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US and China Energy: Swapping Places in World Markets

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Sources and Caveat

These slides include references to the history and forecasts of Chinese, US and world energy demand, production and inter-regional trade. Unless stated otherwise, they are based on data from two main sources:

- The US Energy Information Administration 2012 report on China, updated in April 2013 file:///Users/DGR/Dropbox/2013/OXFORD/NOG/EIA%20data/China%20-%20Analysis%20-%20U.S.%20Energy%20Information%20Administration%20(EIA)%201.webarchivethat (referred to here as EIA 2013).
- The International Energy Agency (IEA) "New Policies Scenario" in the 2012 World Energy Outlook (referred to here as IEA WEO 2012).

The slides were part of a presentation and are not intended as a document that can be read on its own.

Outline

- Introduction
- US Energy Revolution
- China Energy Challenges
- Some International Implications
- Conclusions

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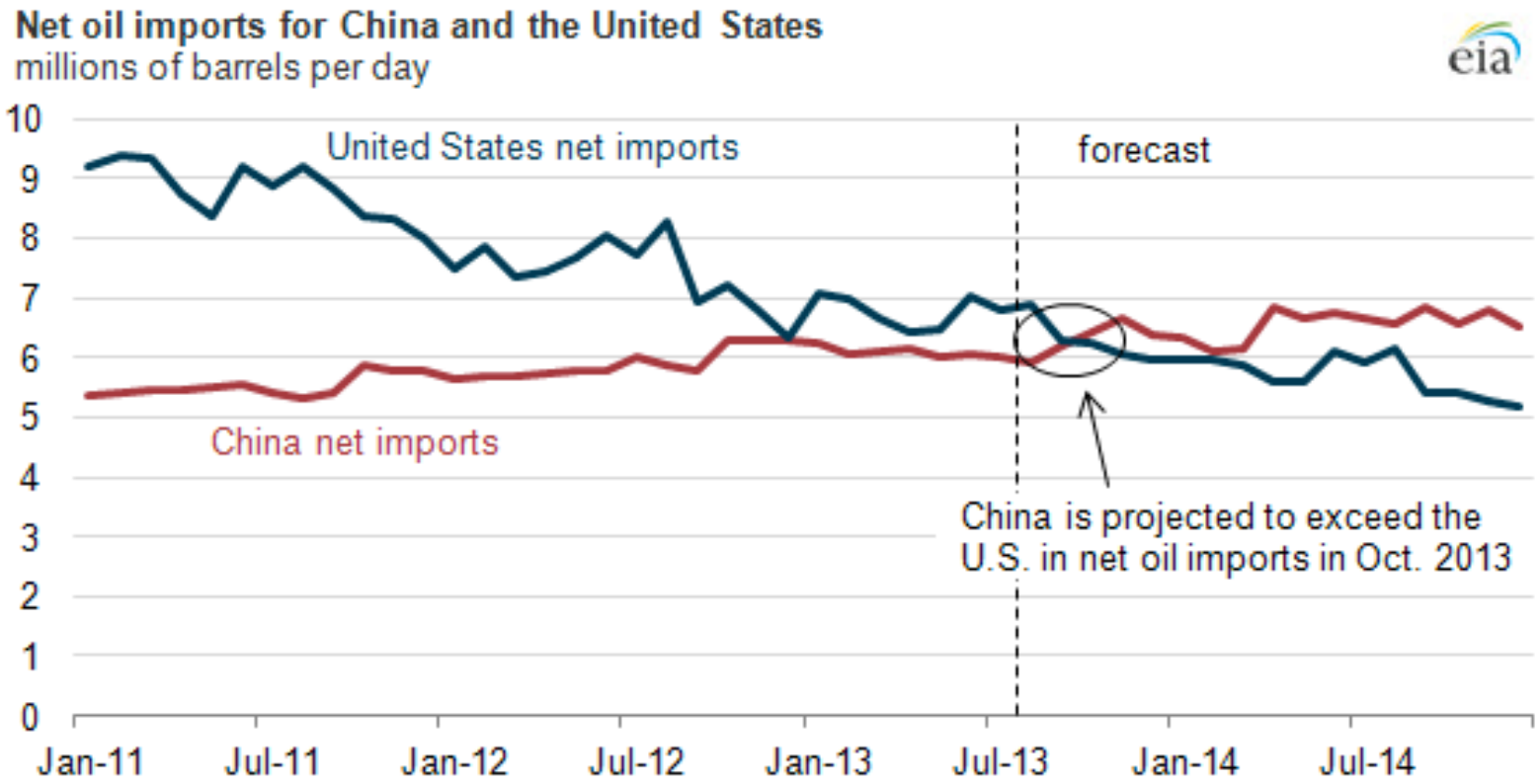
Introduction

- Energy security in short term is about fossil fuel availability and price stability; long term it is about sustainability
- US and China swapping places in energy market, with US energy imports falling and China energy imports rising
- Why is this happening and what implications does it have for these countries and the world?

US and China net oil imports



Source: U.S. Energy Information Administration Short-Term Energy Outlook, August 2013.
Note: Net oil imports are defined as total liquid fuels consumption less domestic production.

Introduction
Key messages

- Energy security is not a zero sum game and 'independence' is a myth
- Energy security relies fundamentally on well functioning markets
- Governments need to provide support to these markets and to help resolve market failures
- The world also needs new global energy governance arrangements to include the major emerging countries, to address short term and long term energy security issues.

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US Energy Revolution
What is Happening?

- US fossil fuel imports are falling but still significant
  - Coal: US exports over 100 million tons of coal per year
  - Natural gas: US will soon be a major net exporter
  - The US is, however, still a major importer of crude oil
  - US now produces 80% of total fossil energy consumed.

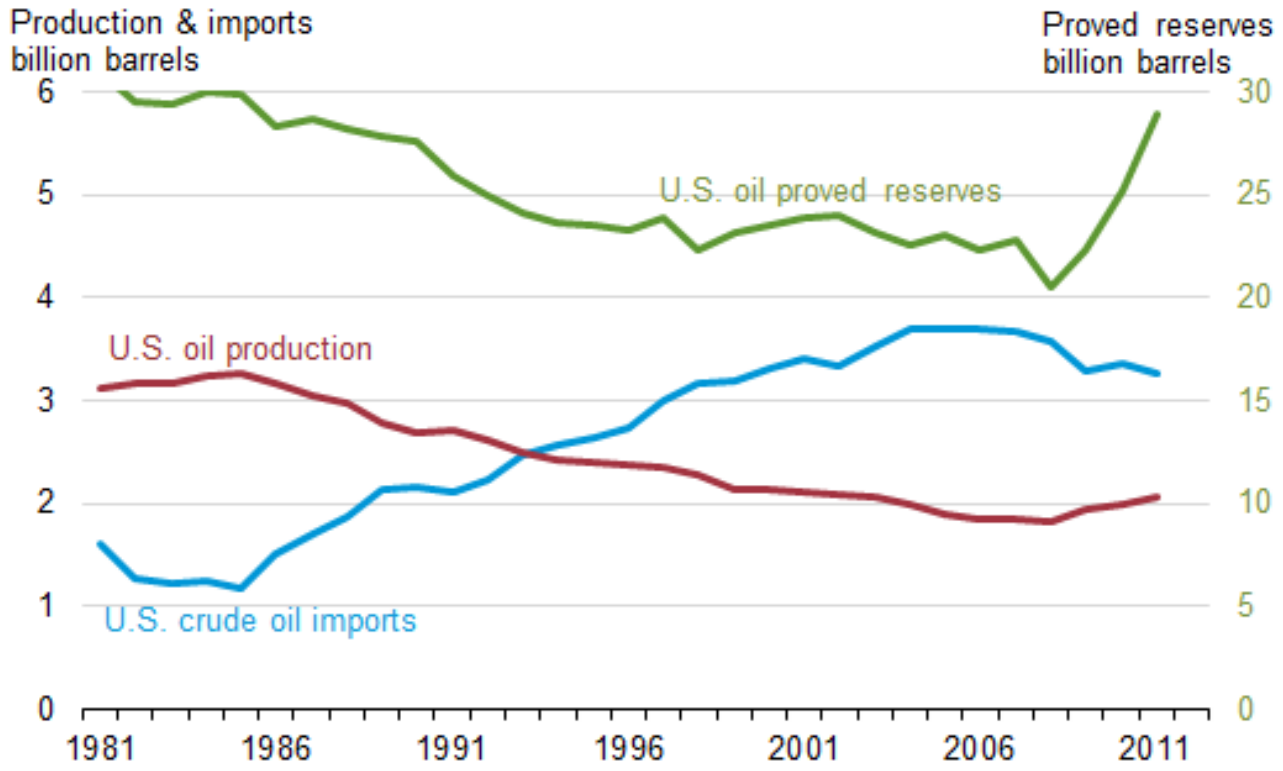
- The US is very dependent on international energy markets
  - Price at the gasoline pump set in international markets
  - US shale oil production requires high world prices
  - US economy depends on stable world energy markets

US Energy Revolution
Explanations for reduced imports

- Markets and commercial incentives
  - High world oil prices drive supply up, demand down
  - Private incentives support drilling in your back yard
  - Technology (e.g. fracking) development profit driven
  - Dynamic NA oil/gas upstream
- Government policies
  - Mileage efficiency standards depress demand
  - Liberalized oil and gas and transport markets
- Greater energy security a result, not the driver

US Energy Revolution
oil reserves, production, imports

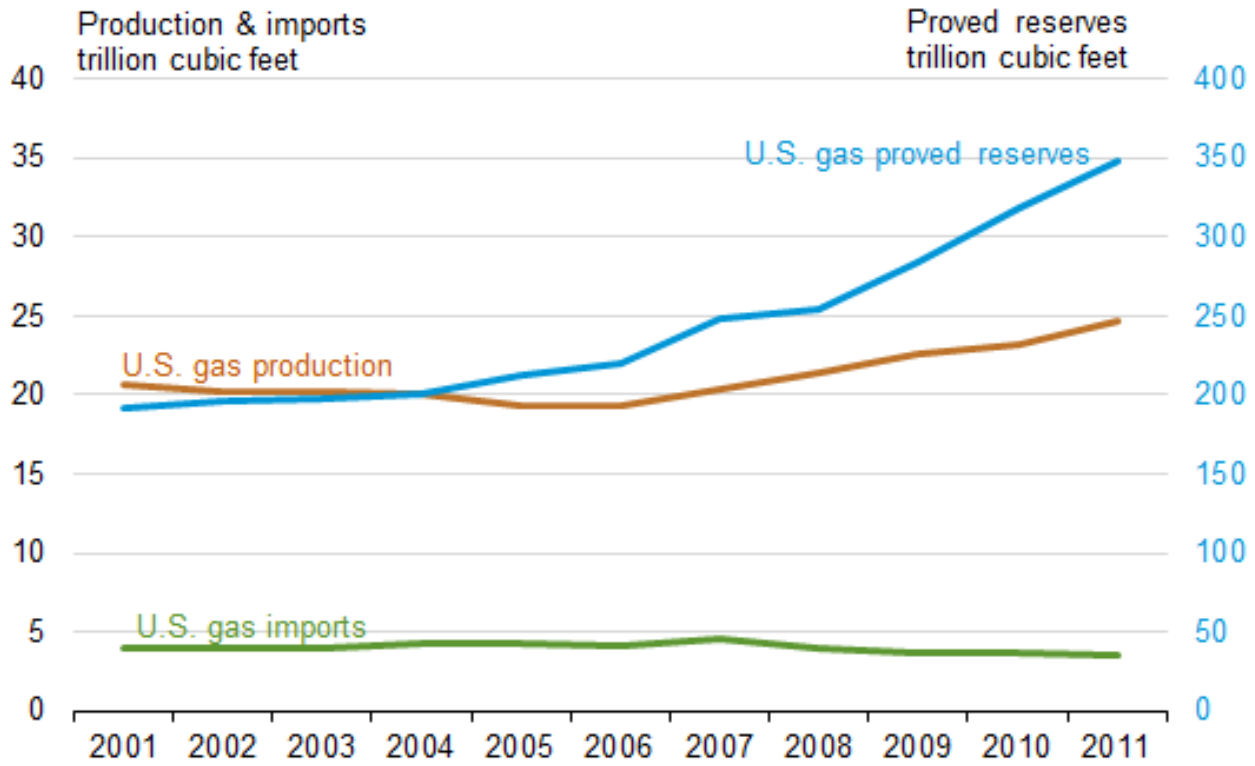
Figure 4. U.S. crude oil and lease condensate reserves, production, and imports, 1981-2011



Sources: U.S. Energy Information Administration, Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves", and Form EIA-814, "Monthly Imports Report".

US Energy Revolution
gas reserves, production, imports

Figure 5. U.S. wet natural gas reserves, production, and imports, 2001-2011



Sources: U.S. Energy Information Administration, Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" and U.S. Department of Energy, Office of Fossil Energy, "Natural Gas Imports and Exports".

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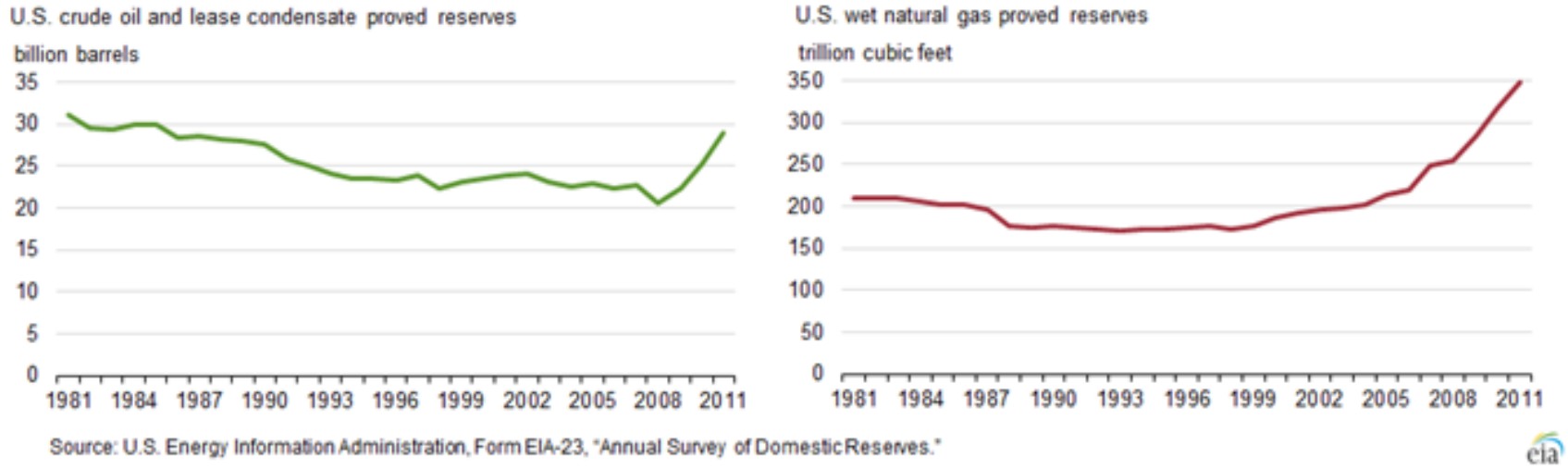
US Energy Revolution
oil and gas proved reserves

Figure 1. U.S. oil and natural gas proved reserves, 1981-2011



Source: U.S. Energy Information Administration, Form EIA-23, "Annual Survey of Domestic Reserves."

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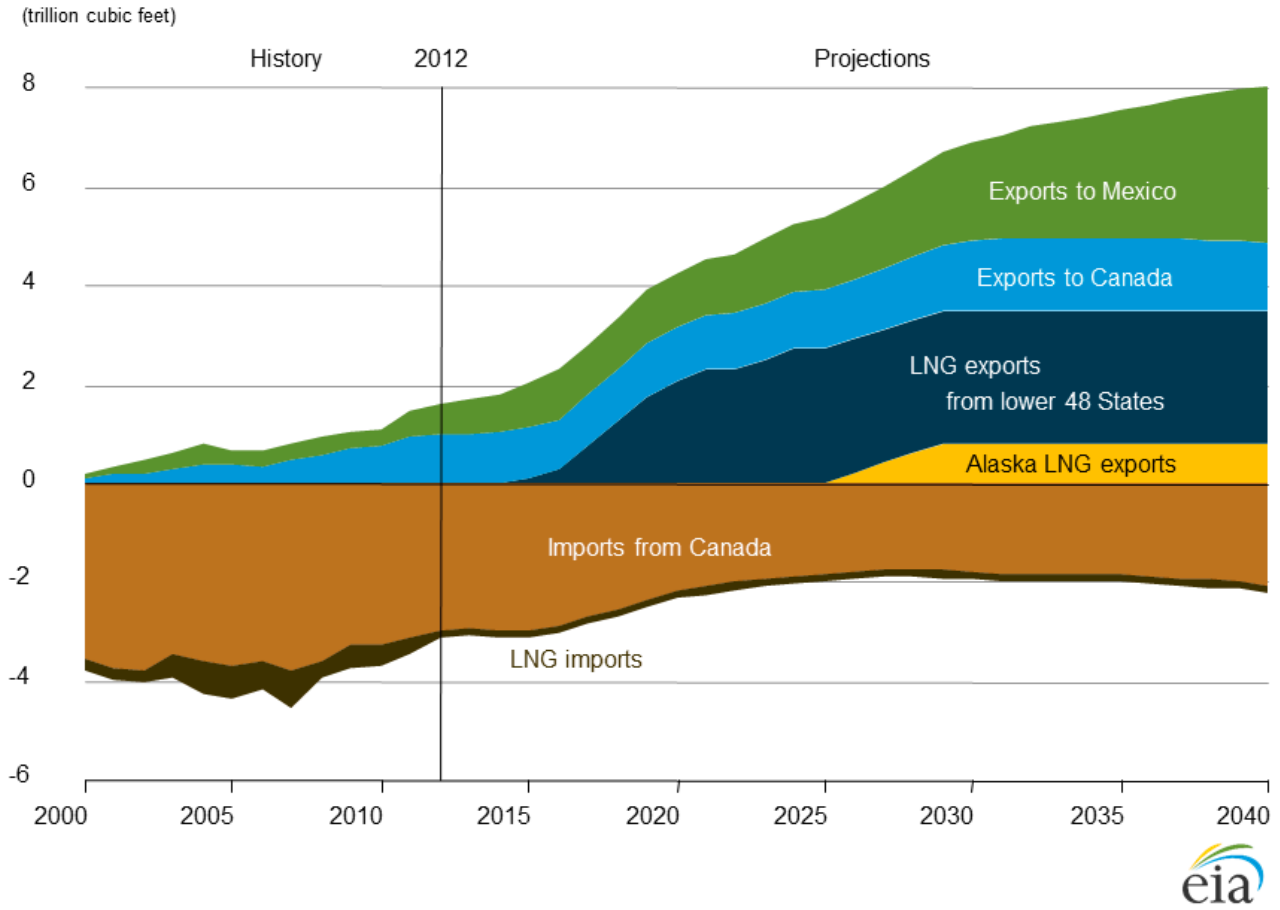
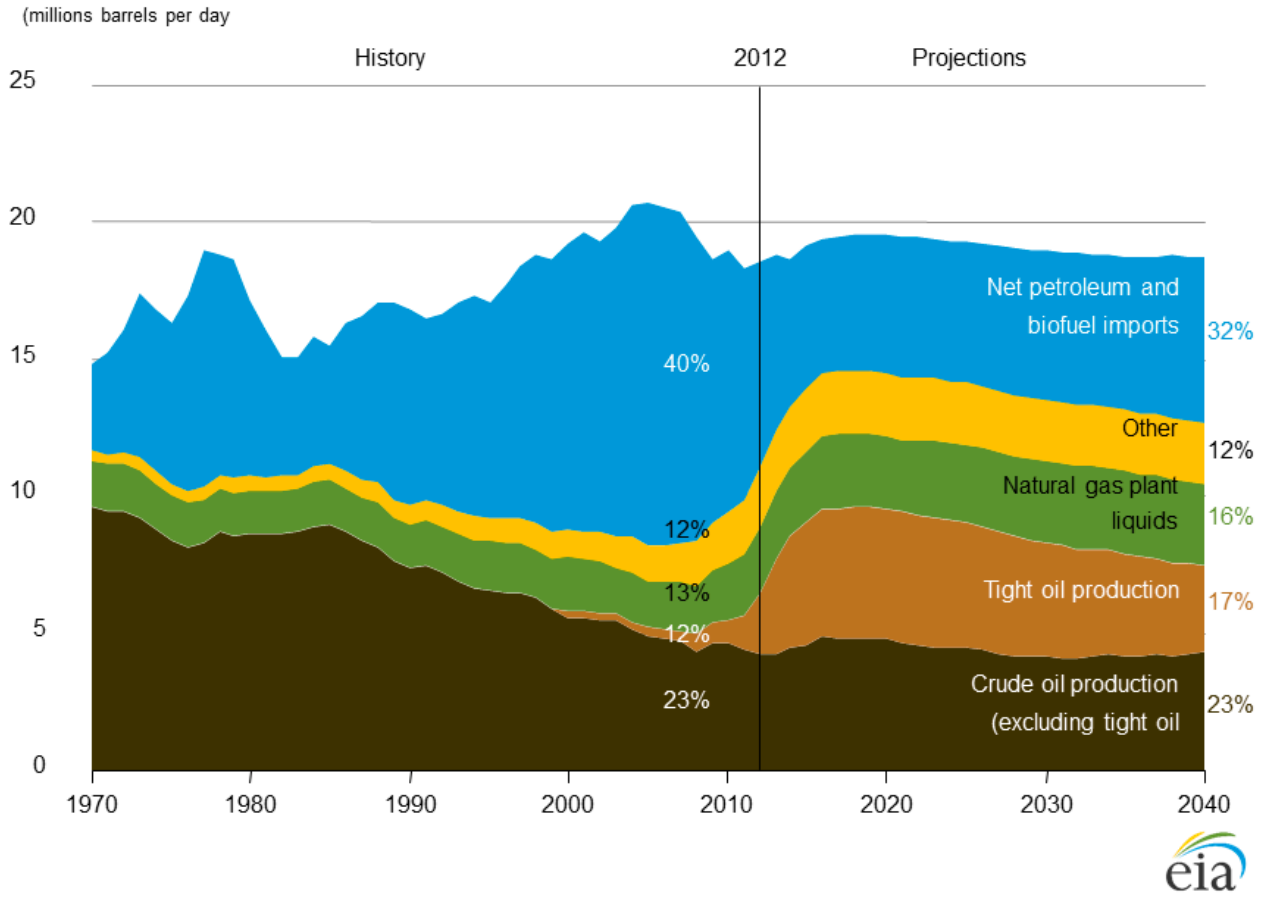
US Energy Revolution
Natural gas exports rising



US Energy Revolution
Oil and liquids imports falling



US Energy Revolution Implications for the US

- Lower gas prices
  - Competitive advantage chemicals, refining, other
  - Change in fuel mix
- Positive macro-economic activity impact
  - Direct: value of shale production, trade balance, jobs
  - Indirect: land values, multiplier effects
- Environment
  - Positive: US CO2 emission reduction (v coal)
  - Negative: impact of hydraulic fracking, continued CO2
- Net economic value disputed: short term (+) v. long term (-)

US Energy Revolution Implications for the world

- Good news
  - US oil helps to limit world oil price increases
  - US gas limits world price increases and oil-based risks
  - Potential transfer of technology for shale production.

- Bad news
  - US now interested in higher world oil prices
  - Coal exports lower world prices and raise CO2 emissions
  - Geopolitical consequences in the Middle East and Asia
  - Long term continued reliance on fossil fuels.

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China Energy Challenges
What is happening?

- The mirror image of the US: energy imports are growing
- Like the US: reliance on world energy markets

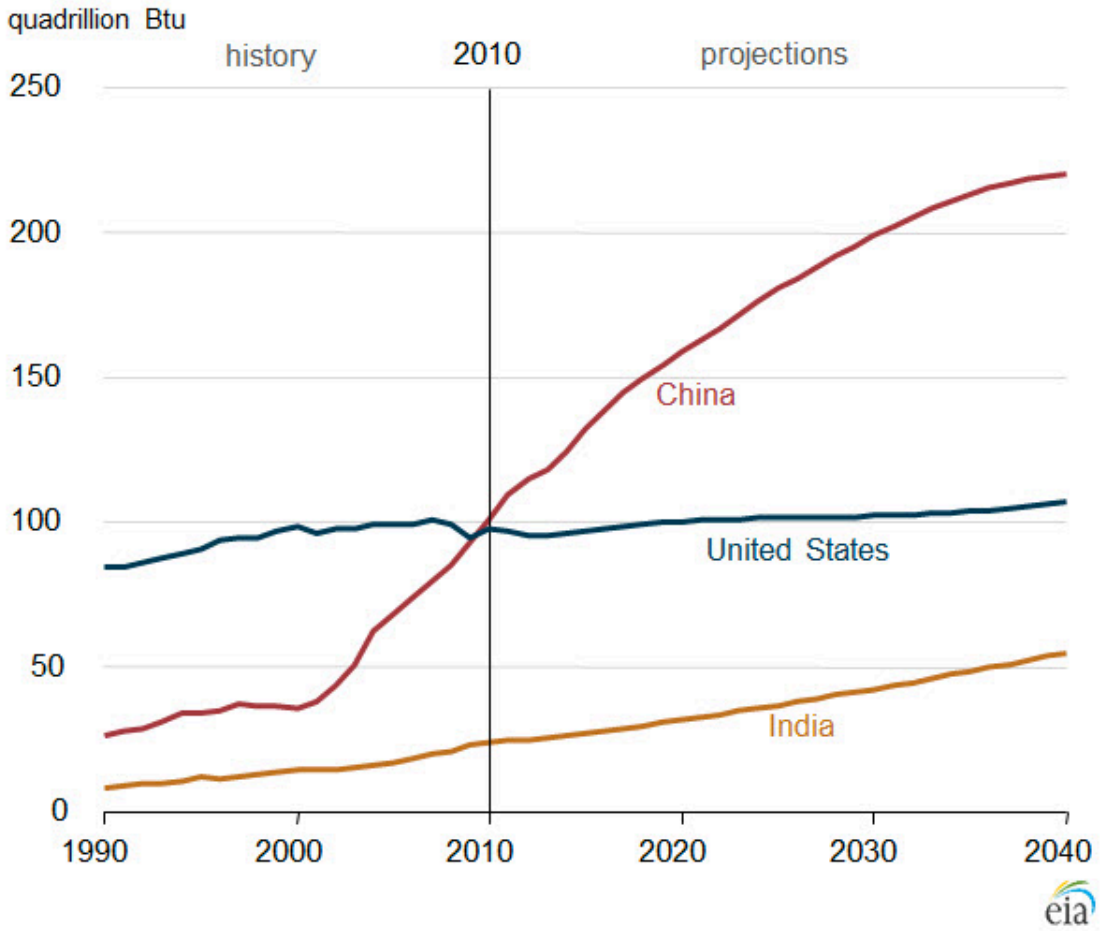
China Energy Challenges: Policy objectives

- Low cost energy for economic growth, welfare and political stability
- Security of energy supply, especially stable energy prices and secure access to energy
- Environmental sustainability – local and global

China Energy Challenges
Energy demand

- Now the world's largest energy consumer; demand in China is projected to be double the US by 2040. [See graphic]
- Very low energy use/capita and in development phase (e.g. urbanization, infrastructure) requiring energy growth, but growth will slow.

Energy consumption in the US, China and India 1990-2040

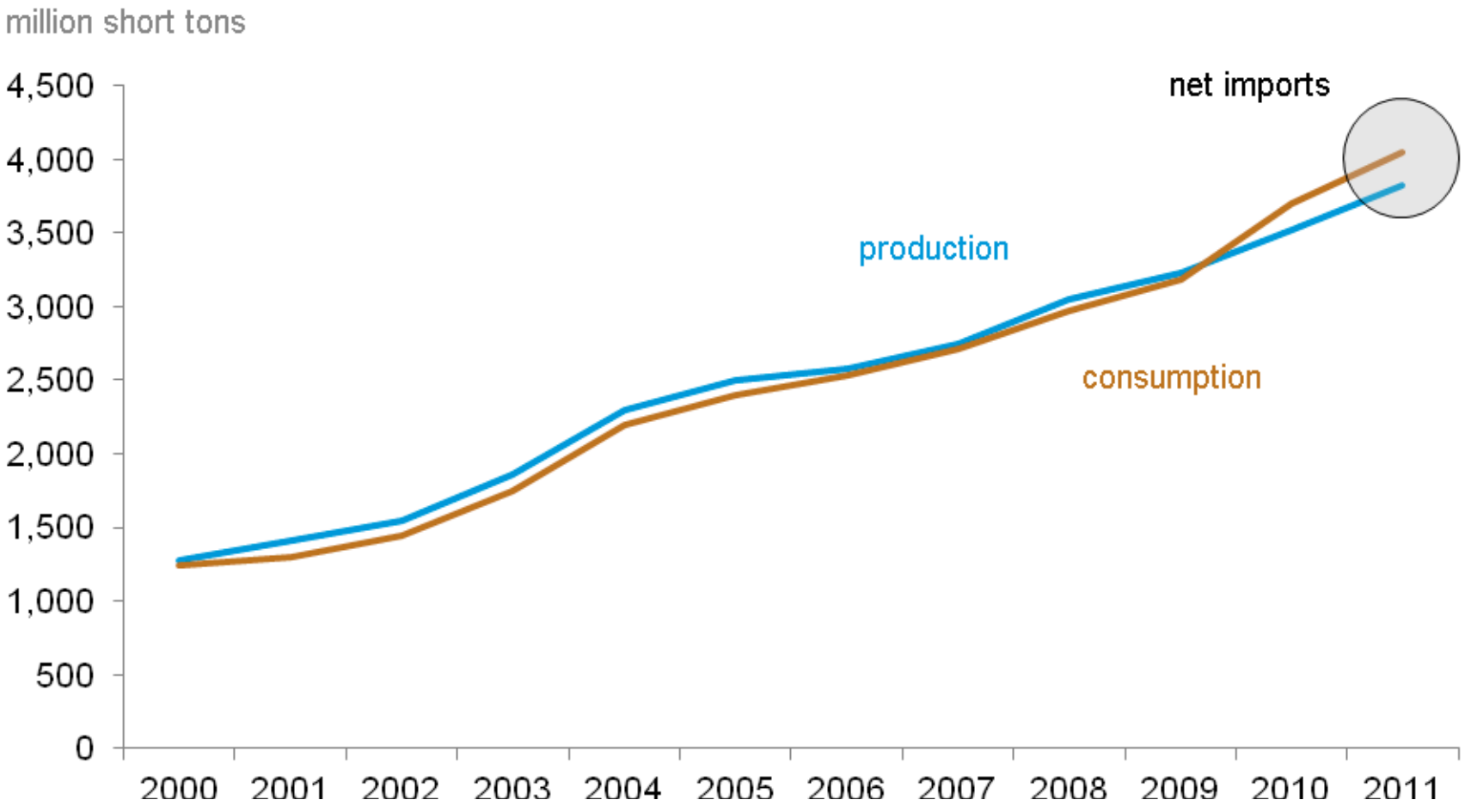


Source: EIA, International Energy Outlook 2013, July 2013. http://www.eia.gov/forecasts/ieo/world.cfm

China Energy Challenges
Energy supply

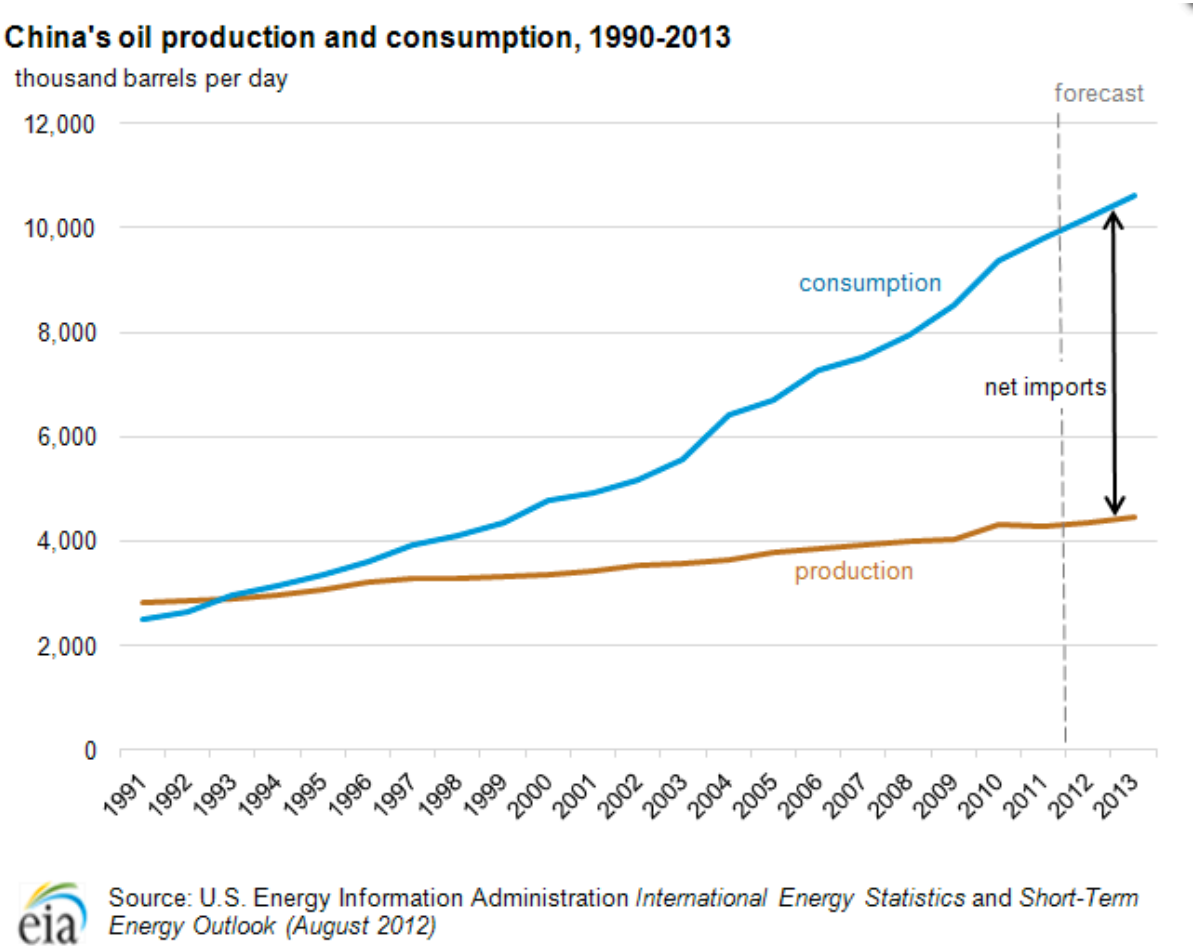
- Coal dominant and imports growing [See graphic]
- Oil demand and imports growing (See graphic]
- Natural gas demand and imports growing (See graphic]

China Energy Challenges
Growing coal net imports

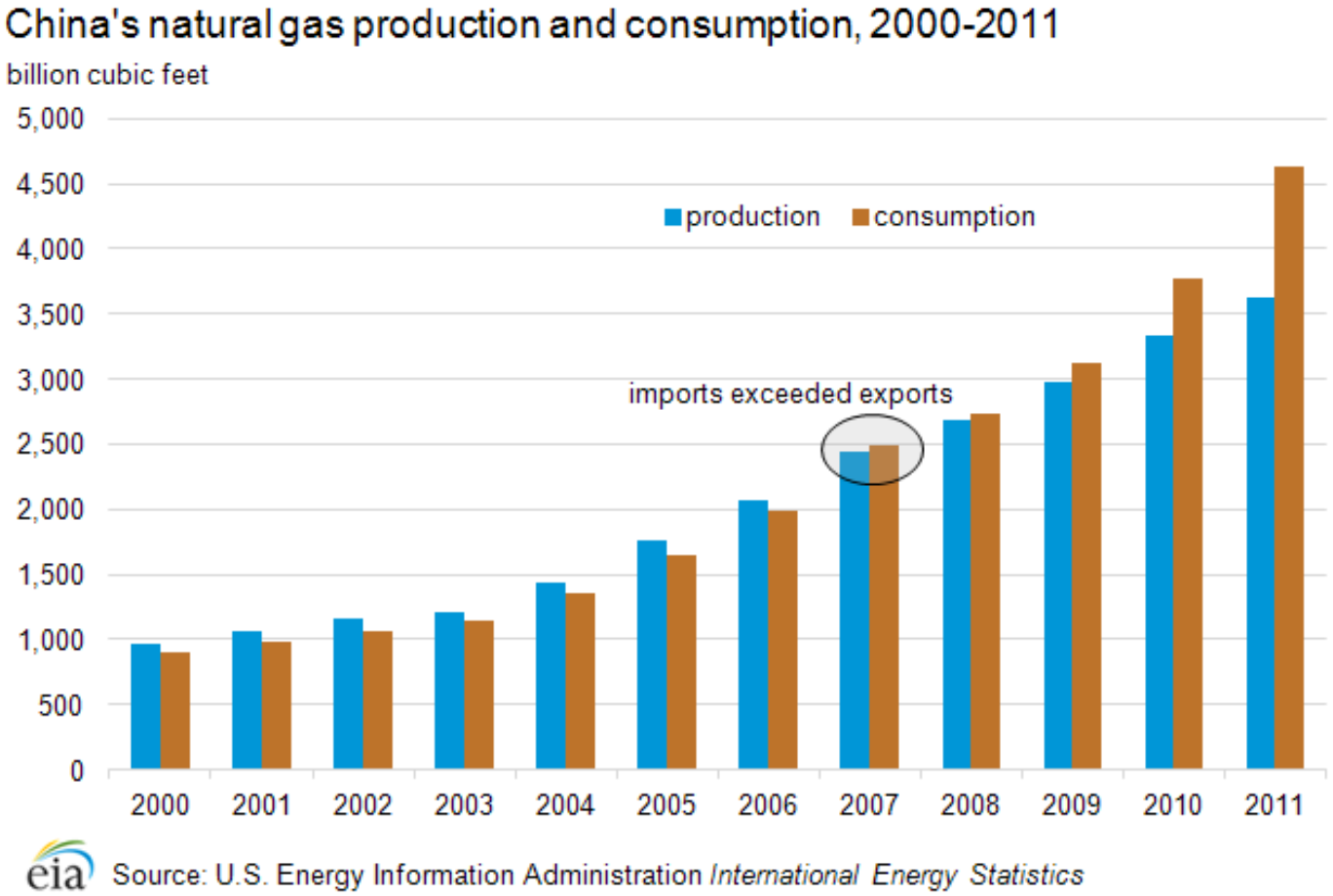


Source: US EIA *International Energy Statistics,* in EIA 2013.

China Energy Challenges
Growing oil net imports



China Energy Challenges
Growing natural gas net imports



China Energy Challenges Implications for Policy Objectives

- Energy security: reliance on energy imports raising alarm in China (similar to US alarm post-1973 Arab oil embargo).
- Environment: serious local pollution from coal; on course to emit 2/3 of the global limit of 700 billion tons of CO2 emission to avoid serious climate change (>2ºC).
- Rising cost of (low carbon – e.g. renewable) energy threatens economic growth.

China Energy Challenges
Domestic Policy Responses

- Demand side, *inter alia*
  - Pressure on 10,000 state owned enterprises - efficiency
  - Price rises for gas and oil, but makes coal more attractive
  - Multiple carbon market pilots, but very low carbon prices
  - China has world's largest fleet of electric vehicles
- Supply side
  - Support for low carbon (RE) resources and shale gas
  - Substantial strategic petroleum reserve
  - Expanding low carbon business opportunities globally
- China sees business opportunities on both sides of the market

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Some International Implications Impact of US energy revolution

- Positive for China:
  - Limits oil price risk
  - Reduces China gas import costs and risk
  - Potential to use shale gas technology
  - Positive impact of US economic growth for China's exports and the value of US treasury bills
- Problematic for China:
  - Effect on chemicals and other industries
  - Geopolitical dilemma in the Middle East and Asia

Some International Implications World Energy Markets

- China demand will drive world energy markets, supporting world oil and gas prices, leading China to seek to ensure security of production and transport routes, e.g. Middle East

- China's reliance on energy imports will lead to greater Chinese integration into world and regional markets, as well as heavy emphasis on developing domestic energy resources

- China drives development of low carbon technologies globally as a business opportunity and to meet domestic needs.

Some International Implications China relations with key regions

- Energy producing countries: China seeks closer collaboration.
- North East Asia: potential for collaboration, e.g. regional gas market hub.
- US: rivalry with energy exporter, but room for collaboration to secure future for coal (CCS/CCU) and to develop shale, smart grids and EV.
- EU: rivalry, but room for collaboration as oil and gas importers, with a common neighbour (Russia) and common interest in low carbon energies and climate change treaty.

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Conclusions

- National energy independence is not the answer to energy security either in the short term or the long term
- For short term energy security, well functioning international and regional markets are critical, as are new global governance arrangements including major emerging countries
- Long term energy security is about sustainability, and that means a transition to low carbon energy. That requires open markets for capital and technology, and agreements to develop and introduce low carbon technologies

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