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China's growing energy demand: some international implications

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Outline

- Introduction
- China's energy demand v. policy objectives
- Domestic measures to improve sustainability
- International energy market implications
- International relations: risks and opportunities
- Conclusions
- Annex with graphics

Sources

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 2013file:///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).

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Introduction

- China has at least 2 major energy-related problems with policy consequences that affect the rest of the world:
  - *Reliance on coal*: Addressing local pollution and global climate change are now major policy priorities that involve curbing growth of coal use in China and developing low or zero carbon alternatives for China and global markets.
  - *Reliance on oil imports*: China has swapped places with the US (after 1974) and is now the world's largest importer of crude oil, while US oil imports are falling fast. China's domestic and international policies increasingly focus on energy security.
- These are problems and potential opportunities for the rest of the world: to reduce global CO2 emissions and ensure open, secure and competitive international energy markets.
- There is an opening here for closer Sino-EU collaboration because of common concerns as well as shared suppliers and neighbours.

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China's energy demand v policy objectives

- China energy policy objectives
  - Low cost energy for economic growth, welfare and political stability
  - Security of energy supply, especially stable energy prices and secure access
  - Environmental sustainability.
- Environmental sustainability rising quickly in importance in China
  - Local smog and pollution is now a critical problem (especially large cities)
  - Global climate change is a problem (especially for top decision makers)
  - Solutions require restricting growth of coal use, unless CO2 captured
  - Accelerated use of all energies, including low and zero carbon technologies.
- Security and low cost energy still critical, but tensions among objectives.
  - Domestic lower carbon technologies support supply security and environment goals, but raise economic costs
  - Imported natural gas and oil raise security concerns, but diversification of sources and pricing mechanisms (e.g. indexation) reduce risk.

China's energy demand v policy objectives (2)

- Overall Chinese energy demand
  - Now the world's largest energy consumer; demand in China is projected to be double the US by 2040 (graphic 1)
  - Very low energy use/capita (graphic 2) and in development phase (e.g. urbanization, infrastructure) requiring energy growth, but growth will slow.

- Coal
  - 70% of China's energy demand now (graphic 3) and 80% of electricity
  - Coal demand growing and forecast to account for about 45-50% of global coal demand in 2035 (graphic 4)
  - China has become a very large coal importer (graphic 5)
  - Growth rate of China's coal demand is diminishing and the big question is when China's coal demand (and related emissions) will peak and begin to fall.

China's energy demand v policy objectives (3)

- China demand for oil
  - Growing demand, flat supply: imports growing (graphic 6)
  - China now imports more oil than US (graphic 7)
  - Demand growth in cars: forecast to rise from 100 to 350 million by 2035
  - Forecast China oil imports of 12.5 mbd v. 3 mbd US by 2035 (graphic 8).

- China demand for natural gas
  - Demand growth, flat supply: imports growing (graphic 9)
  - Demand expected to almost double to 300 bcm by 2018 (graphic 10)
  - Forecast China's demand to grow to over 500 bcm and imports to be over 200 bcm by 2035, about 40% of inter-regional trade.

China's Energy Demand v Policy Objectives (4)

- Implications for China's policy objectives:
  - Energy security: net fossil fuel imports very high and growing, making China concerned about high and volatile prices and the availability of fuels, similar to US alarm post-1973 Arab oil embargo.
  - Environment: serious local pollution and on course to emit 2/3 of the GHG emissions that the IPCC considers to be the global "limit" beyond which concentration of GHG will trigger dangerous climate change.
  - Rising cost of (low carbon) energy threatens economic development.

- Serious problems for the world: possible resource wars, trade tensions and global climate deterioration, *inter alia.*

- But also an opportunity to collaborate with China to solve these problems, for wider benefit and commercial benefit of those contributing to the solution.

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Domestic measures to improve sustainability

- Government is very aware of the challenges and opportunities and taking action.
- Demand side, *inter alia*
  - Pressure on 10,000 state owned enterprises to improve efficiency
  - Price rises for fuels, e.g. gas and oil, but that makes coal more attractive
  - Multiple carbon market pilots, but very low carbon prices at outset
  - China has world's largest fleet of electric vehicles (many two-wheeled).
- Supply side
  - Very strong support for low carbon domestic resources, especially hydro, other renewables and nuclear, thereby reducing coal's share in power sector
  - Support for domestic shale gas, but not promising in short-medium term
  - Building substantial strategic petroleum reserve (graphic 11)
  - Expanding low carbon business opportunities in global markets built on China's success in driving down costs
- Unofficial talk of China CO2 emissions peaking by 2020/2025 – much earlier than official forecasts suggest.

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Implications for world energy markets

- China demand will continue to drive world energy markets, supporting oil and gas prices
  - Forecast 60% of global energy demand growth by 2035, especially oil and coal.
  - By 2040, China projected to consume twice as much energy as the US, with much lower consumption/capita.

Implications for world energy markets (2)

- In oil, world demand expected to grow from 87 mbd to about 100 mbd by 2035.
  - China's forecast demand growth more than offsets OECD decline (graphic 12)
  - Global call on OPEC oil will grow; non-OPEC oil (e.g. US, Brazil, Canada) will help to support a crude oil price range of $90-125/bbl; but a price collapse below $60/bbl is still possible (for instance if China demand growth falls and/or low-cost OPEC production increases, say in Iraq and Iran) as are periods of much higher prices (for instance due to disruption in the Middle East)
  - Physical flows of oil increasingly to Asia, giving China more leverage on terms
  - China is being drawn into security issues: claims to South China Sea resources; and readying to take greater role in oil transport security from Persian Gulf as US reduces spending on security in the region.
- Implications for EU: China shares EU concerns about security of oil supply – prices and access - and both have an interest in efficient world oil markets, stability in producing regions, transport security and emergency procedures.

Implications for world energy markets (3)

- World natural gas demand expected to grow 1.6% per annum (2010-35), with China at 6.6%, accounting for 25% of total global increase (graphics 13 & 14)
  - China demand puts upward pressure on world natural gas prices; new supply in China puts downward pressure on prices
  - US LNG exports could be 100 bcm by 2020 and keep rising, compared to today's global inter-regional trade in 2010 of 675 bcm
  - China may be able to use arrival of US LNG exports in Asia to improve price and other terms from other suppliers: Russia, East Africa, Australia, Qatar; US LNG indexation to Henry Hub gas spot prices could enable China to reduce risk related to oil prices.
  - Recent agreement between China and Russia for oil exports, and anticipated agreement on Russian LNG exports, are evidence of pressure on traditional exporters.
  - This pressure may reduce Asian natural gas prices and challenge traditional oil-based indexation of natural gas in Asian markets.
  - Could lead to Asian hub and more competitive gas markets, or to efforts by large LNG buyers to work together to reduce prices and improve terms .
- Implications for EU: additional demand for world gas will drive up prices, but a more competitive Asian gas market could release Qatar gas for Europe and encourage Russia to move away from oil indexation. Also, Chinese shale gas would free-up gas for EU.

Implications for world energy markets (4)

- China demand for coal will grow, but Chinese imports are likely to decline
  - World coal prices very sensitive to China's import requirements
  - Some evidence that China's recent rise in coal imports was strategic: enables China in future to reduce reliance on domestic coal without having to close existing coal mines or penalize Chinese coal companies
  - Forecasts suggest China's coal imports will fall, especially after 2020
  - US and EU regulatory pressure on coal use will reduce growth in OECD coal demand; and lower growth of Chinese demand will dampen potential for exports of coal from US and other coal regions to China
  - Implication is that coal trade could peak by 2020, but there is uncertainty, notably the potential increase of imports into India. (graphic 15)
  - More positive growth for coal increasingly requires development of commercially viable carbon capture and storage or utilisation (CCS/CCU).
- Implication for EU: declining price of coal risks coal displacing natural gas (as currently is happening); potential for CCS/CCU collaboration with China.

Implications for world energy markets (5)

- In non-fossil fuels, China investing heavily, especially generation (graphic 16).
  - World's largest wind power capacity and turbine manufacturer/exporter
  - World's largest solar PV manufacturer/exporter, soon to become one of world's largest users of solar PV
  - World's largest fleet of electric vehicles: many two-wheeled
  - World's largest development program for nuclear power
  - Successful in driving down the costs of all these technologies.
- Has become major exporter and foreign investor in these technologies.
- Implication for EU: China helping to drive down the cost of non-fossil technologies and accelerate de-carbonization globally through exports and FDI. Chinese companies are actual and potential partners for EU companies in the development and commercialization of these technologies globally.

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Implications for international relations

- China with oil and gas exporters
  - China will seek closer collaboration with oil and gas exporting countries.
    - China and Russia just signed an agreement involving*, inter alia*, Rosneft supplying Sinopec with additional crude oil, a joint venture for E&P in Russia, and a contract between Novatek and CNPC for LNG (ahead of Gazprom losing its export monopoly)
    - Saudi Aramco investment in refining in China.
  - Chinese oil companies will invest increasingly in energy exporting regions, especially Iraq and East Africa, especially when US oil companies are leaving.
  - China also offers loans to oil producing countries in return for long term guarantees of oil supply (e.g. Ecuador).
  - China will be drawn increasingly into security matters – pipelines through Myanmar, transport security from Persian Gulf, increased concern about Middle East stability.
- Implication: there is a risk of conflict over resources, but there is also an incentive for China to collaborate with other countries, for instance in Iran.

Implications for international relations (2)

- China with the US
  - On the on hand, the countries are competitors and rivals, and make each other nervous: for instance, China is worried about US industrial competitiveness due to shale gas, US refusal to allow Chinese ownership of US resources, and US withdrawal of resources from Middle East
  - On the other hand, the two countries share common objectives: global economic prosperity requires peace and reasonably stable energy markets; and both seek a way to use their coal resources without destroying the planet, which may encourage collaboration on R&D related to coal and CCS/CCU
  - A major dilemma for China is in the Middle East: as the US relies less on the Middle East for oil, it is less willing to spend resources there. China's dependence on imports from the Middle East means that they will increasingly be motivated to help stabilize that region, but doing this enables the US to dedicate more resources to Asia!
- Implication: China is looking for new global governance arrangements to secure access to global energy markets, maintain global security and limit US advantages.

Implications for international relations (2)

- China with the EU
  - Obvious tensions in energy: competitors for world oil and gas supplies, trade disputes over solar PV, and over Intellectual property protection.
  - But the two regions share many common concerns – especially heavy dependence on energy imports, the goal of improving energy efficiency, developing domestic low carbon technologies and managing climate change.
  - The countries also share a common neighbour: Russia. Although they are competitors for Russian resources, there is also an opening here – more competitive access to Russian oil and gas, with lower prices and higher export volumes – that could be beneficial for all concerned.
  - Commercially, there are opportunities for collaborating with Chinese companies in clean energies for Chinese and world markets.
  - Politically, there are opportunities to collaborate in global energy and climate governance, and in promoting more competitive world LNG markets.

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Conclusions

- China faces two serious problems related to successful economic development and growth: growing energy import dependence and environmental degradation.
- These are problems and opportunities for the rest of the world: to develop low carbon energy sources to displace coal and accelerate the moment when China's GHG emissions peak; to lower the costs of low carbon alternatives and thereby accelerate de-carbonization around the world; and to improve global governance of energy markets and competition in them.
- Apart from these global concerns and opportunities, the EU and China have a common neighbour in Russia and much to discuss that would benefit all concerned.
- There is an opening for the EU to work with China in a new strategic alliance: top down from an EU political perspective and bottom up for commercial enterprises in addressing these challenges.

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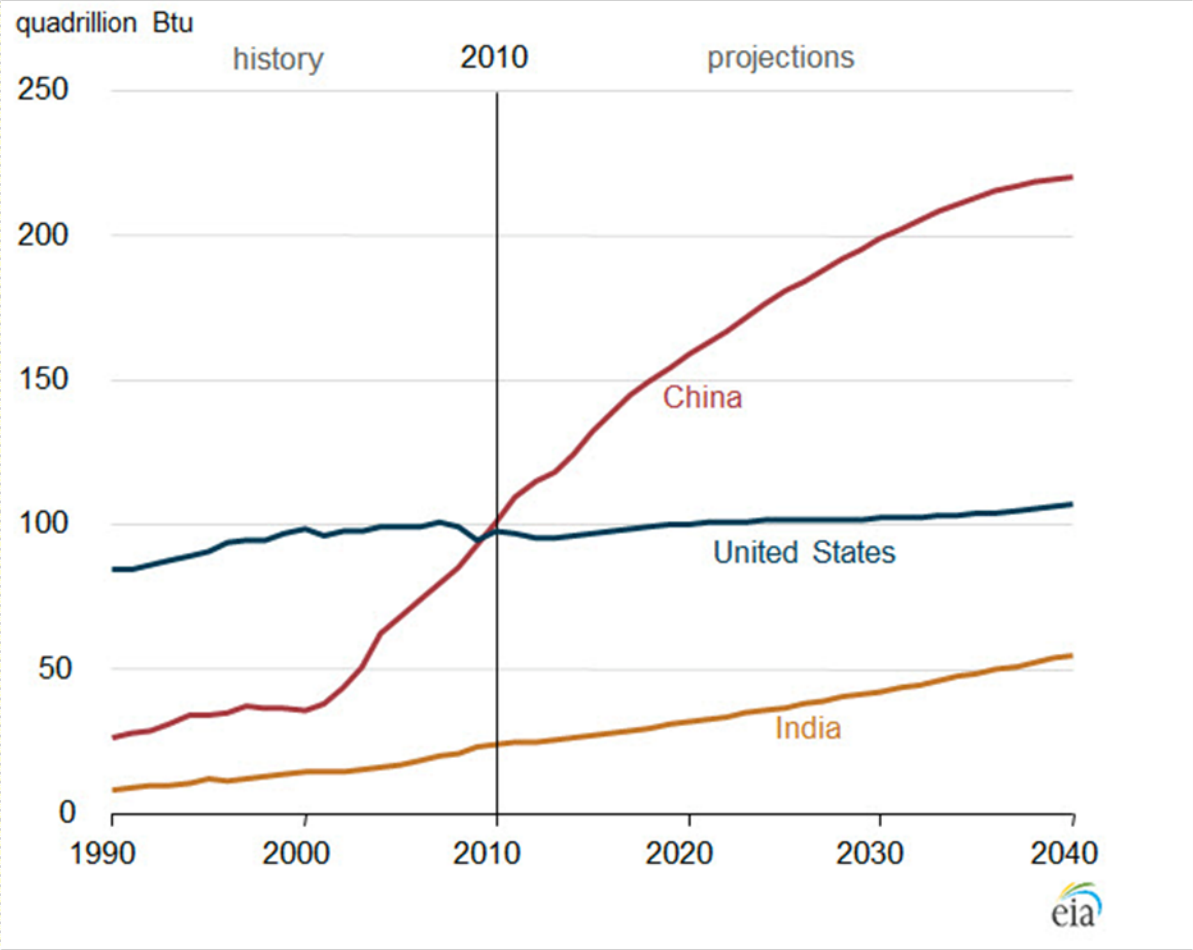
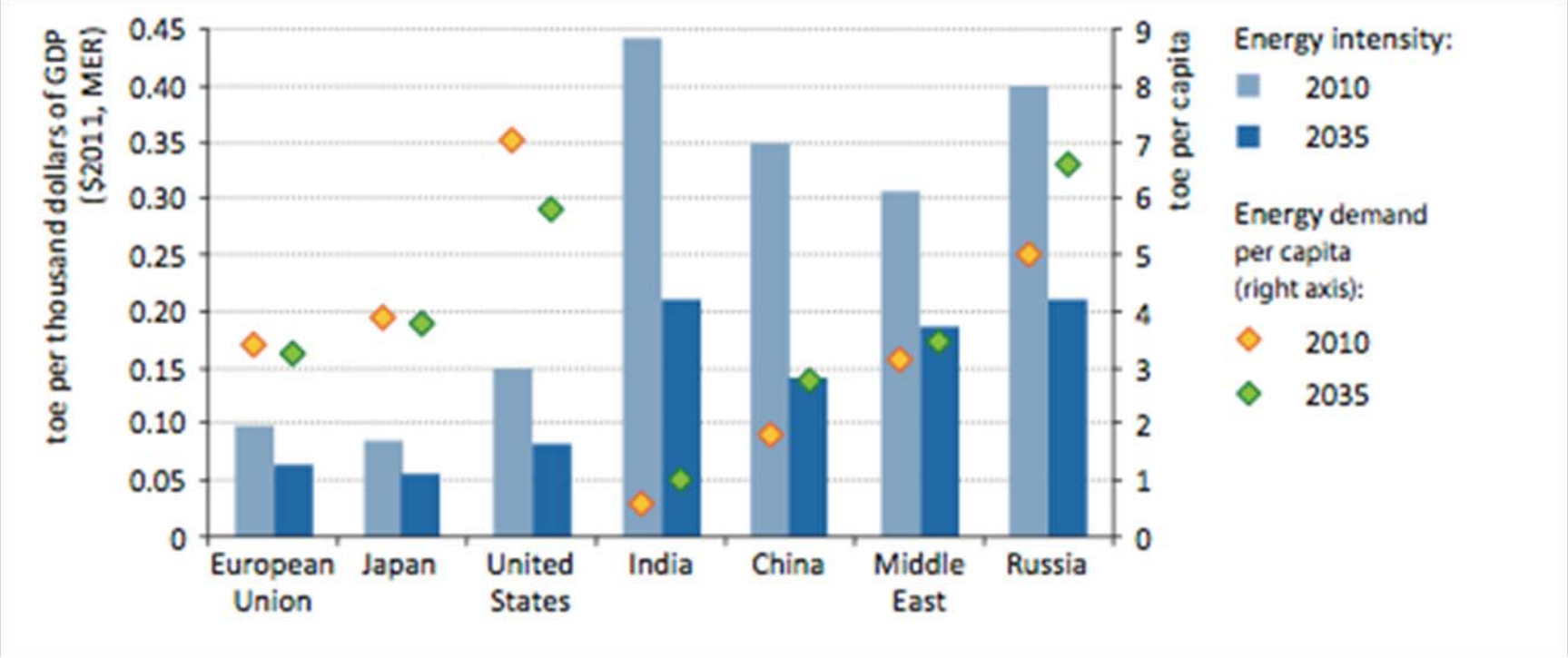
Graphic 1: Energy consumption in the US, China and India 1990-2040



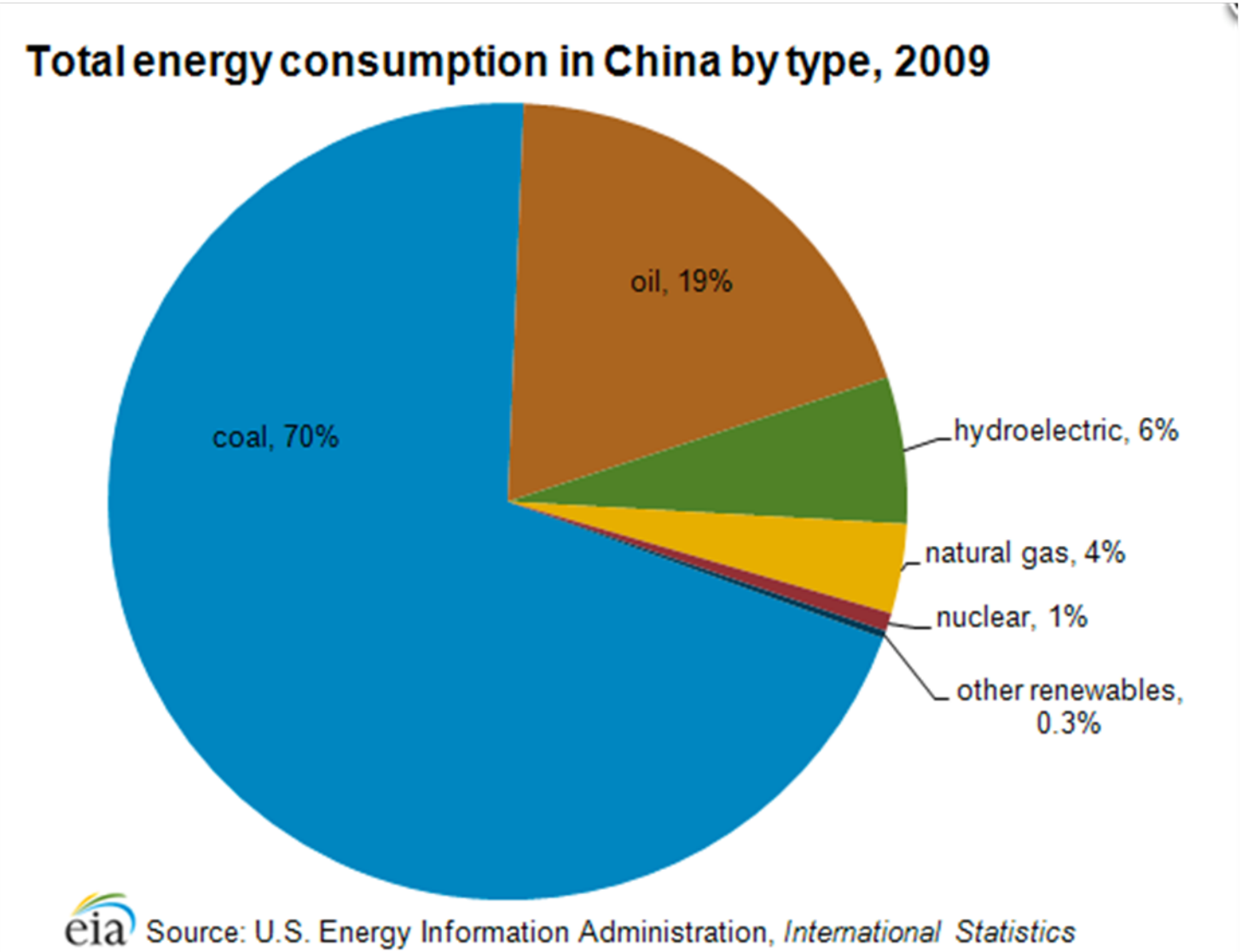
Source: EIA, International Energy Outlook 2013, July 2013. http://www.eia.gov/forecasts/ieo/world.cfm

Graphic 2: Global energy demand per unit GDP and per capita



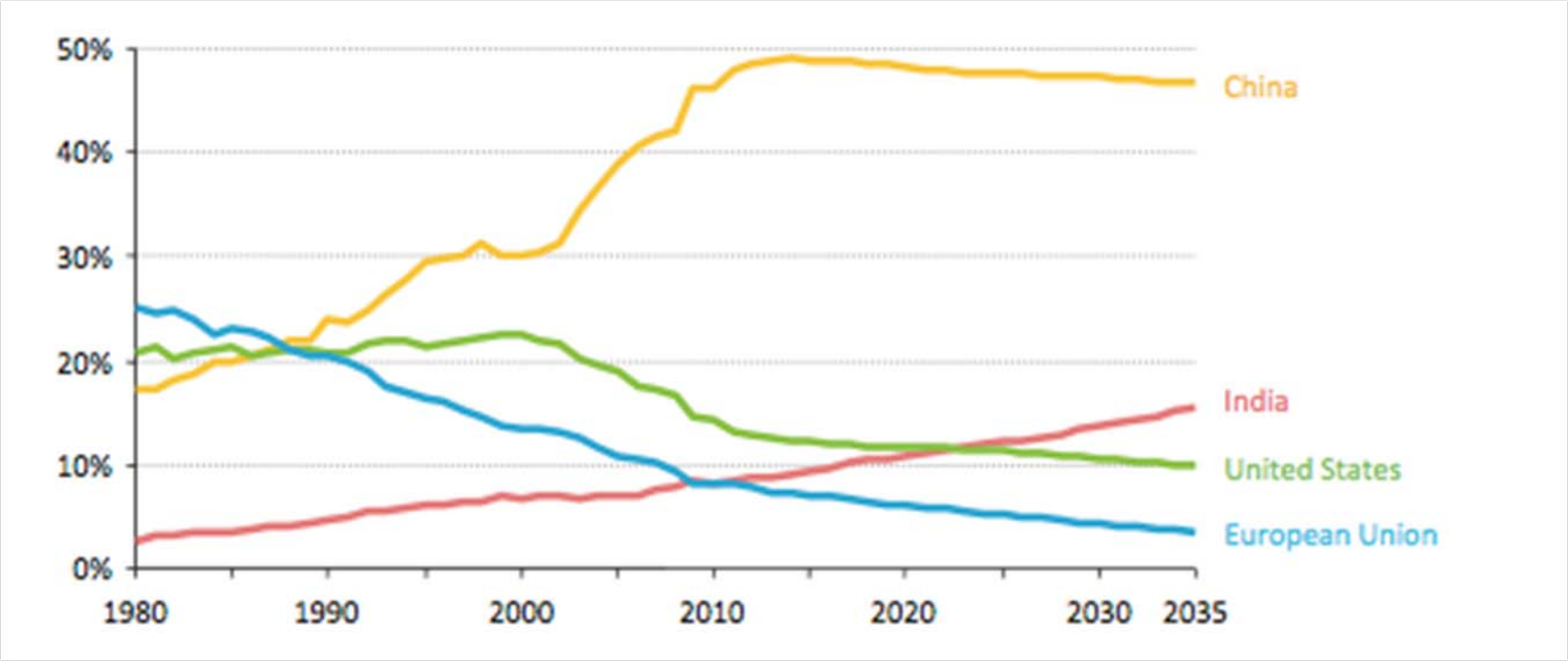
Source: IEA WEO 2012, New Policies Scenario, page 55.

Graphic 3
China's energy needs - 2009



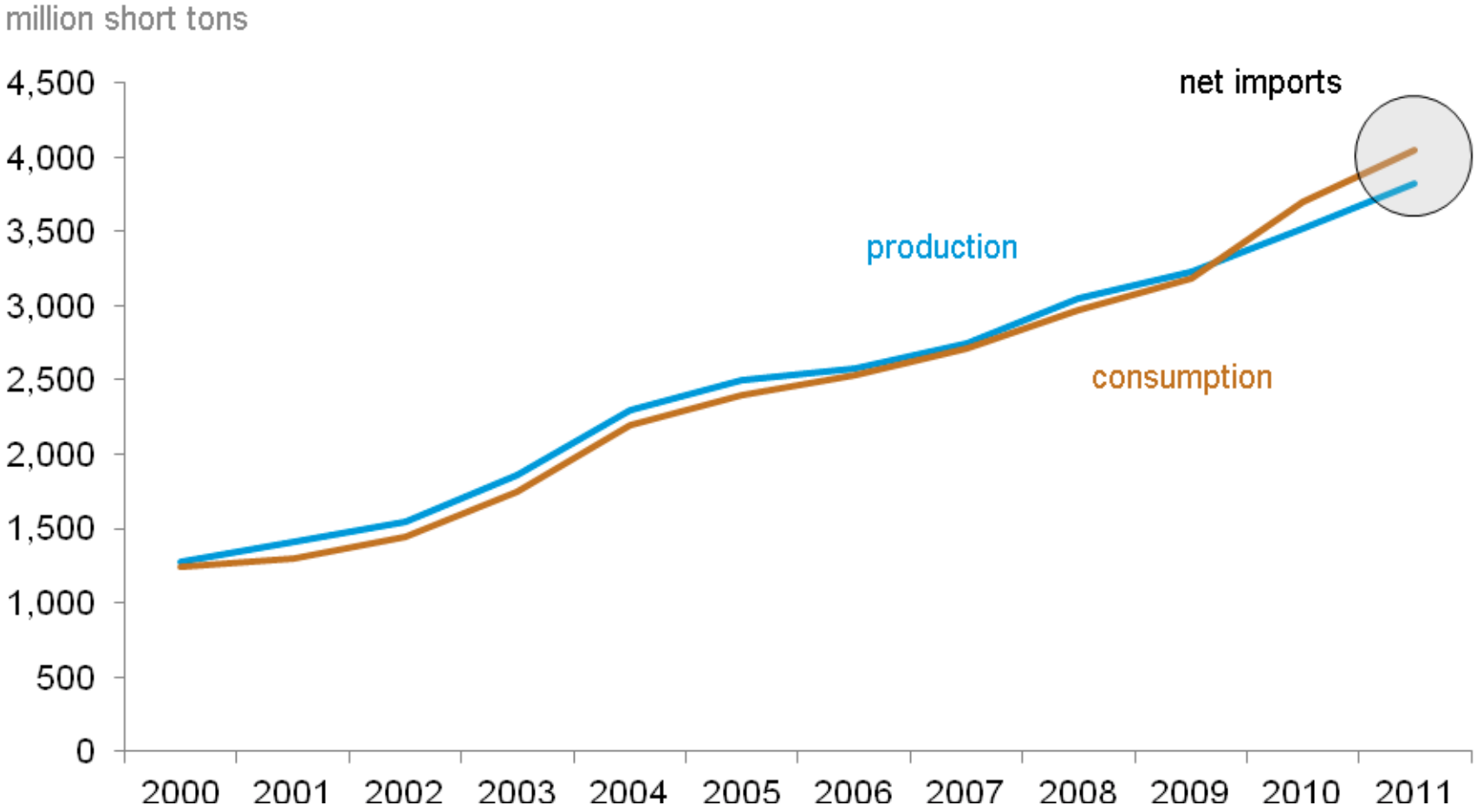
In EIA 2013.

Graphic 4:
Share of key regions in global coal demand



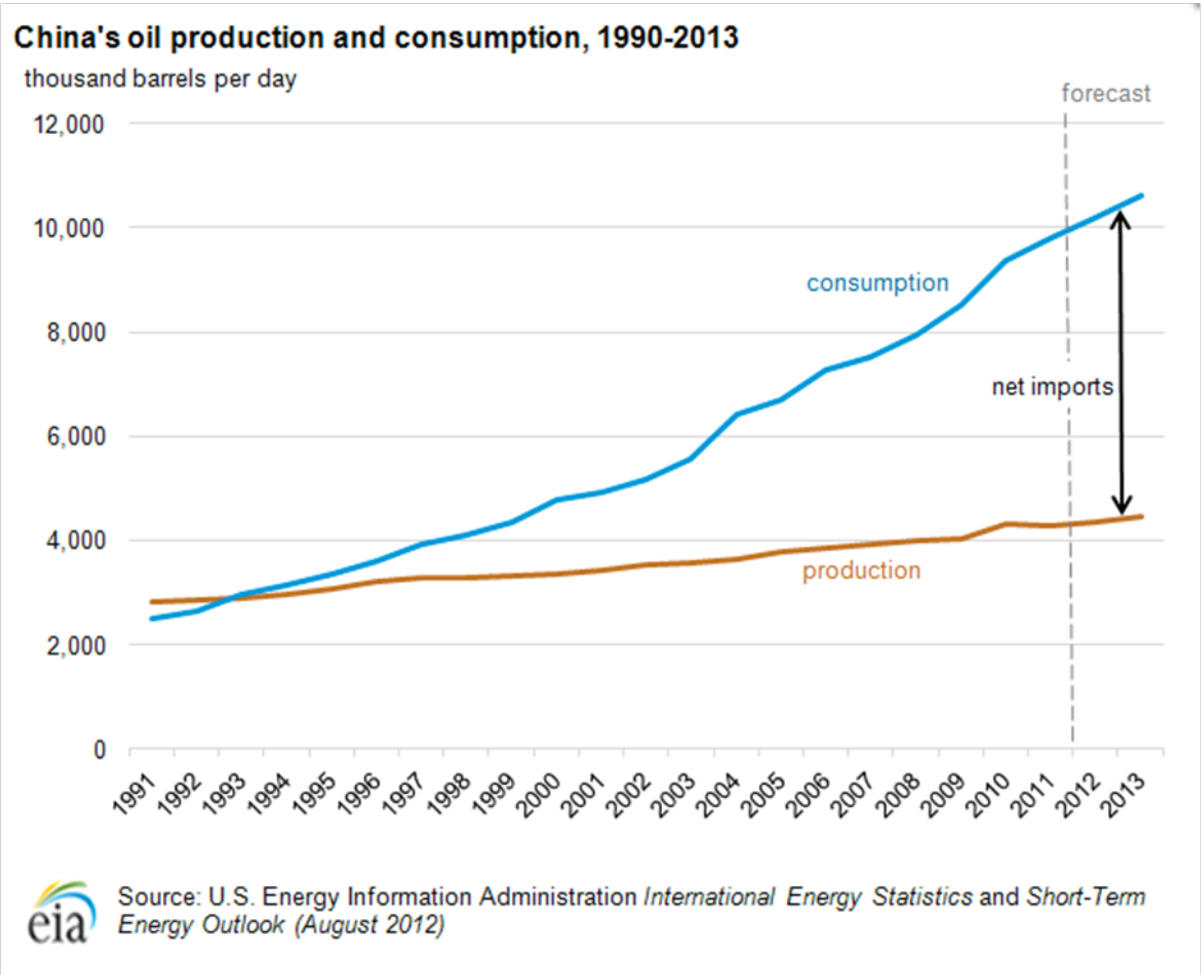
Source: IEA WEO 2012, New Policies Scenario, page 162.

Graphic 5
China's energy needs – coal imports

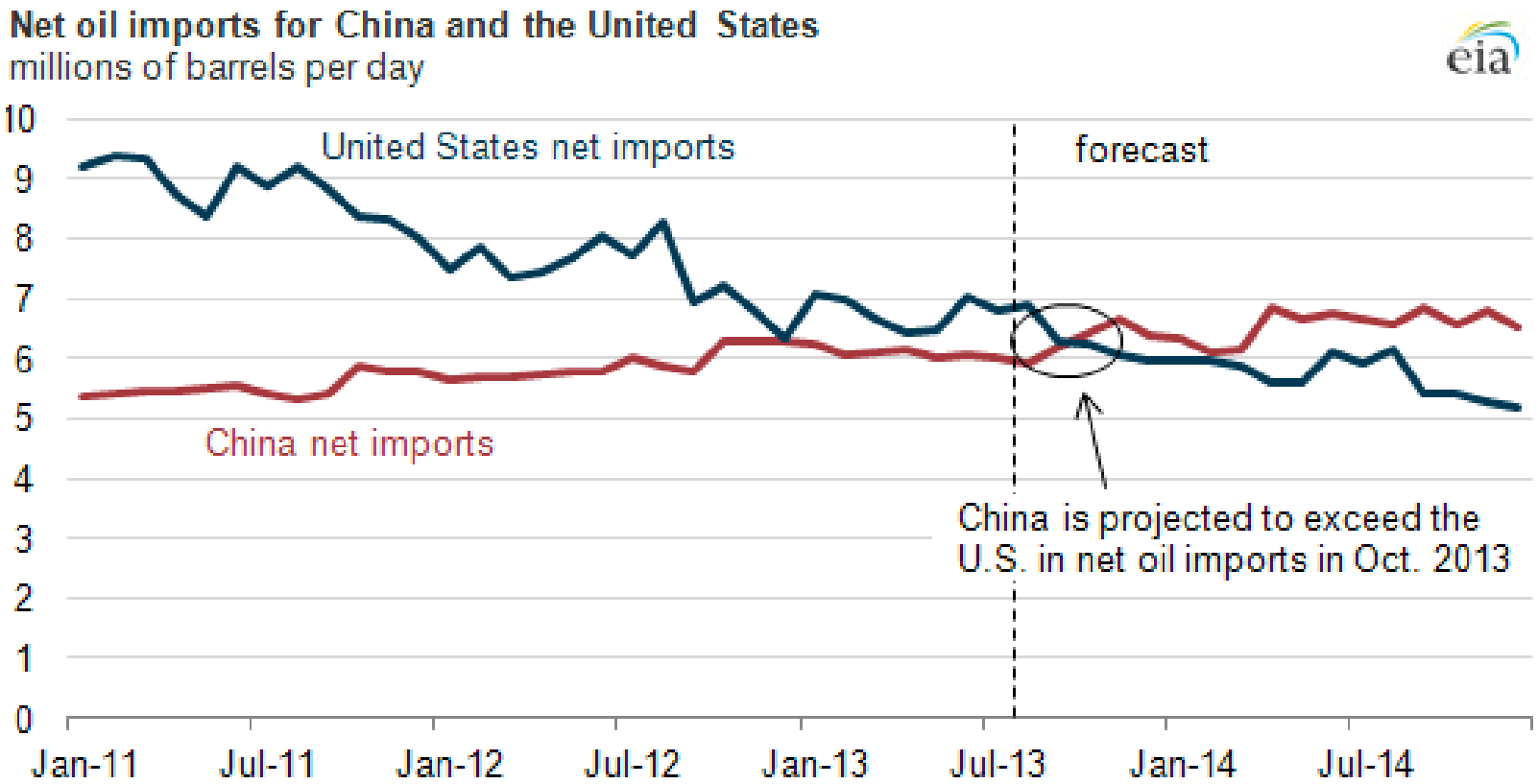


Source: US EIA *International Energy Statistics,* in EIA 2013.

Graphic 6
China's energy needs – oil



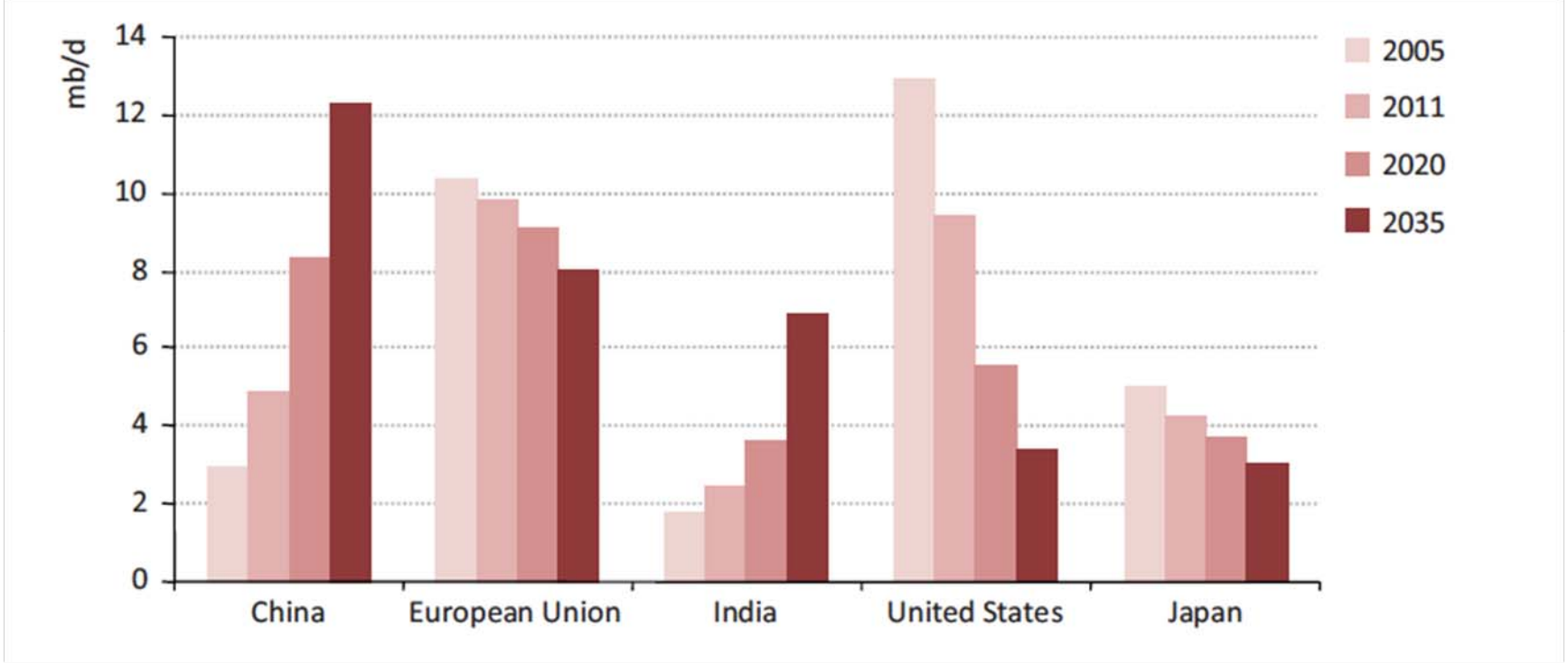
Graphic 7:
China's energy needs China v. US oil imports



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.

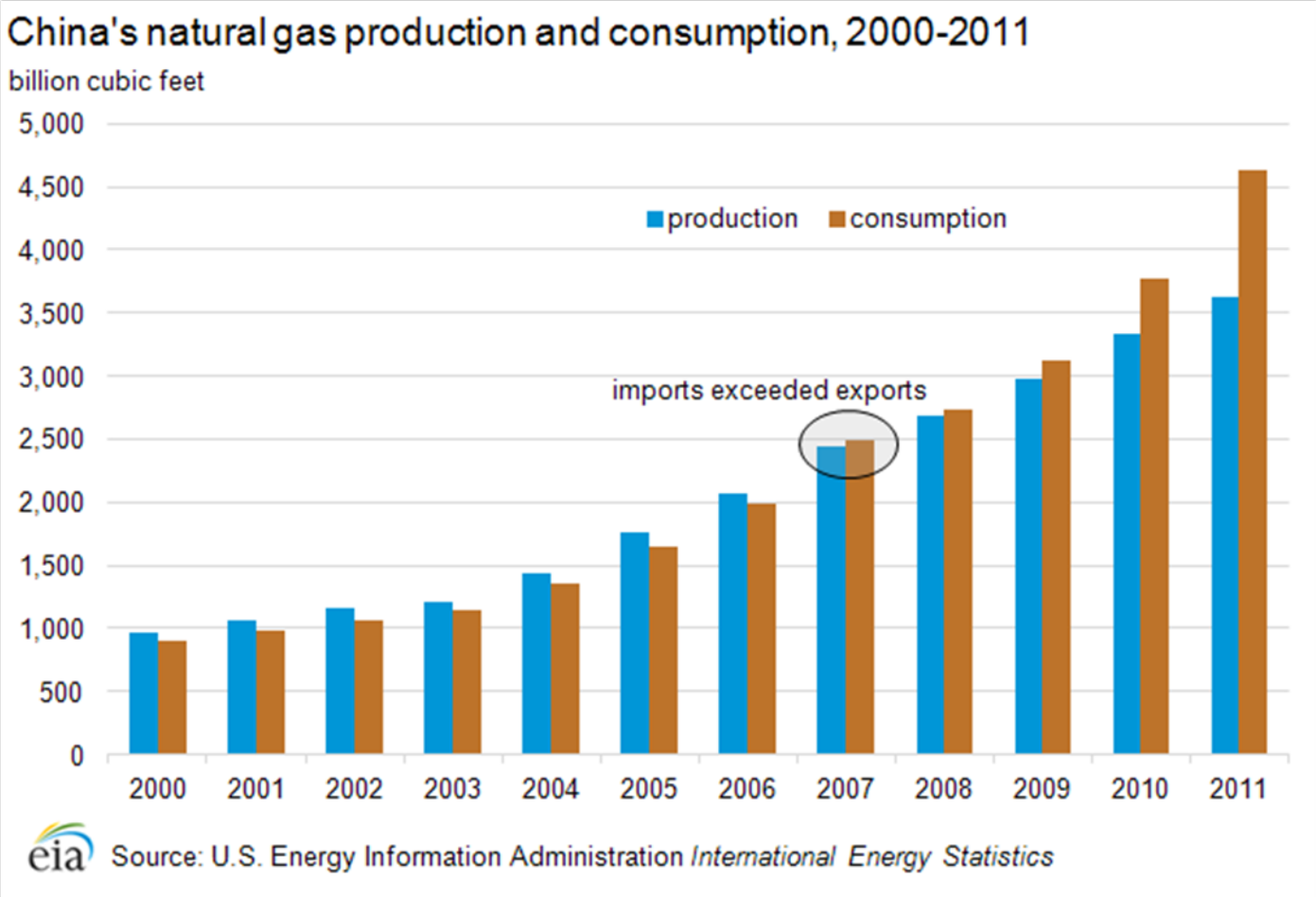
Graphic 8

Net oil imports countries-regions (2005-2035)

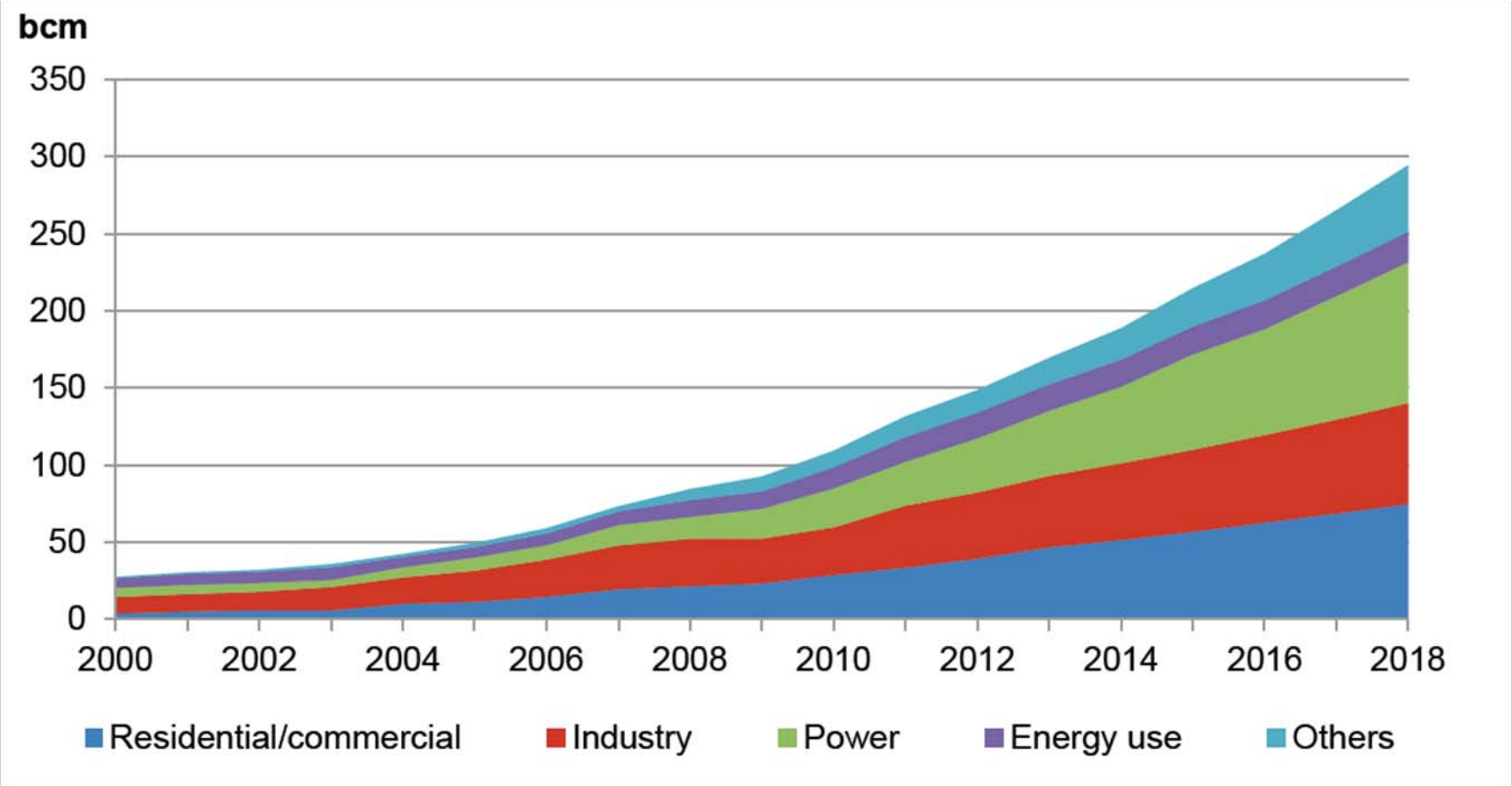


IEA WEO 2012, New Policies Scenario, page 120.

Graphic 9
China's energy needs – natural gas

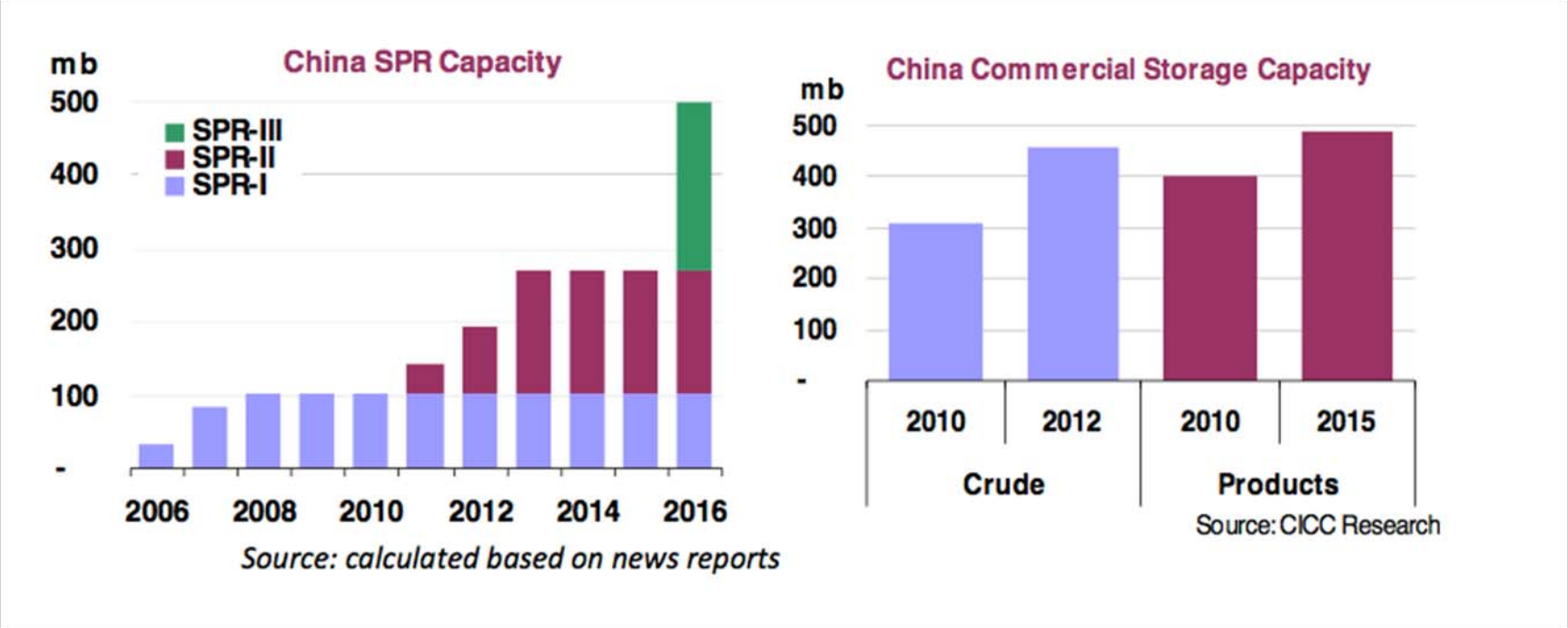


Graphic 10:
China's sectoral gas demand (2000-2018)



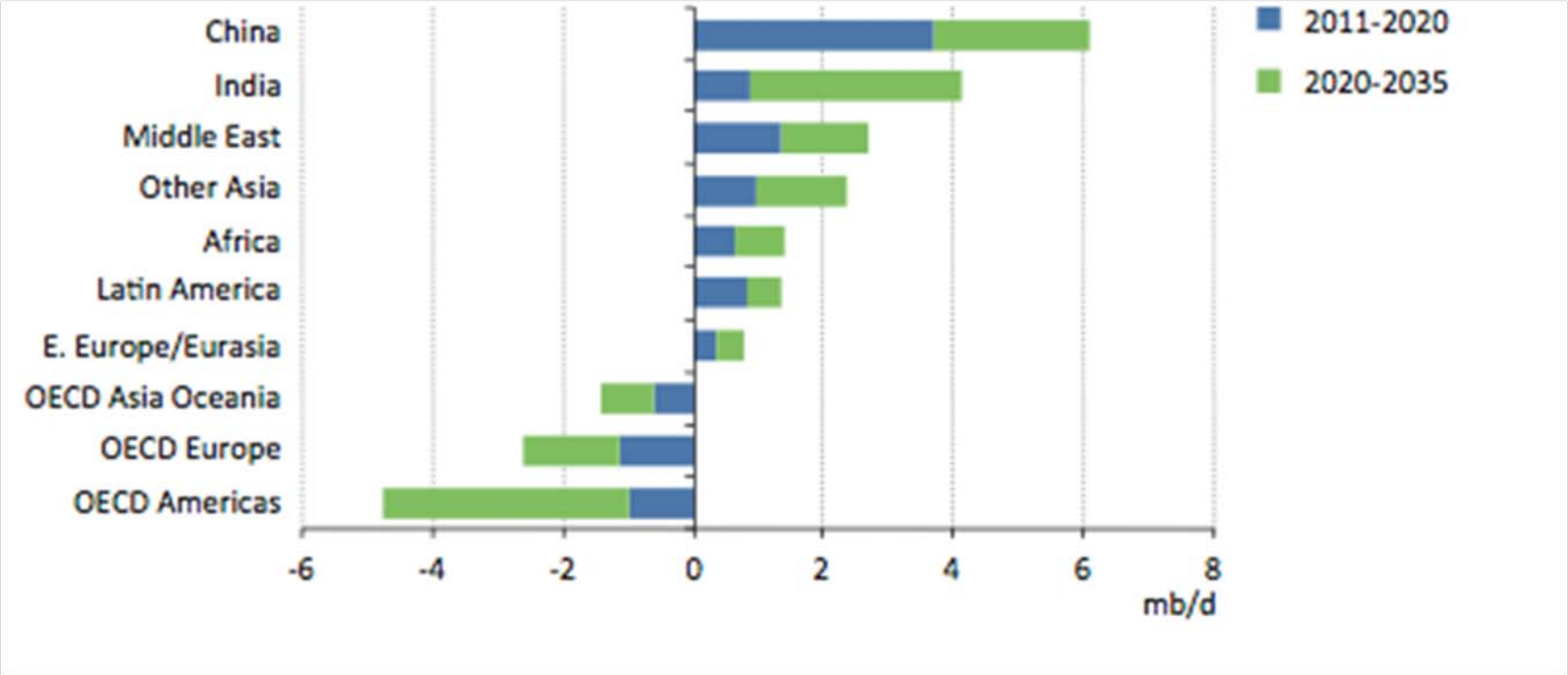
Source: Medium-Term Gas Market Report 2013 -- Market Trends and Projections to 2018, IEA, 2013.

Graphic 11:
China's oil storage



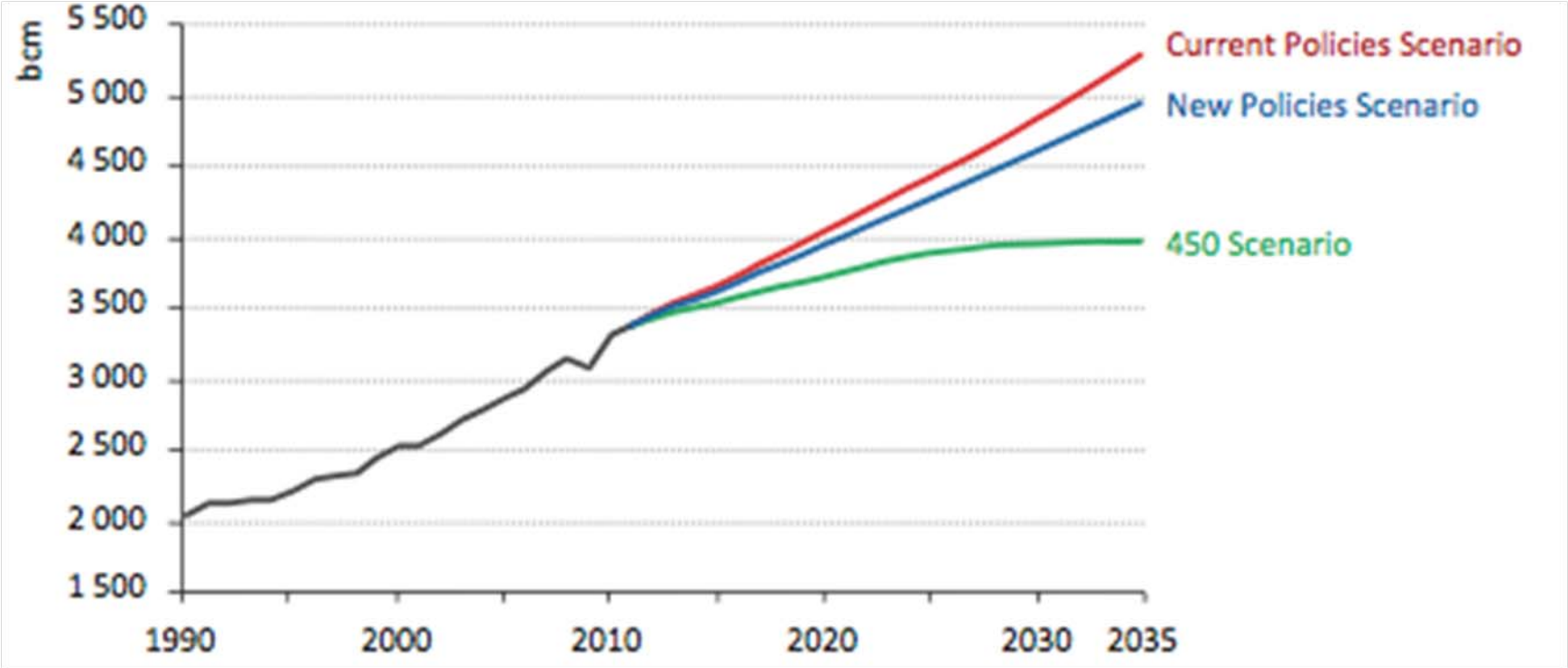
Source: Oil and Gas Security: Emergency Response of IEA Countries; The People's Republic of China, 2012, IEA, page 9.

Graphic 12:
World oil demand growth



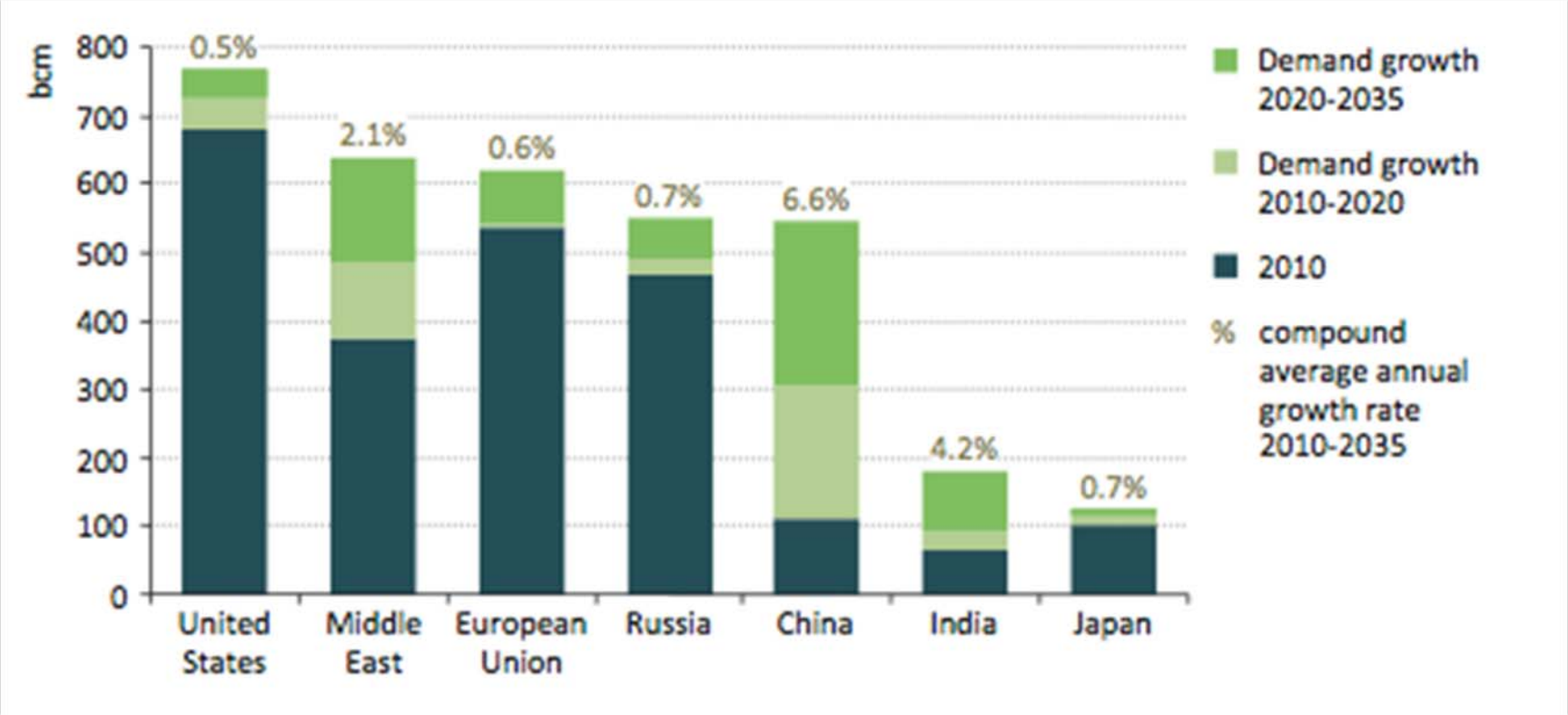
Source: IEA, WEO2012 New Policies Scenario, page 85.

Graphic 13:
World natural gas demand growth



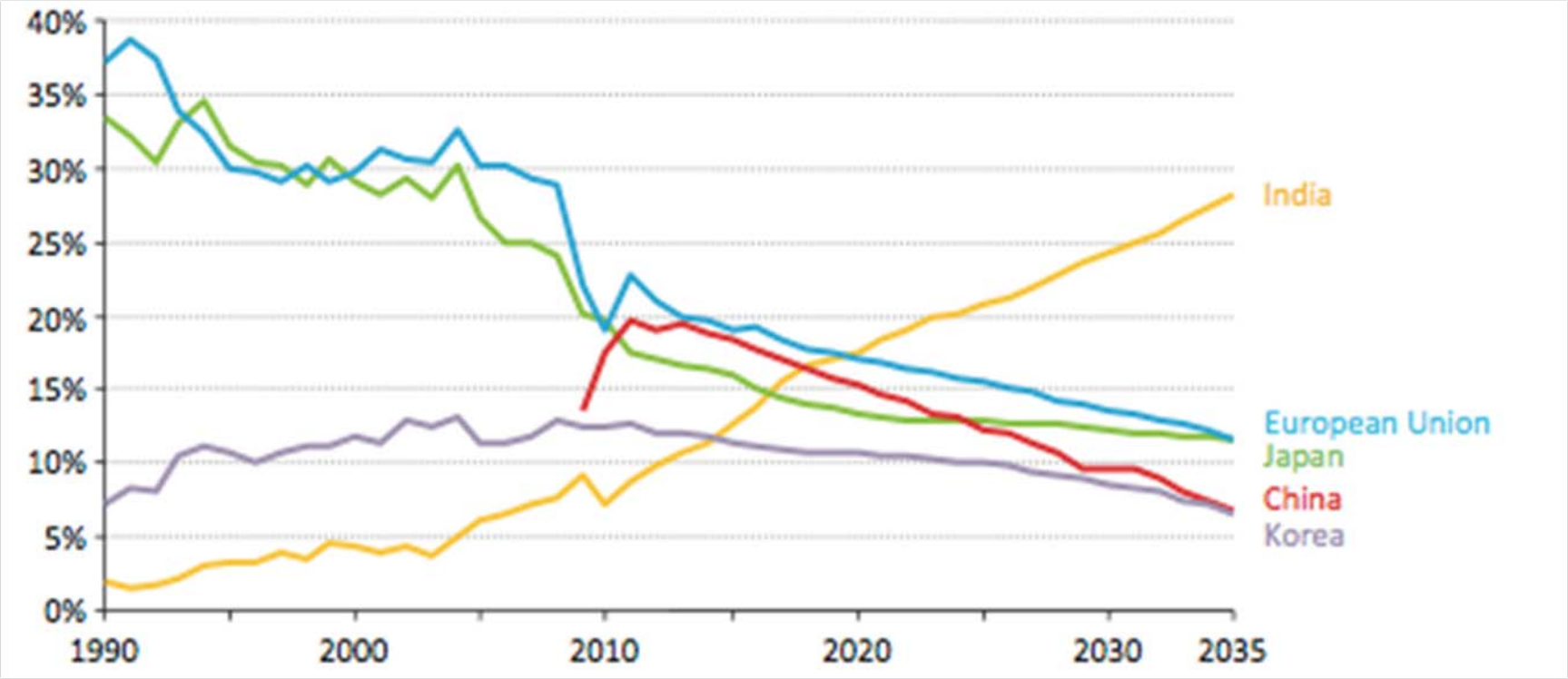
Source: IEA WEO 2012, page 126.

Graphic 14:
Natural gas demand in selected regions



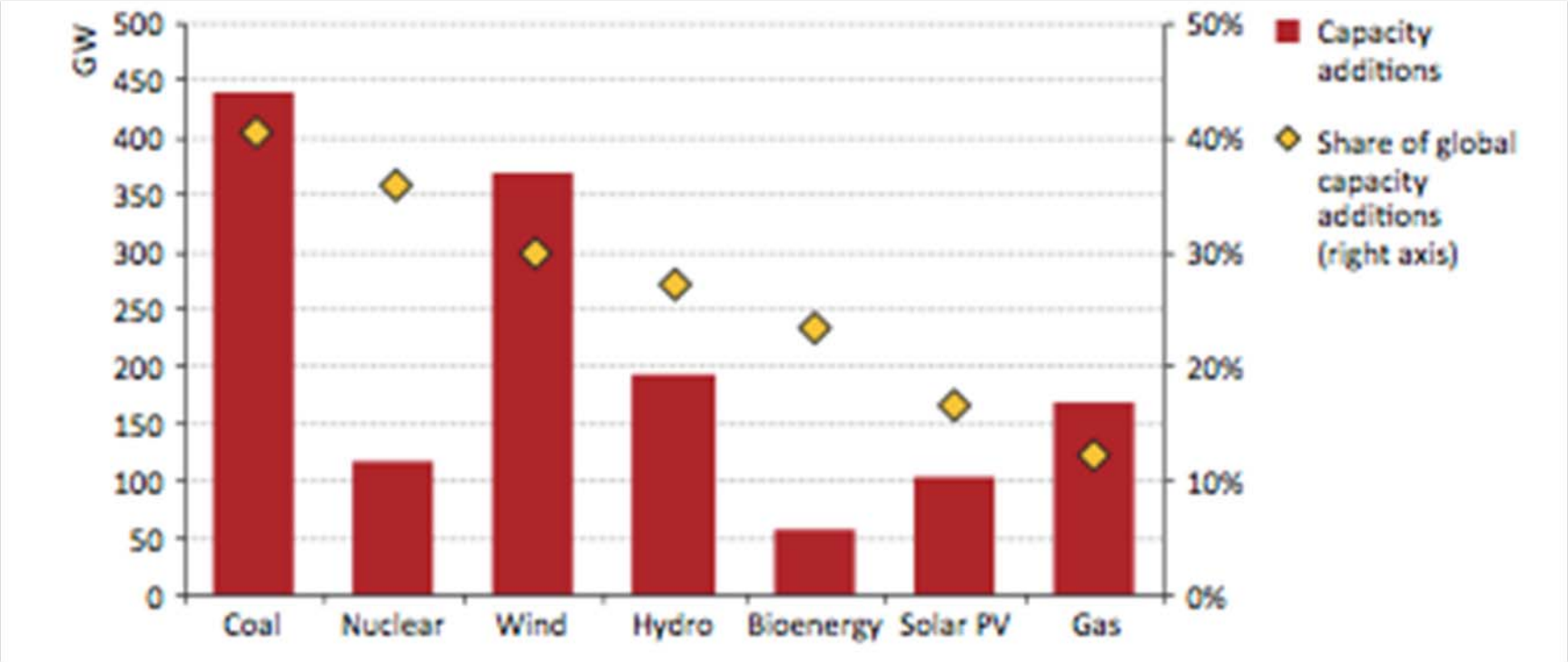
Source: IEA WEO 2012, New Policies Scenario, page 127.

Graphic 15:
Coal imports into selected regions



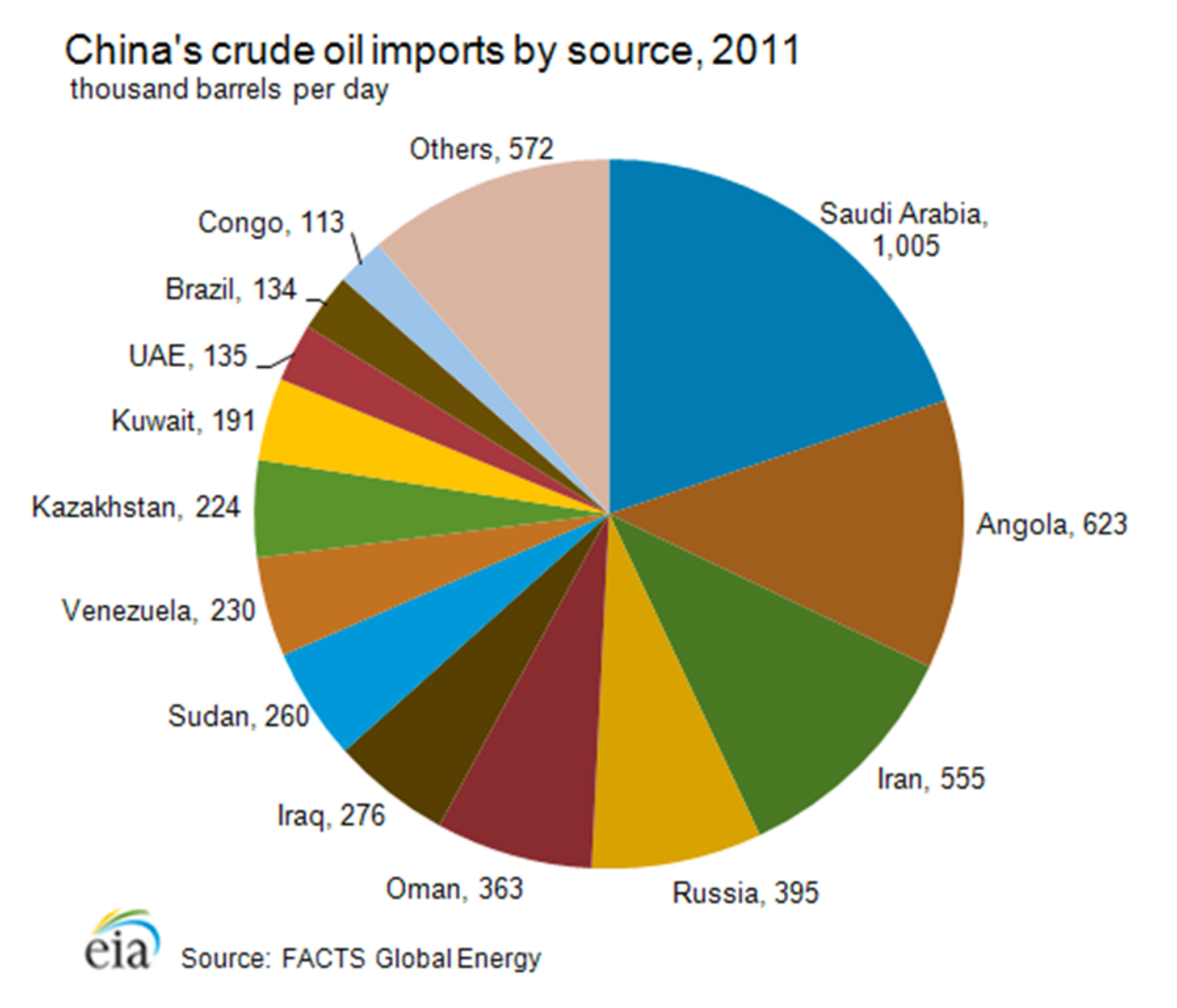
Source: IEA WEO 2012, New Policies Scenario page 169.

Graphic 16: Generation capacity additions in China 2012-2035

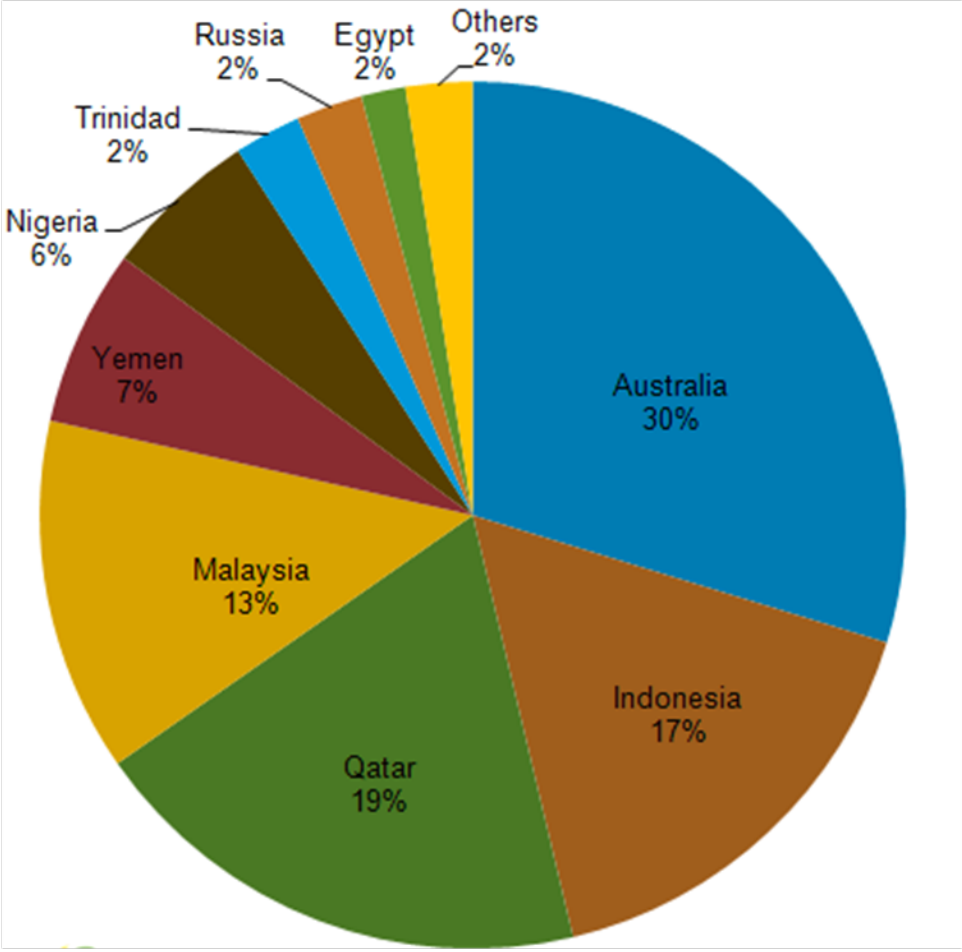


Source: IEA WEO 2012, New Policies Scenario, page 201.

Graphic 17
China's crude oil imports by source



Graphic 18
China's LNG imports by source



Source: EIA FACTS Global Energy

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