International Energy Agency

WORLD ENERGY OUTLOOK

# Orientation for a fast-changing energy world

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Tokyo, 21 April 2014

# The world energy scene today

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- **Some long-held tenets of the energy sector are being rewritten**
  - *Countries are switching roles: importers are becoming exporters…*
  - *… and exporters are among the major sources of growing demand*
  - *New supply options re-orientate the energy trade map*
- **But long-term solutions to global challenges remain scarce**
  - *Renewed focus on energy efficiency, but $CO_2$ emissions continue to rise*
  - *Fossil-fuel subsidies increased to $544 billion in 2012*
  - *1.3 billion people lack electricity – especially in Africa and S.Asia*
- **Energy prices add to the pressure on policymakers**
  - *Sustained period of high oil prices without parallel in market history*
  - *Large, persistent regional price differences for gas & electricity*

# The engine of energy demand growth moves to South Asia

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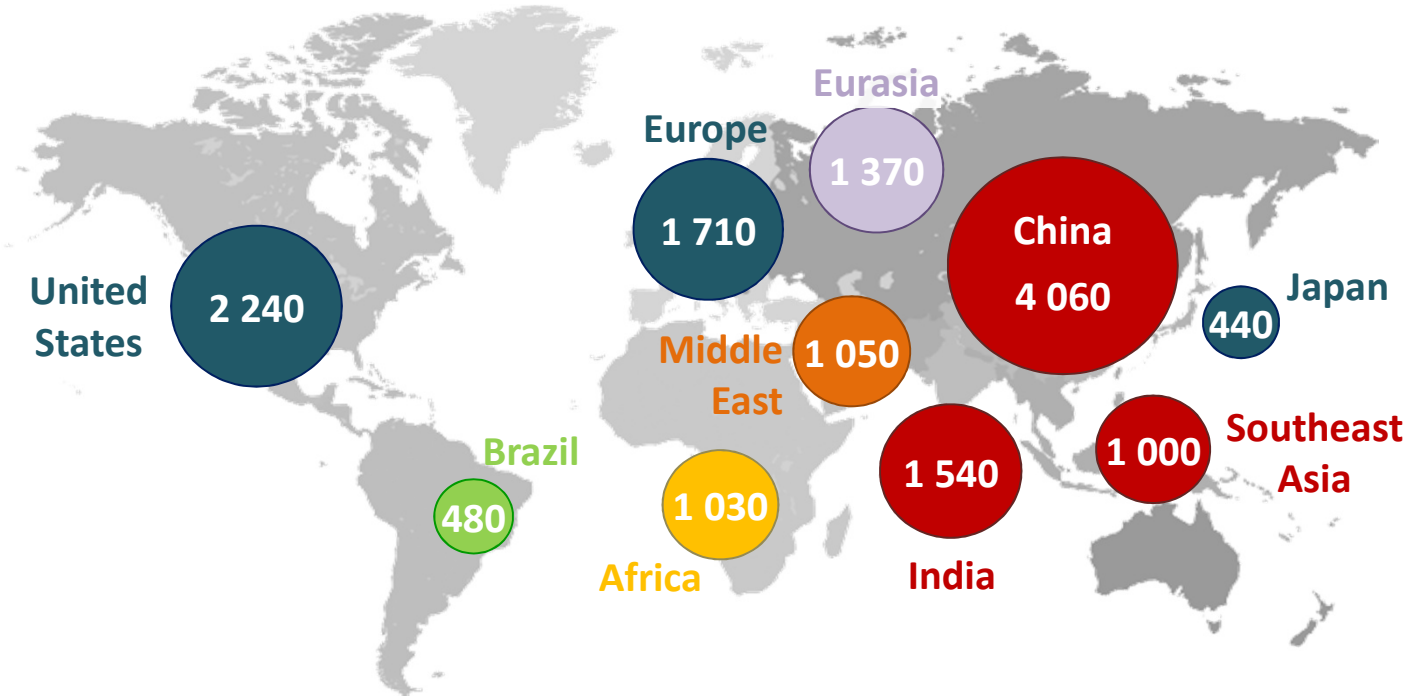
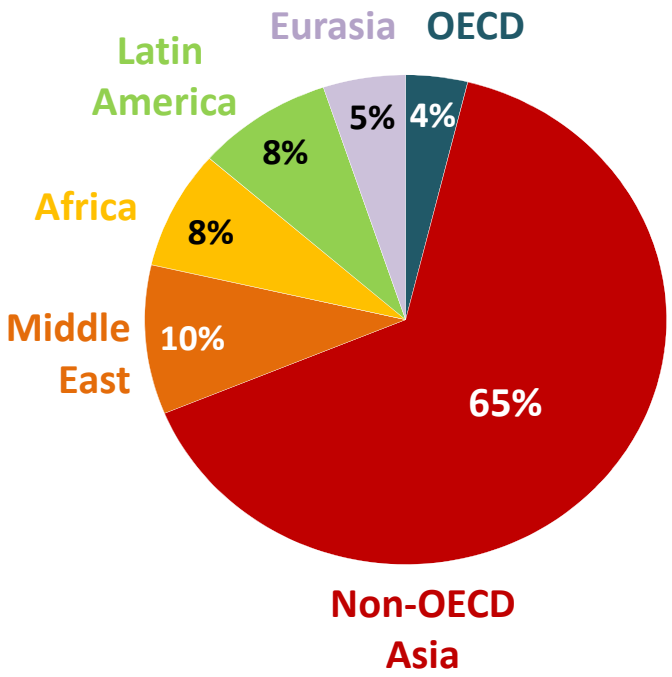
## Primary energy demand, 2035 (Mtoe)




## Share of global growth 2012-2035




***China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth***

# A mix that is slow to change

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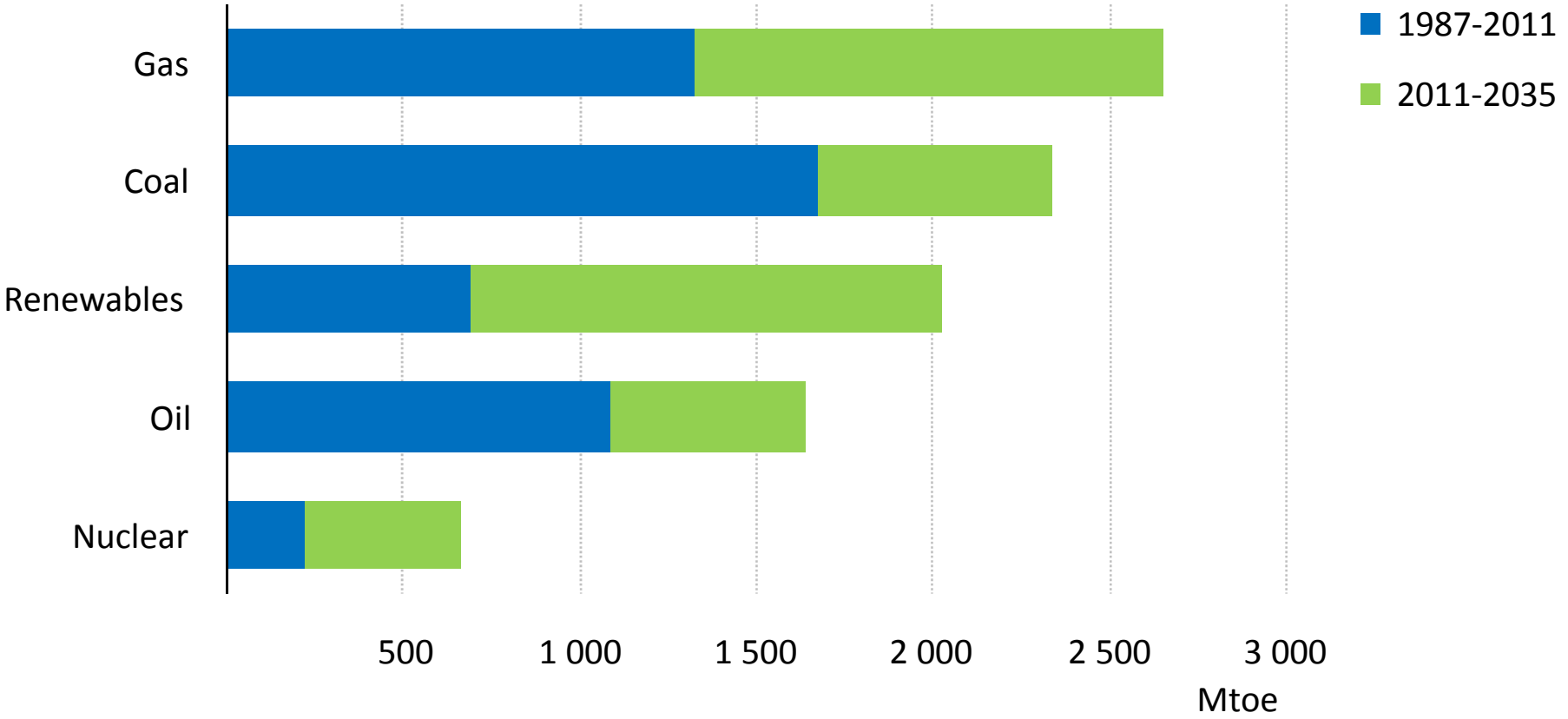
## Growth in total primary energy demand




***Today's share of fossil fuels in the global mix, at 82%, is the same as it was 25 years ago; the strong rise of renewables only reduces this to around 75% in 2035***

# Unconventional oil and gas has made a major contribution to global production

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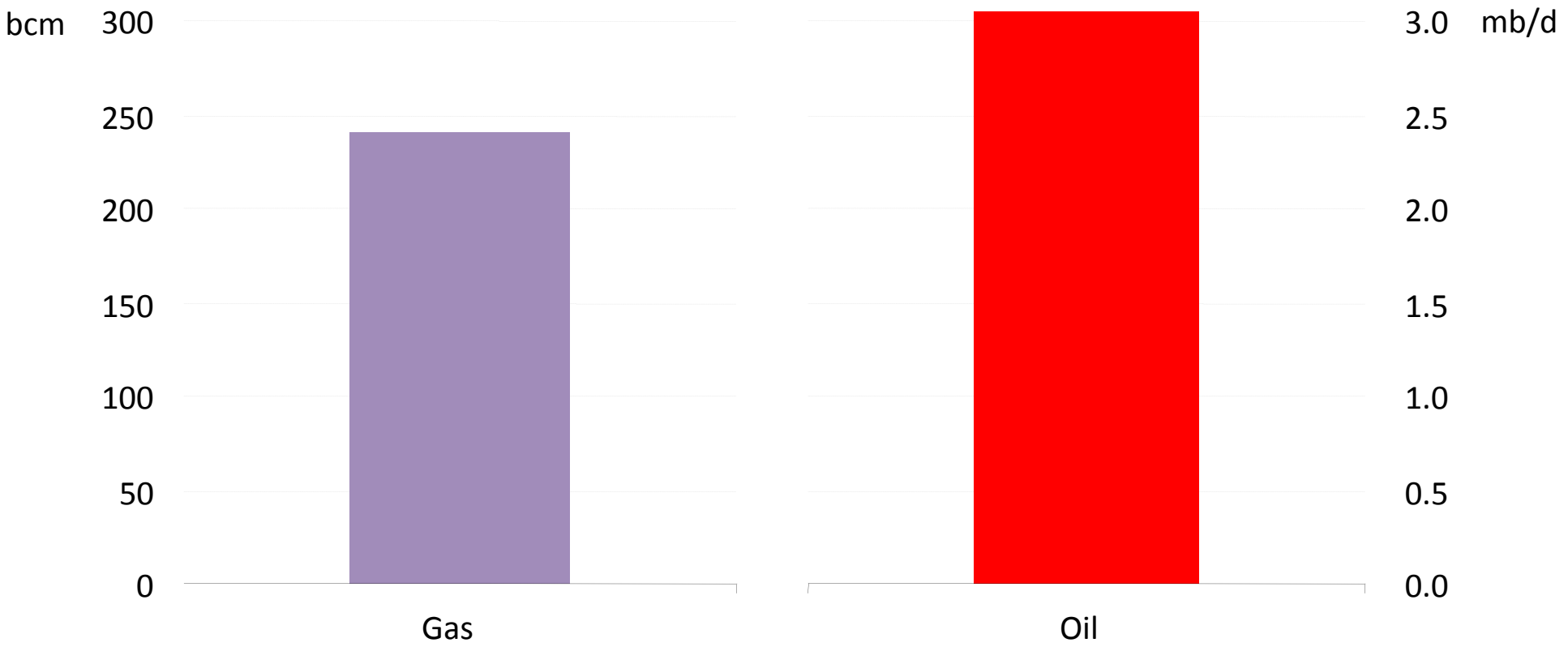
## US shale gas and shale oil production increases: 2005-2014




***Growth in US shale gas output since 2005 is equivalent to the total production of Qatar, Kuwait, UAE and Iraq combined; while shale oil output is equal to that of Iraq***

# US oil imports are shrinking rapidly – thanks to shale oil only?

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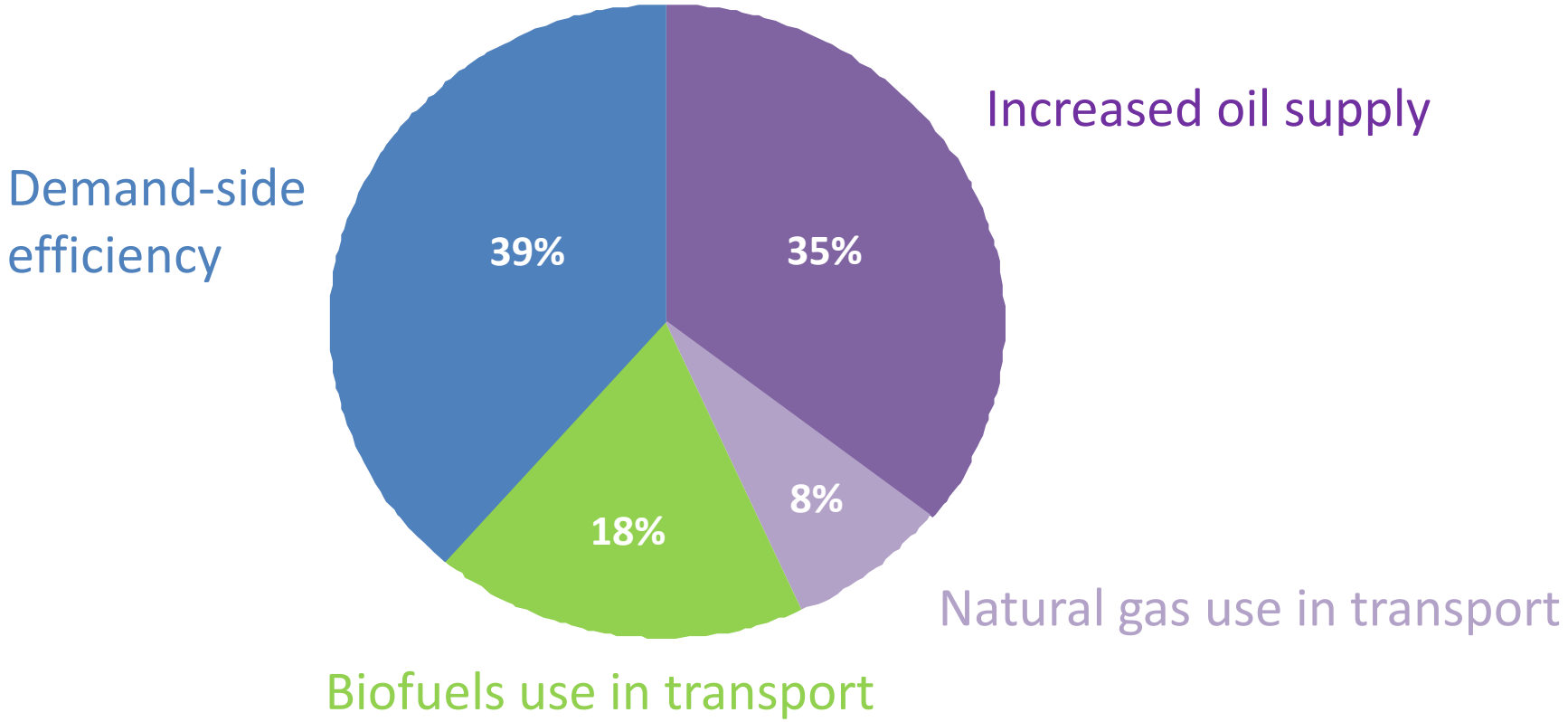
## Reductions in US oil imports in 2035 relative to today




***US oil imports are set to plummet due to increasing oil supplies and recently adopted policies to improve efficiency of cars and trucks***

# Two chapters to the oil production story

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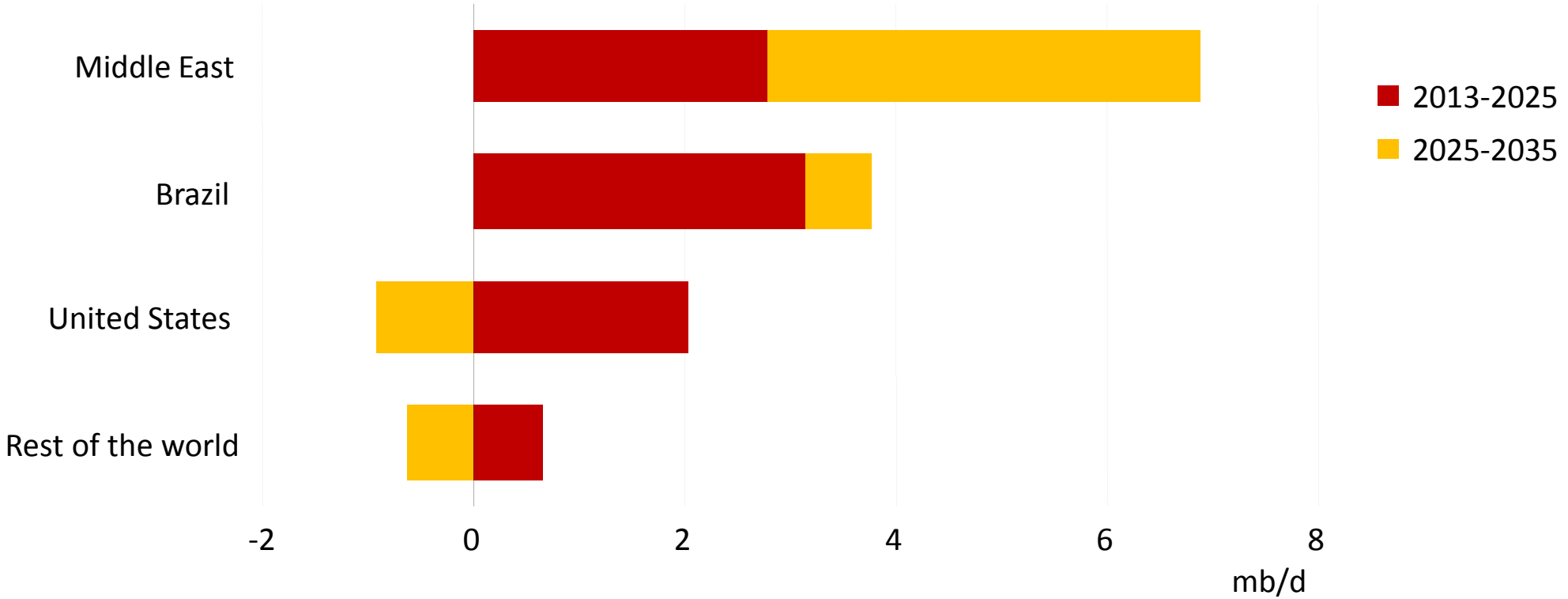
## Contributions to global oil production growth




***The United States (light tight oil) & Brazil (deepwater) step up until the mid-2020s, but the Middle East is critical to the longer-term oil outlook***

# US emissions on a downward trend

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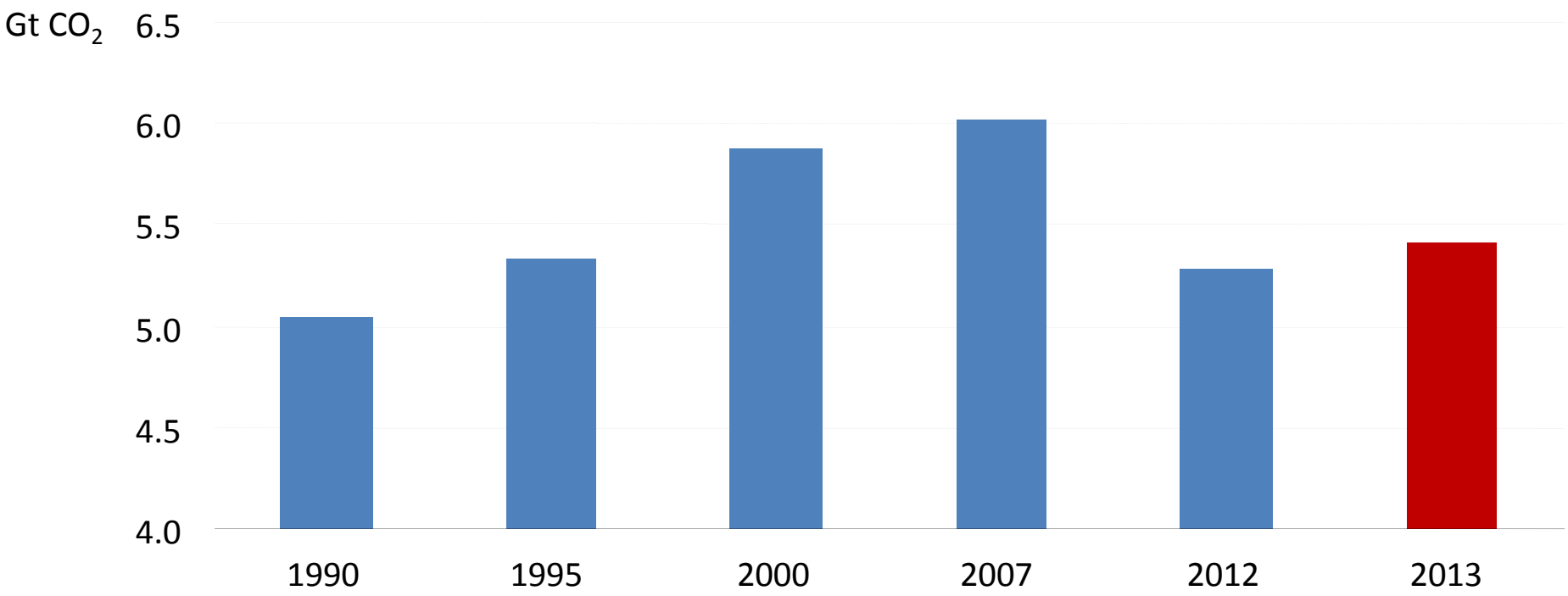
## Energy-related $CO_2$ emissions in the United States




***$CO_2$ emissions fell sharply since the shale gas revolution, but rebounded last year on the back of a partial gas-coal switch and increased industrial activity***

# Who has flooded the markets?

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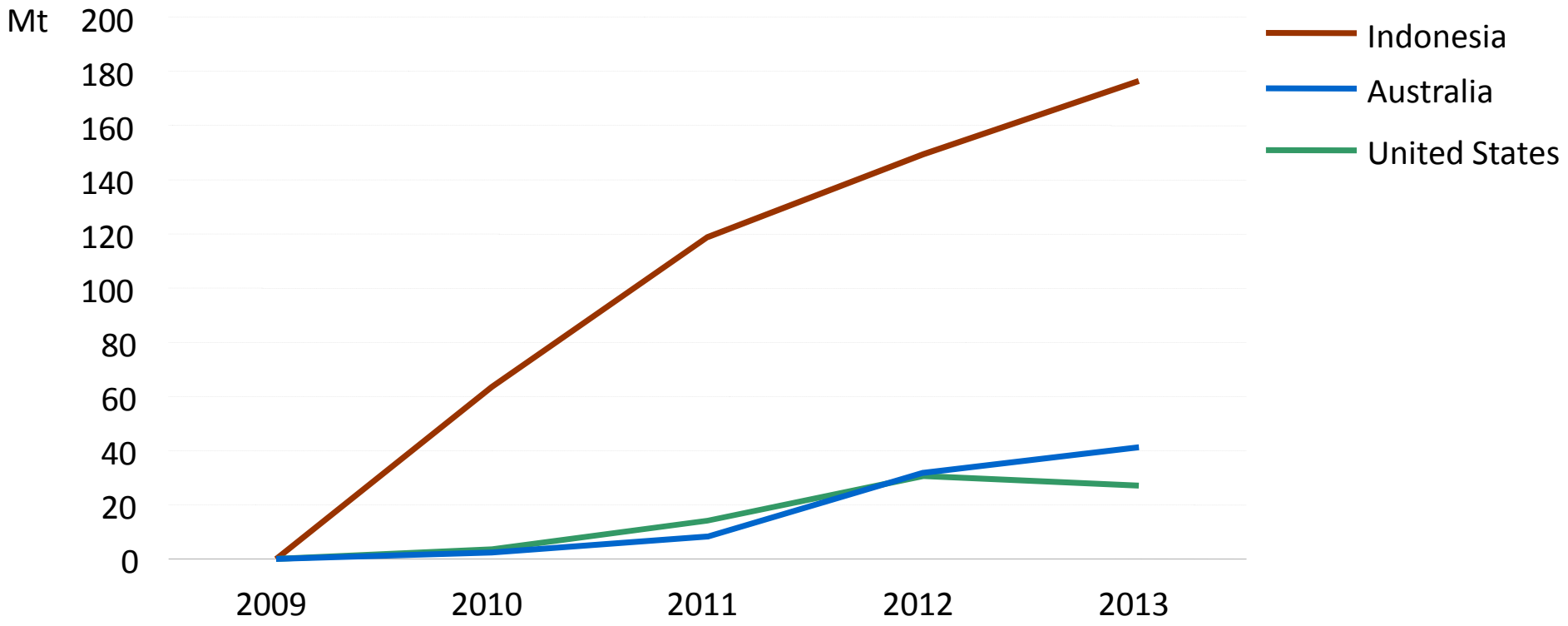
## Incremental steam coal exports




***The US accounted for only 7% of the increase in global steam coal exports since 2007***

# The slowdown in Chinese demand caught the industry off-guard

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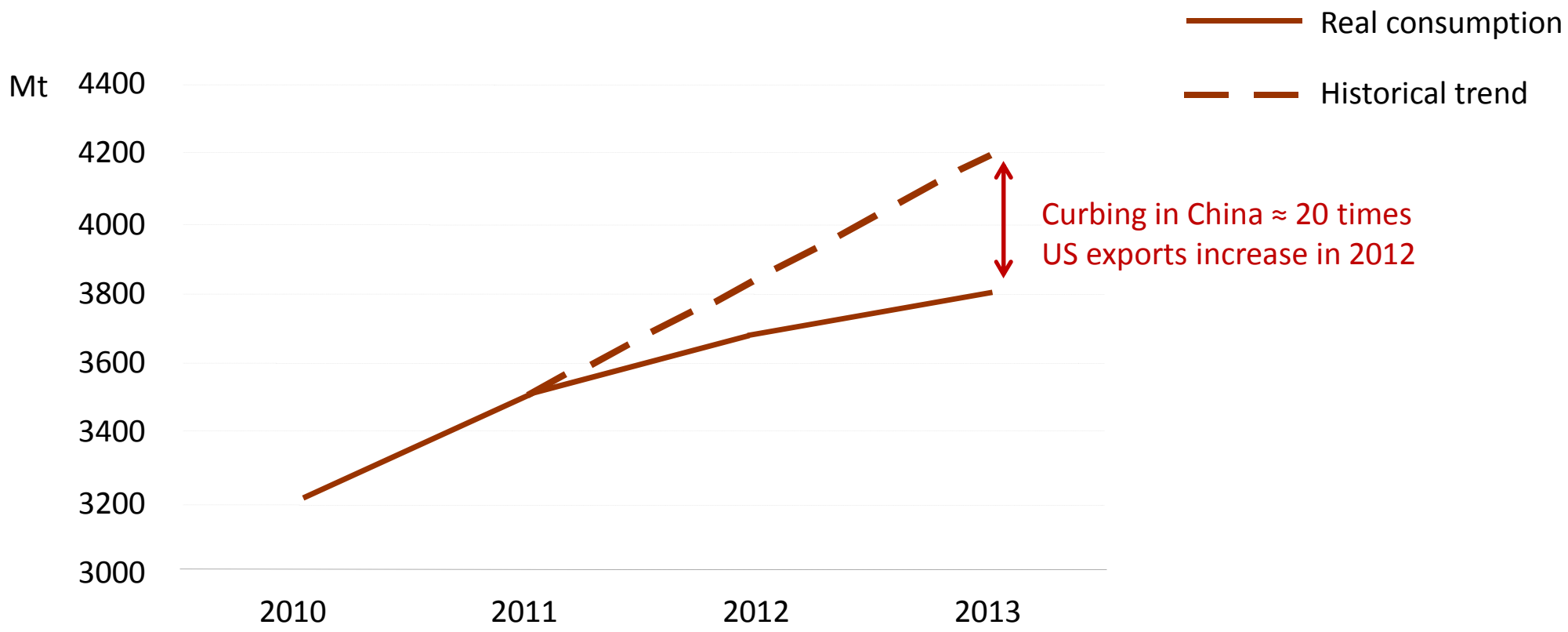
## Coal demand in China: real demand vs historical trend




***China's move away from coal will be a far greater determinant of the direction of the coal markets than the shale gas revolution in the US***

# Who has the energy to compete?

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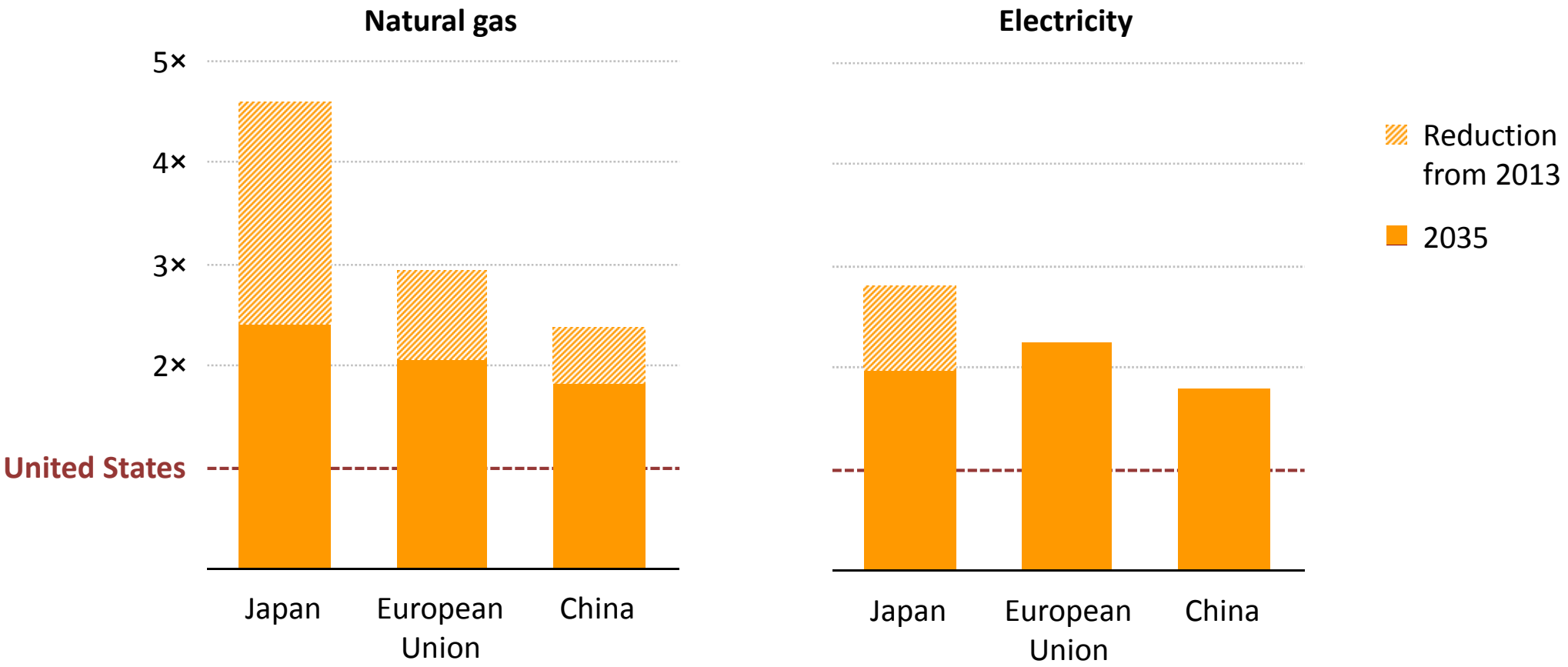
## Ratio of industrial energy prices relative to the United States




***Regional differences in natural gas prices narrow from today's very high levels but remain large through to 2035; electricity price differentials also persist***

# Higher energy prices make it harder for Japanese industry to compete

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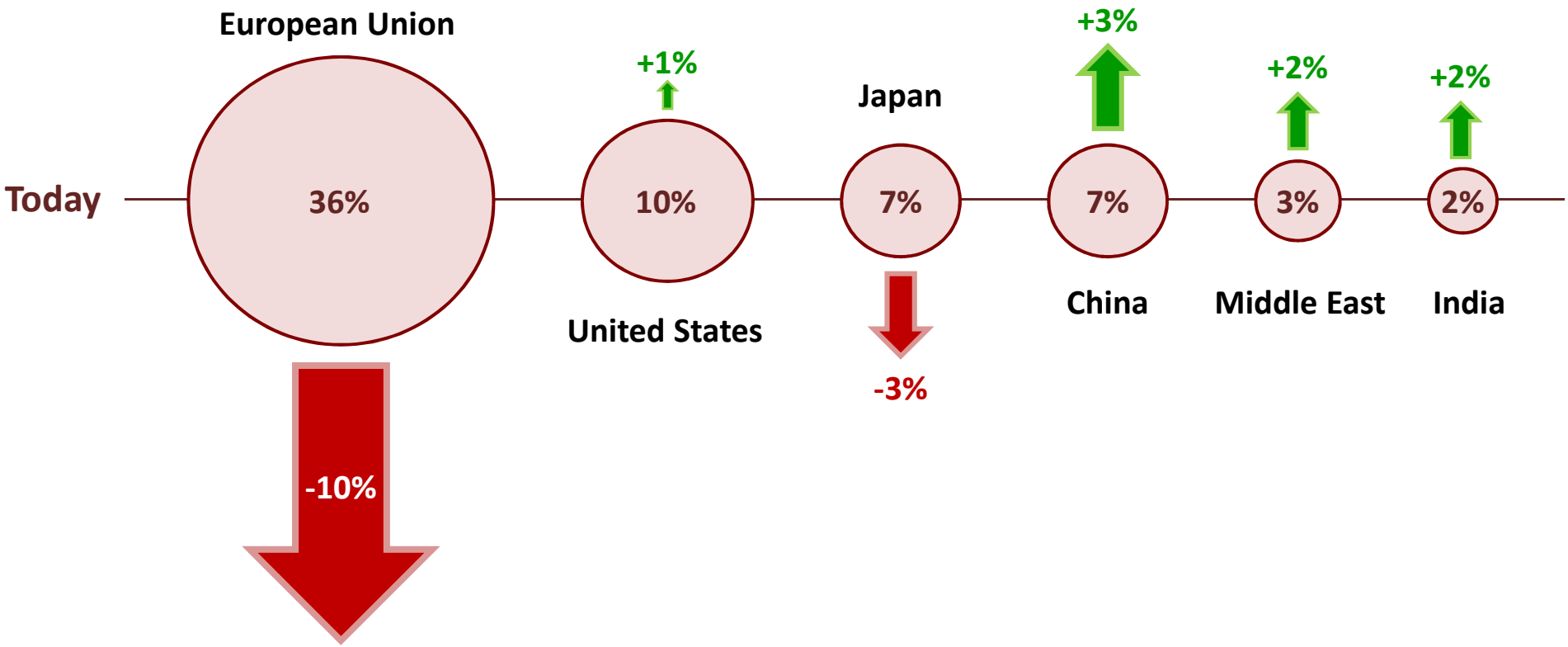
## Share of global export market for energy-intensive goods to 2035




*Even in our Central Scenario (in which nuclear reactors gradually restart), higher energy price result in a decline in Japan's share of global trade in energy-intensive goods*

# LNG from the United States can alleviate strain on the gas markets, but is no silver bullet

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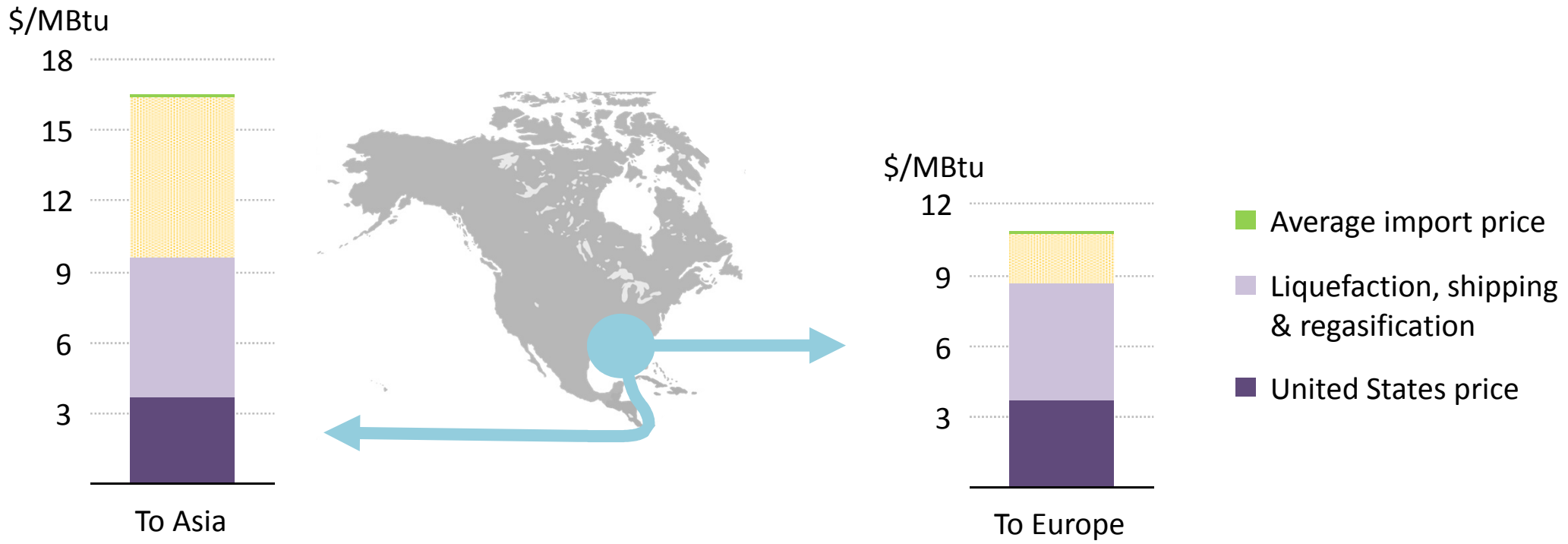
## Indicative economics of LNG export from the US Gulf Coast




***New LNG supplies accelerate movement towards a more interconnected global market, but high costs of transport between regions mean no single global gas price***

# The implications of Zero Nuclear for Japan's energy outlook to 2035

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- **Energy import bills – the key to the record current account deficit – rise by an additional 1.3 Trillion Yen per year on average**
- **To replace the nuclear capacity, investment in the power sector & in LNG terminals needs to rise by an additional 250 Billion Yen per year**
- **Japan's energy self-sufficiency deteriorates**
  - *Self-sufficiency drops by one-third to just 16% in 2035, which is 5 times lower than China's & 6 times lower than that of the US*
- **Effects on LNG market in Asia: low (or zero) nuclear power generation in Japan will contribute to a tightening of Asian LNG markets, leading to upward pressure on gas prices in Asia**

# Climate implications of Zero Nuclear

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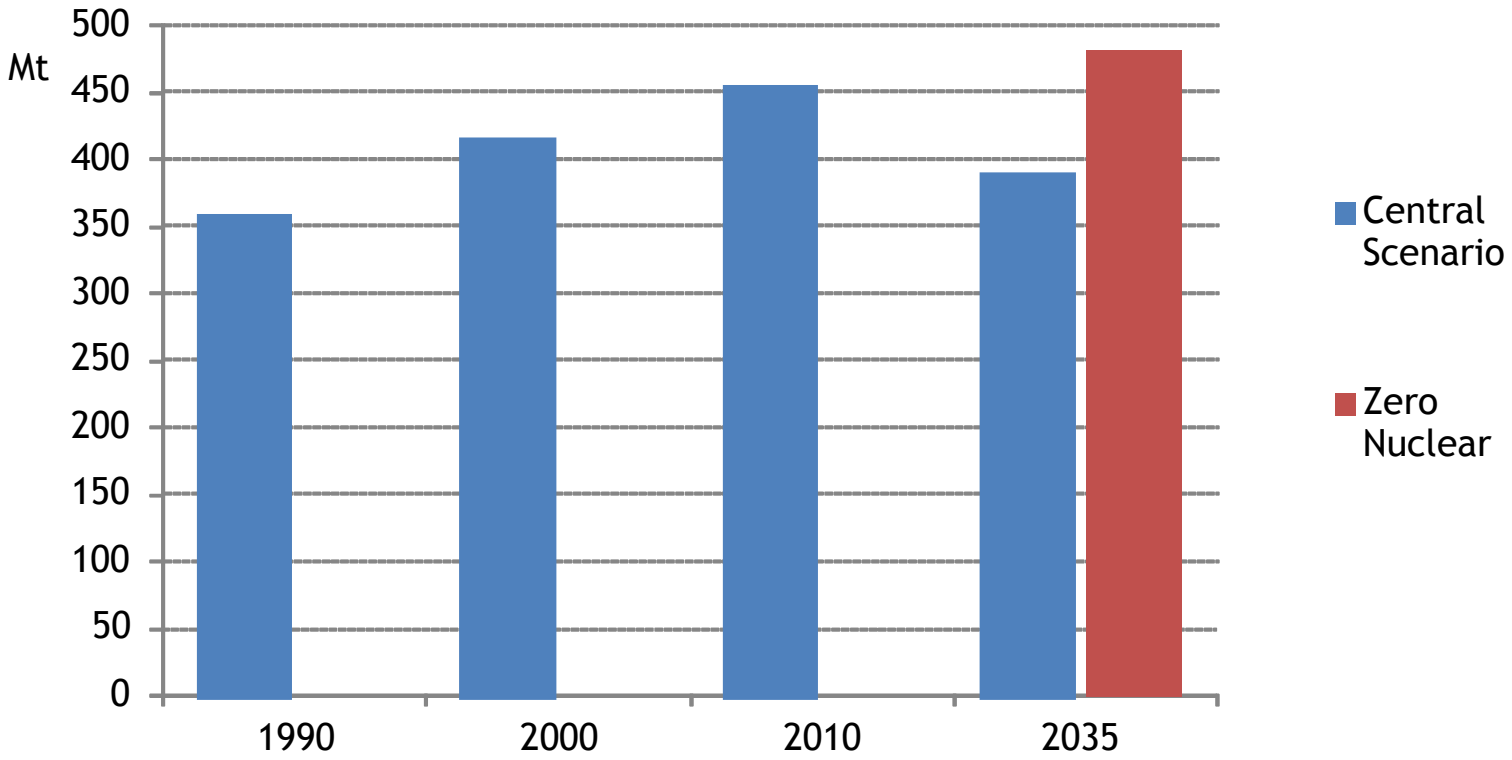
## Japan's $CO_2$ emissions in power generation




***With Zero Nuclear, expectations for declining $CO_2$ emissions from the power sector are reversed, with emissions in 2035 higher than before Fukushima Daiichi***

# Orientation for a fast-changing energy world: Implications for Japan

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- Regional price gaps & concerns over competitiveness are here to stay, but there are ways to react – with efficiency first in line
- Gas market reforms in the Asia-Pacific region and LNG exports from N. America could help to narrow the regional gas price gap
- Nuclear power and renewables can contribute to energy security, climate change goals & enhancing energy competitiveness
- Support schemes for renewables need to be carefully designed – & re-designed – to achieve their objectives in the most cost-effective way
- The new Basic Energy Plan sends a strong message about Japan's focus on delivering reliable, secure, affordable and clean energy