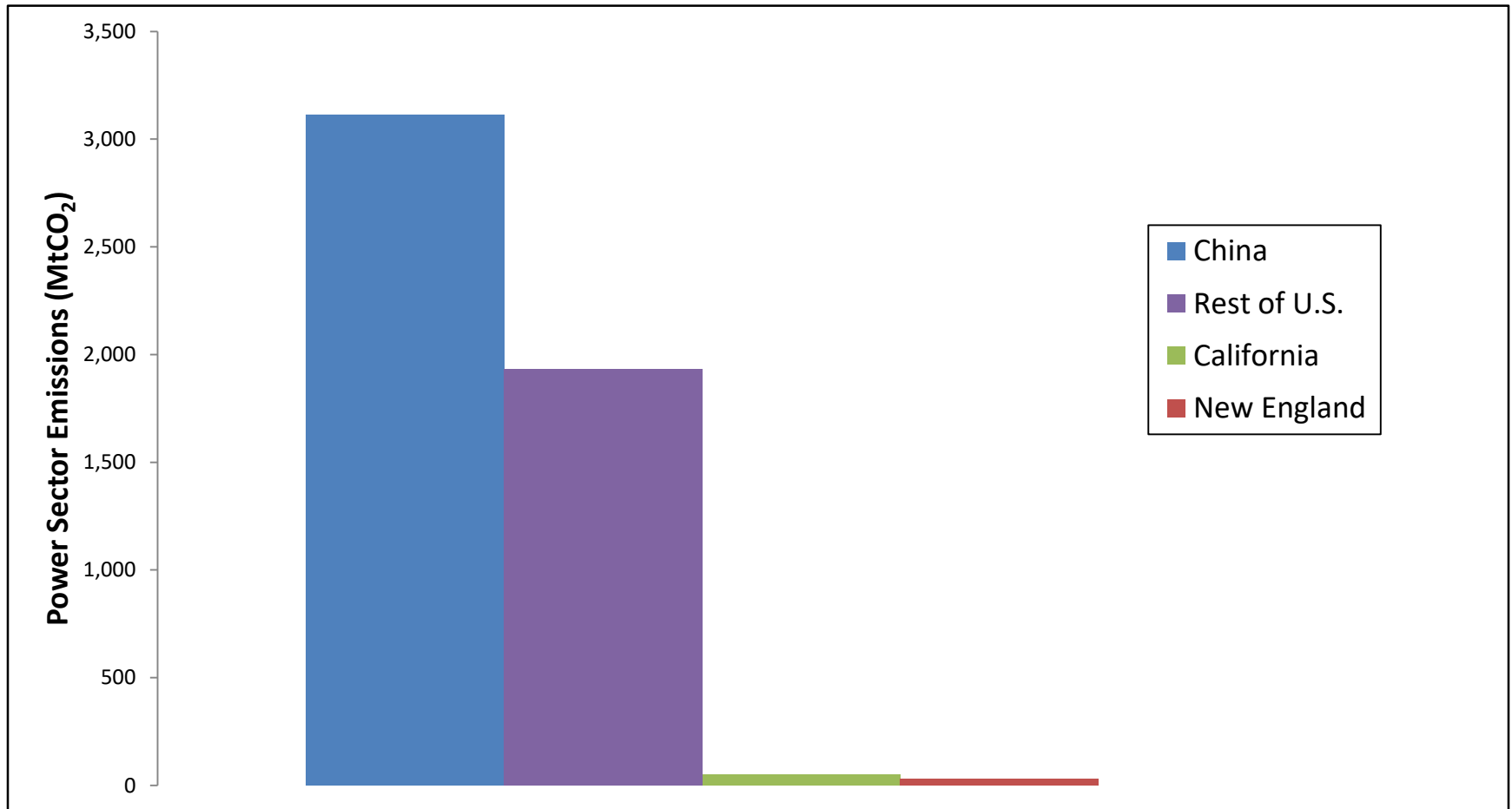
# Immigration Policy?



- EPA: downwind air pollution from Asia may erase savings from domestic emissions programs
- Ozone, particulates, and mercury
  - 8-12% of pollutants in the Pacific NW have an Asian signature



# There are two ways to look at this graph



# In conclusion: as in 2015, again

- Continue to reform your markets:
  - Design them to favor desired outcomes and capabilities: e.g., no-carbon and flexibility
  - Fully integrate environmental and energy policymaking
- Expand investment in end-use efficiency and renewables
- If you have the opportunity, engage with China
  - Fashion solutions that work for China
  - Help build institutional capacity
  - Remember that learning goes both ways
- Be a threat of a good example

Beijing, 26 October 2007, 9:21 AM



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北京市朝阳区建国门外大街19号国际大厦2504室 • 邮编:100004 • 电话: +86-10-8526-2241

CITIC Building, Room 2504 • No 19 Jianguomenwai Dajie • Beijing 100004 • phone: + 86-10-8526-2241

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