



International
Energy Agency

WORLD ENERGY OUTLOOK

World Energy Outlook 2013

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The world energy scene today

■ 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 reshape ideas about distribution of resources*

■ But long-term solutions to global challenges remain scarce

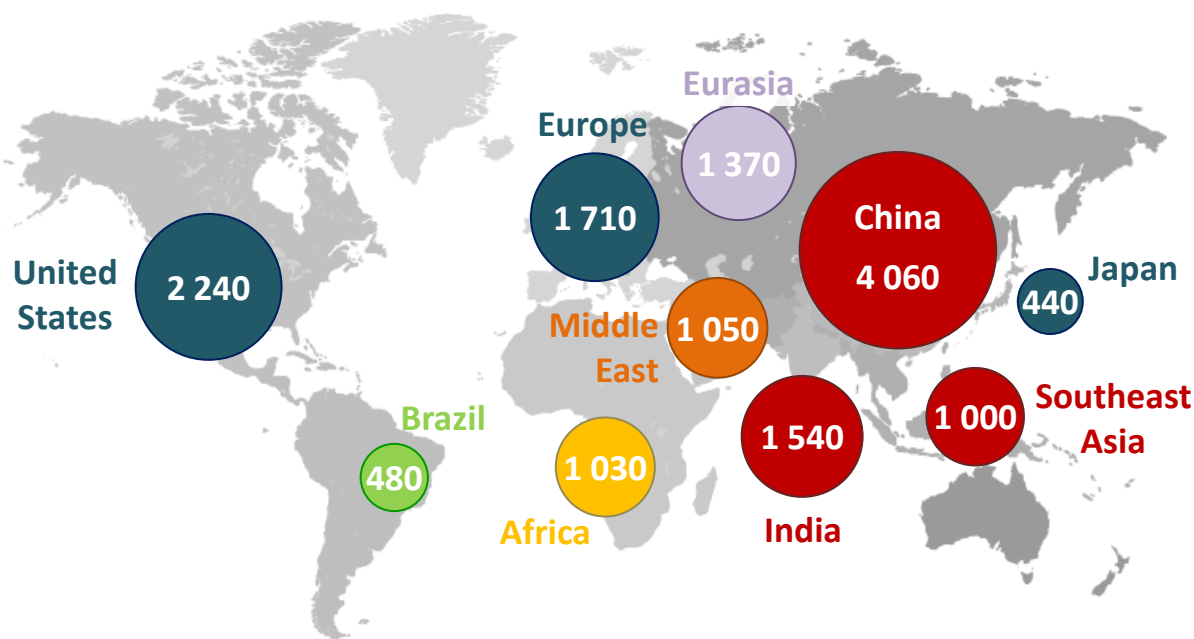
- *Renewed focus on energy efficiency, but CO₂ emissions continue to rise*
- *Fossil-fuel subsidies increased to \$544 billion in 2012*
- *1.3 billion people lack electricity, 2.6 billion lack clean cooking facilities*

■ Energy prices add to the pressure on policymakers

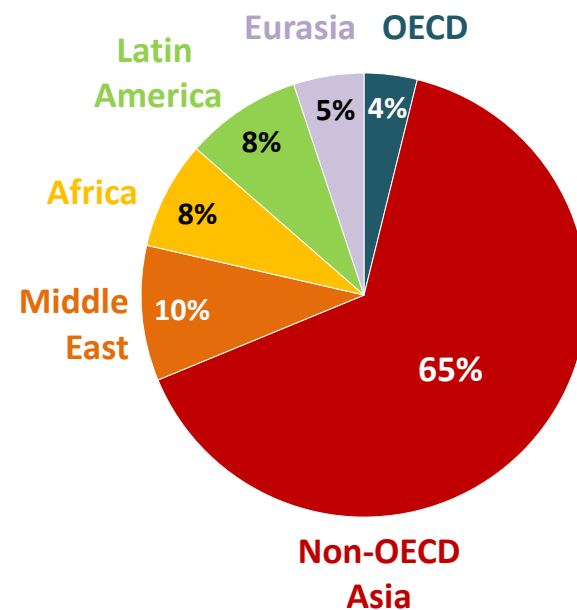
- *Sustained period of high oil prices without parallel in market history*
- *Large, persistent regional price differences for gas & electricity*

The engine of energy demand growth moves to South Asia

Primary energy demand, 2035 (Mtoe)



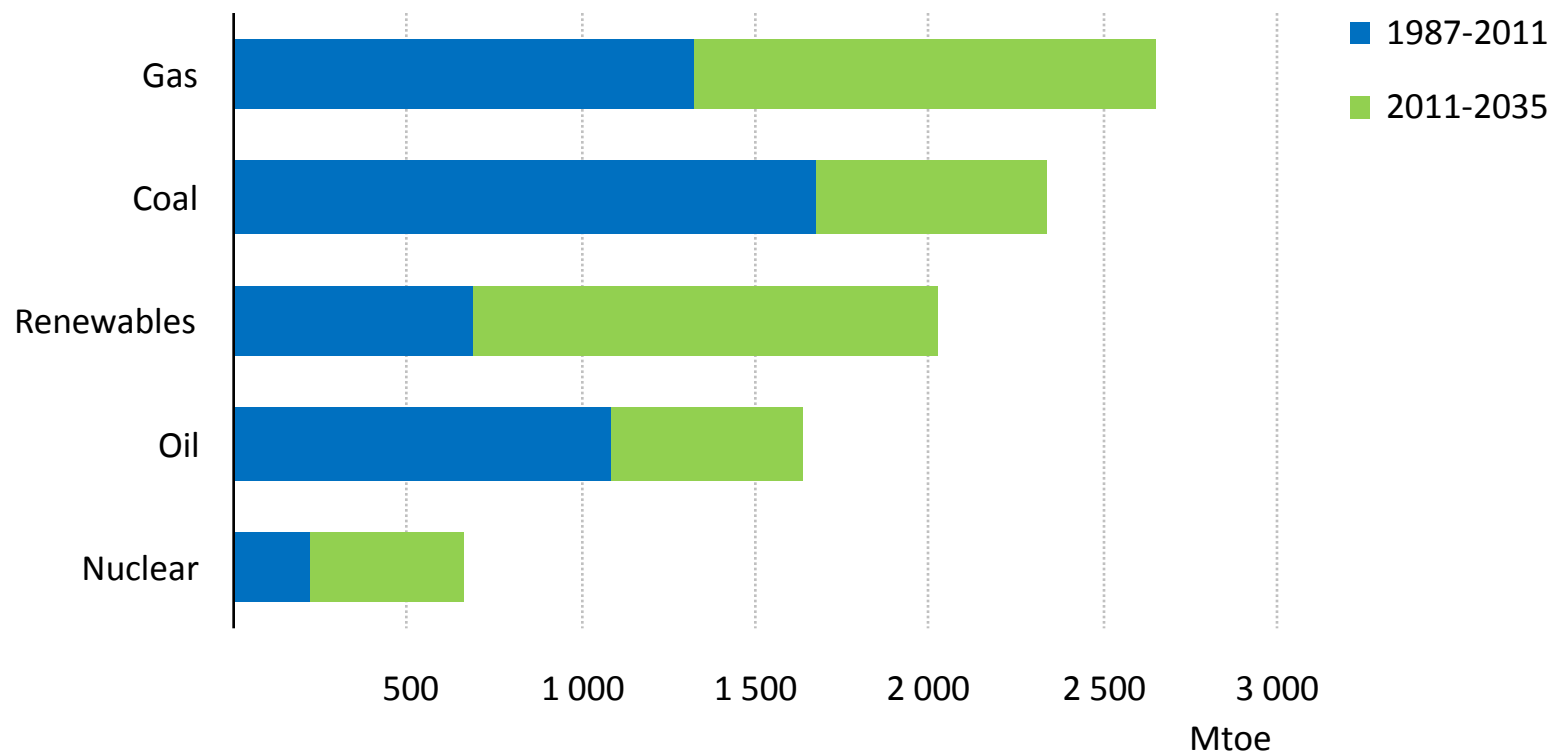
Share of global growth 2012-2035



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

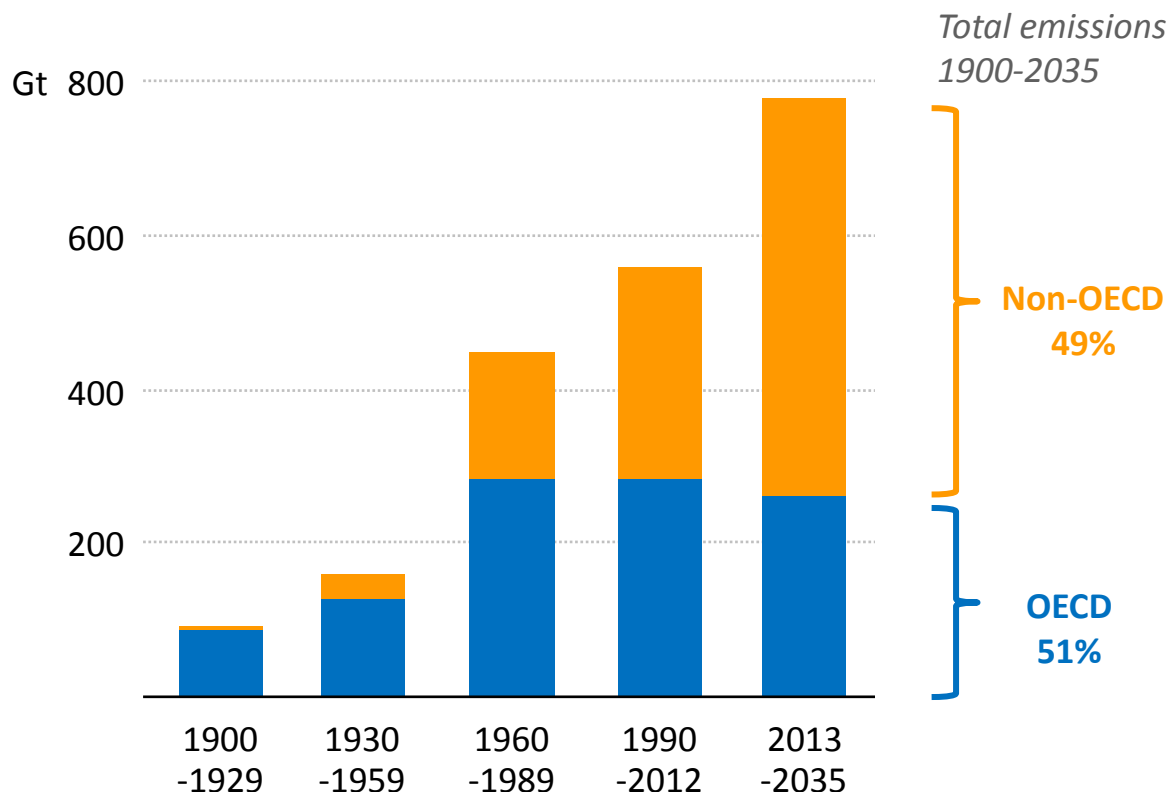
Growth in total primary energy demand



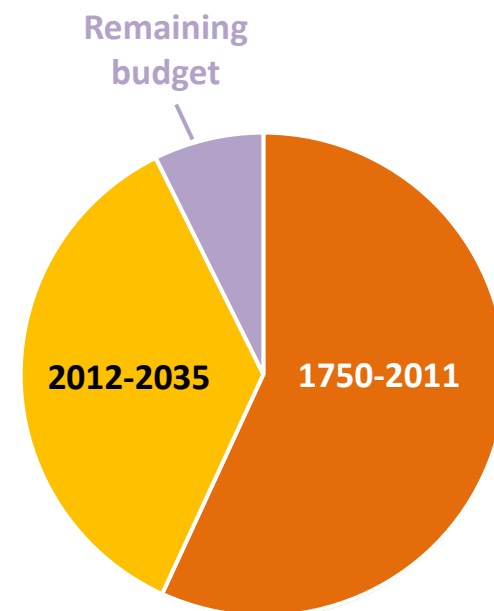
Today's share of fossil fuels in the global mix, at 82%, is the same as it was 25 years ago; the strong rise of renewables only reduces this to around 75% in 2035

Emissions off track in the run-up to the 2015 climate summit in France

Cumulative energy-related CO₂ emissions



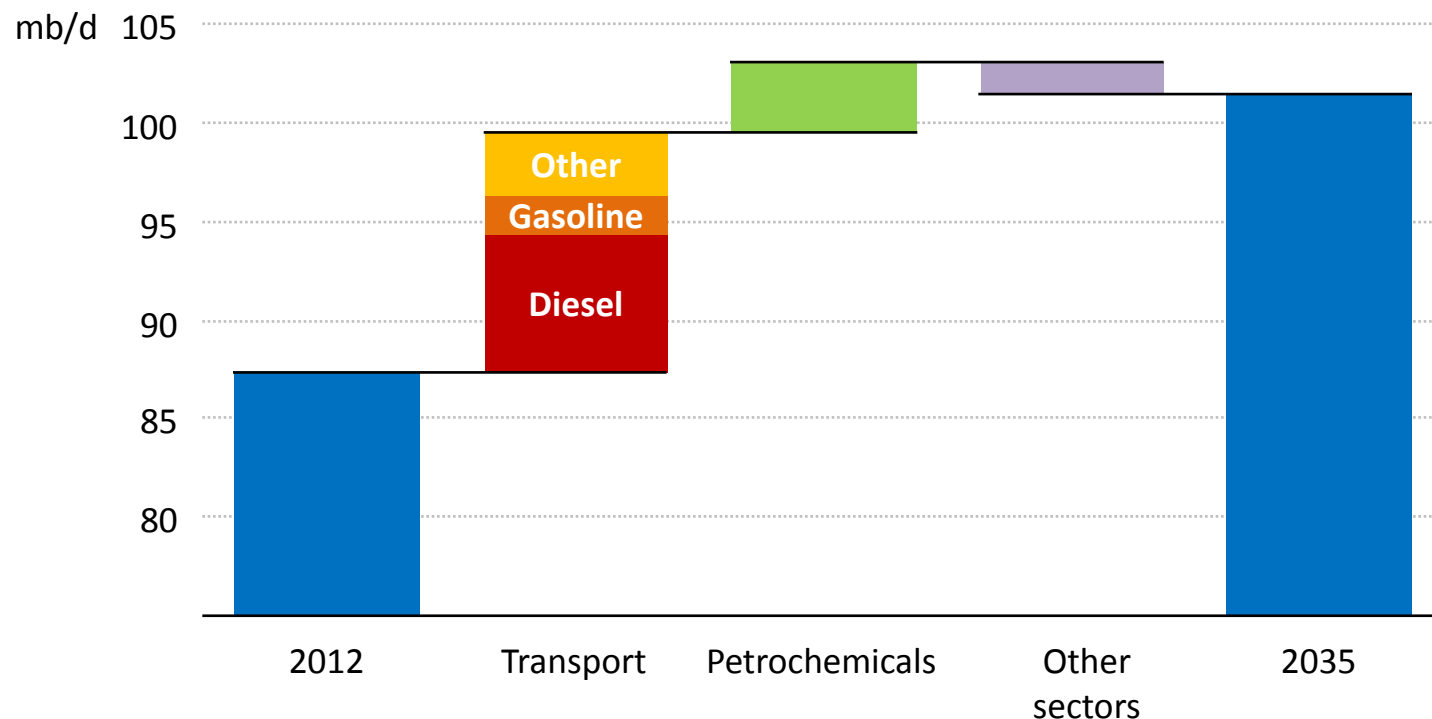
'Carbon budget' for 2 °C



Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD; the 2 °C 'carbon budget' is being spent much too quickly

Oil use grows, but in a narrowing set of markets

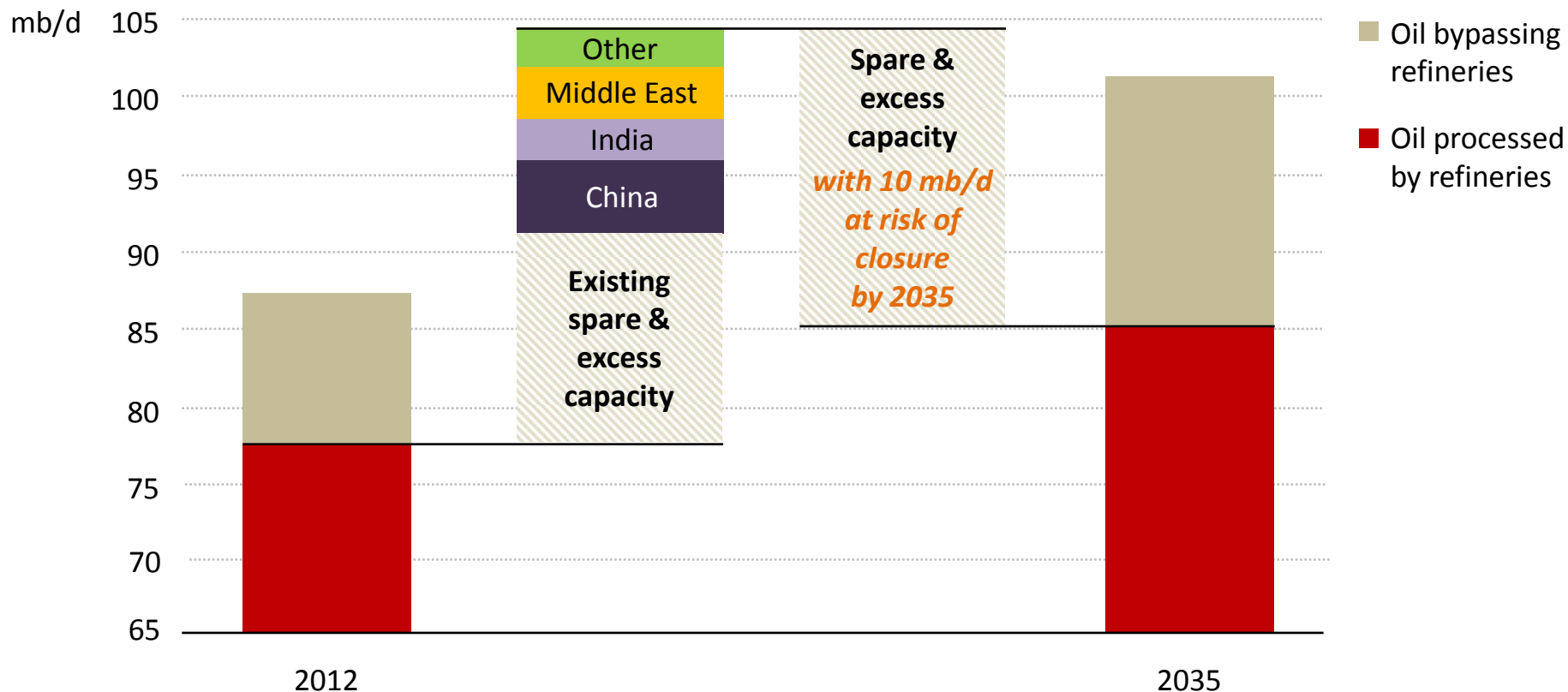
Oil demand by sector



China becomes the largest consumer of oil by 2030, as OECD oil use drops; demand is concentrated in transport, where diesel use surges by 5.5 mb/d, & petrochemicals

Turbulent times for the refining sector

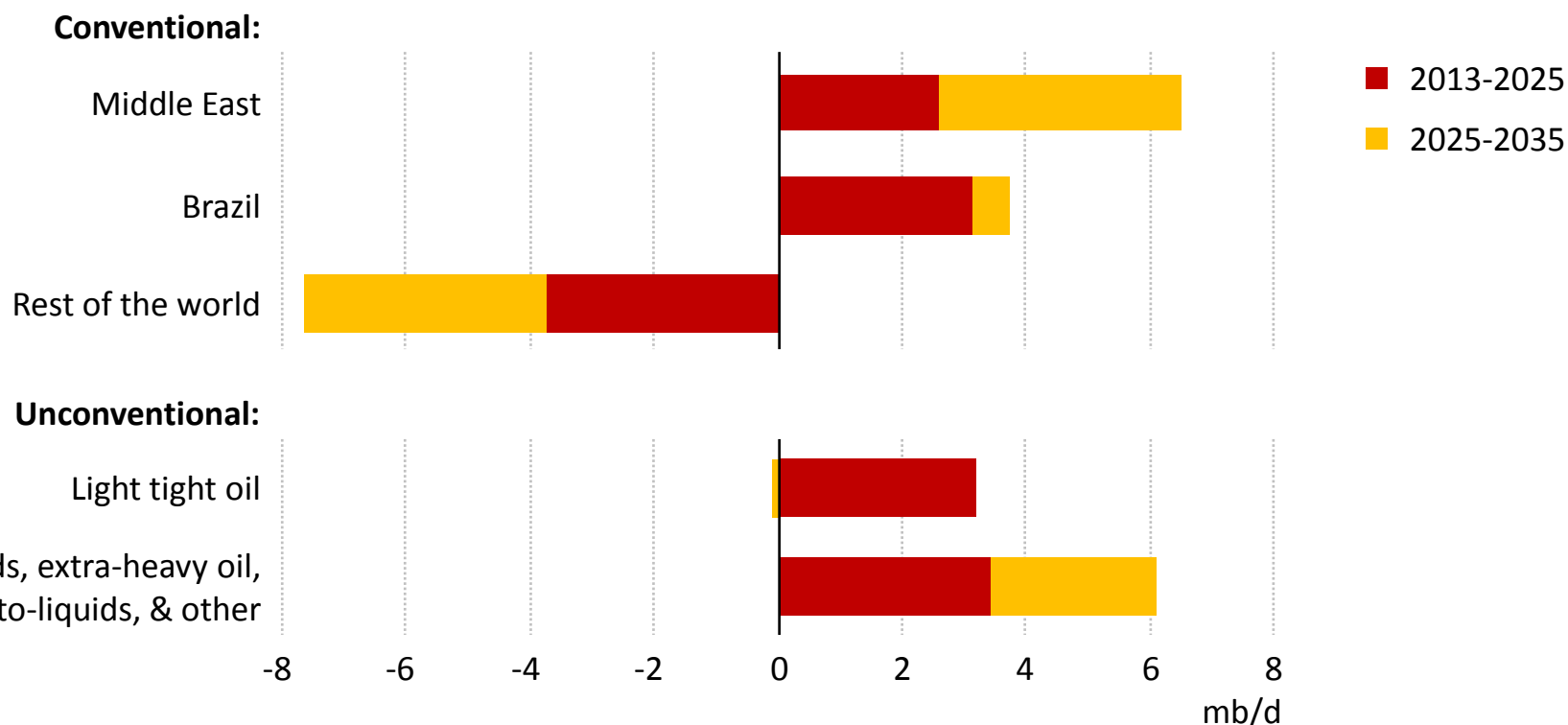
Refinery capacity and operation



More oil bypassing the refining system and new capacity in growing non-OECD markets piles pressure on existing refiners, especially in Europe

Two chapters to the oil production story

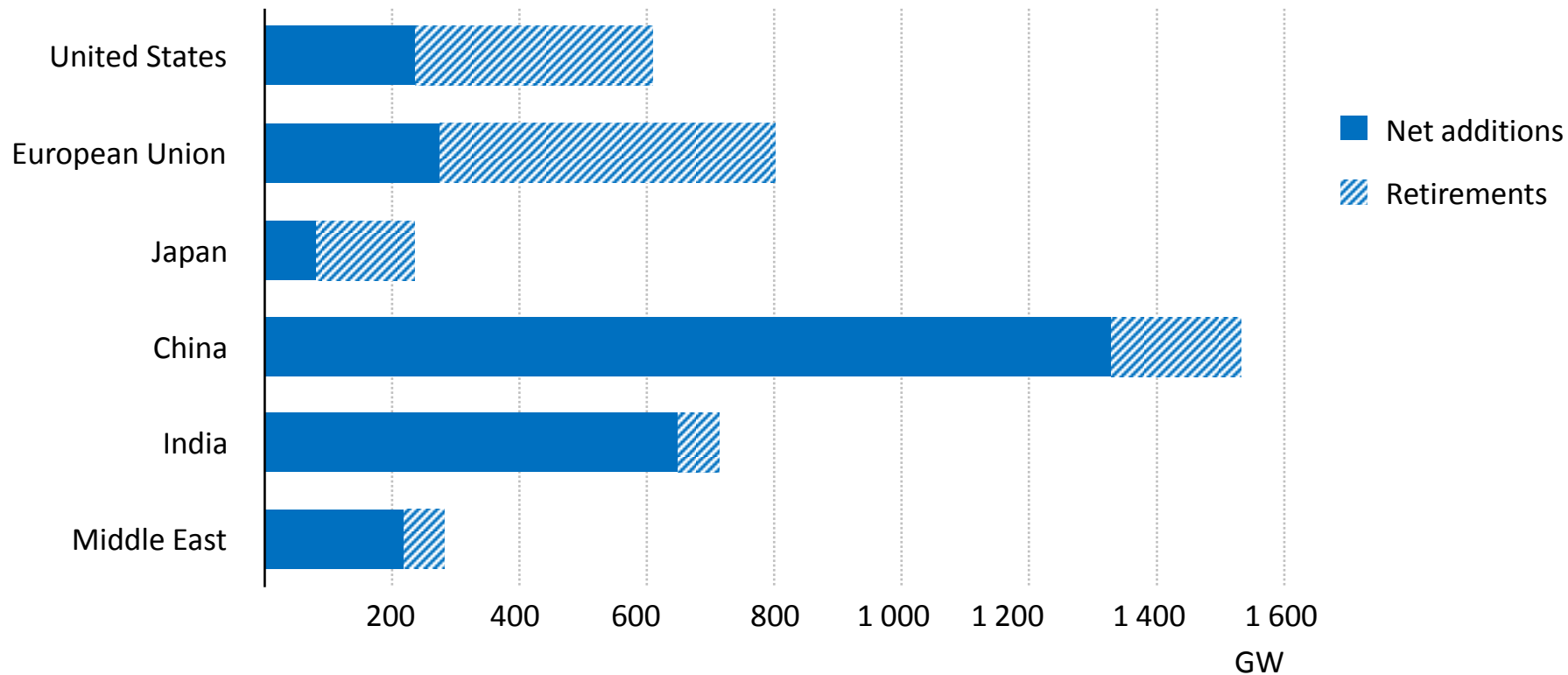
Contributions to global oil production growth



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

Capacity to change?

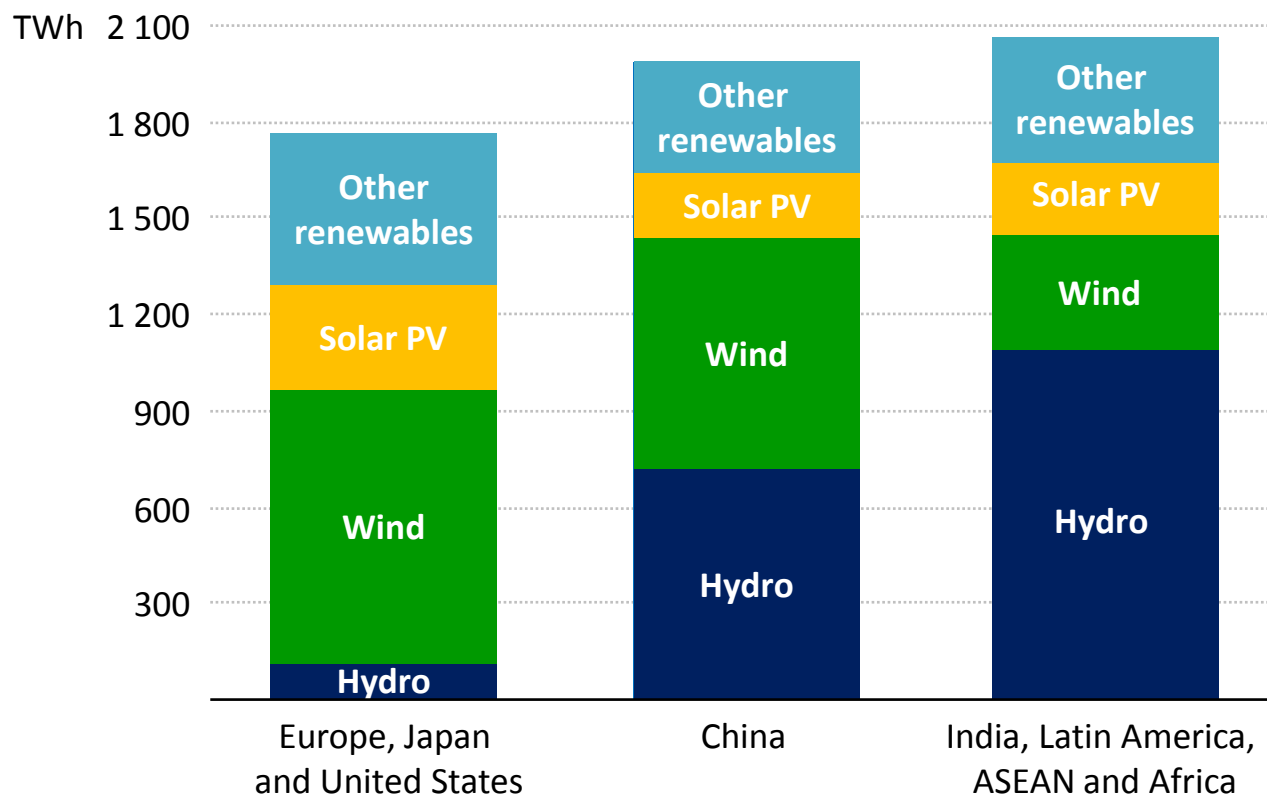
Power generation capacity additions and retirements, 2013-2035



***China & India together build almost 40% of the world's new capacity;
60% of capacity additions in the OECD replace retired plants***

Renewables power up around the world

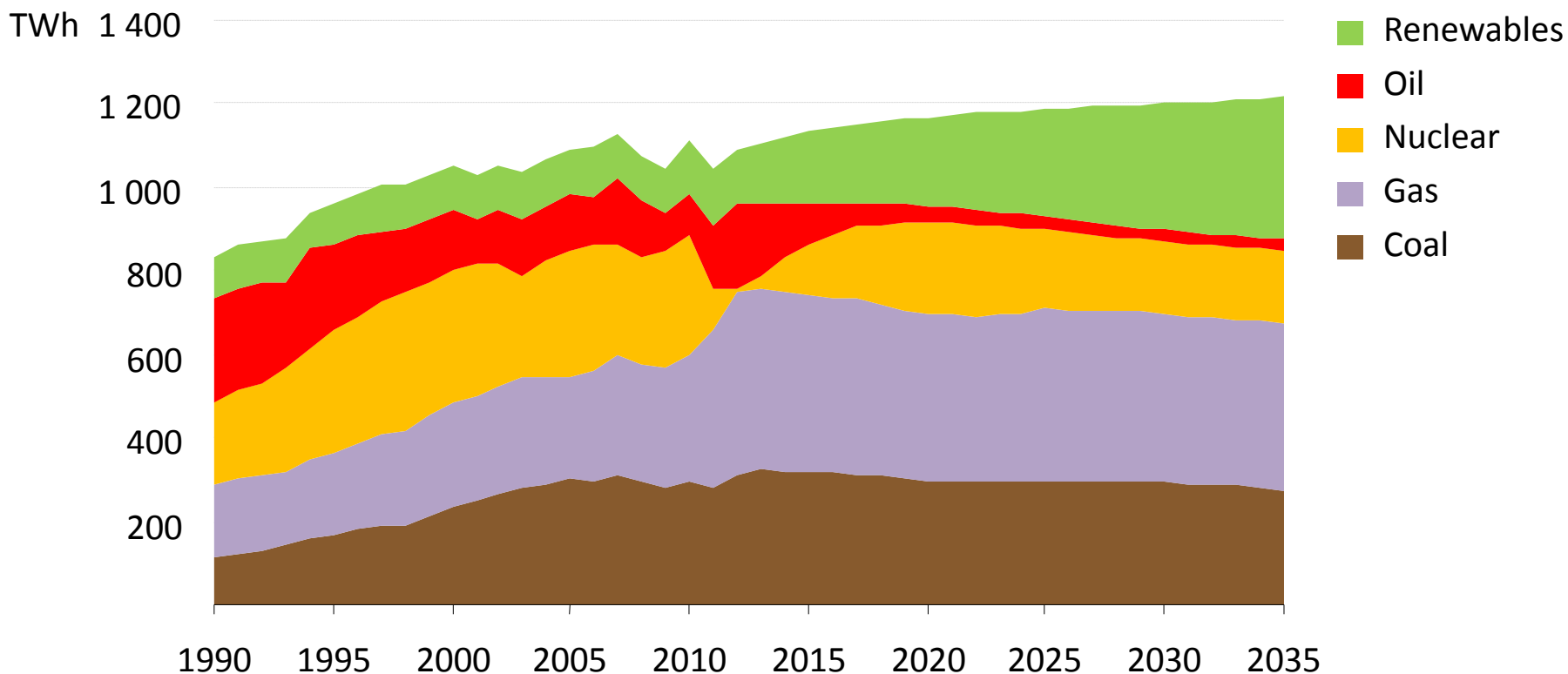
Growth in electricity generation from renewable sources, 2011-2035



The expansion of non-hydro renewables depends on subsidies that more than double to 2035; additions of wind & solar have implications for power market design & costs

Japan's power system has been under extreme stress since Fukushima Daiichi

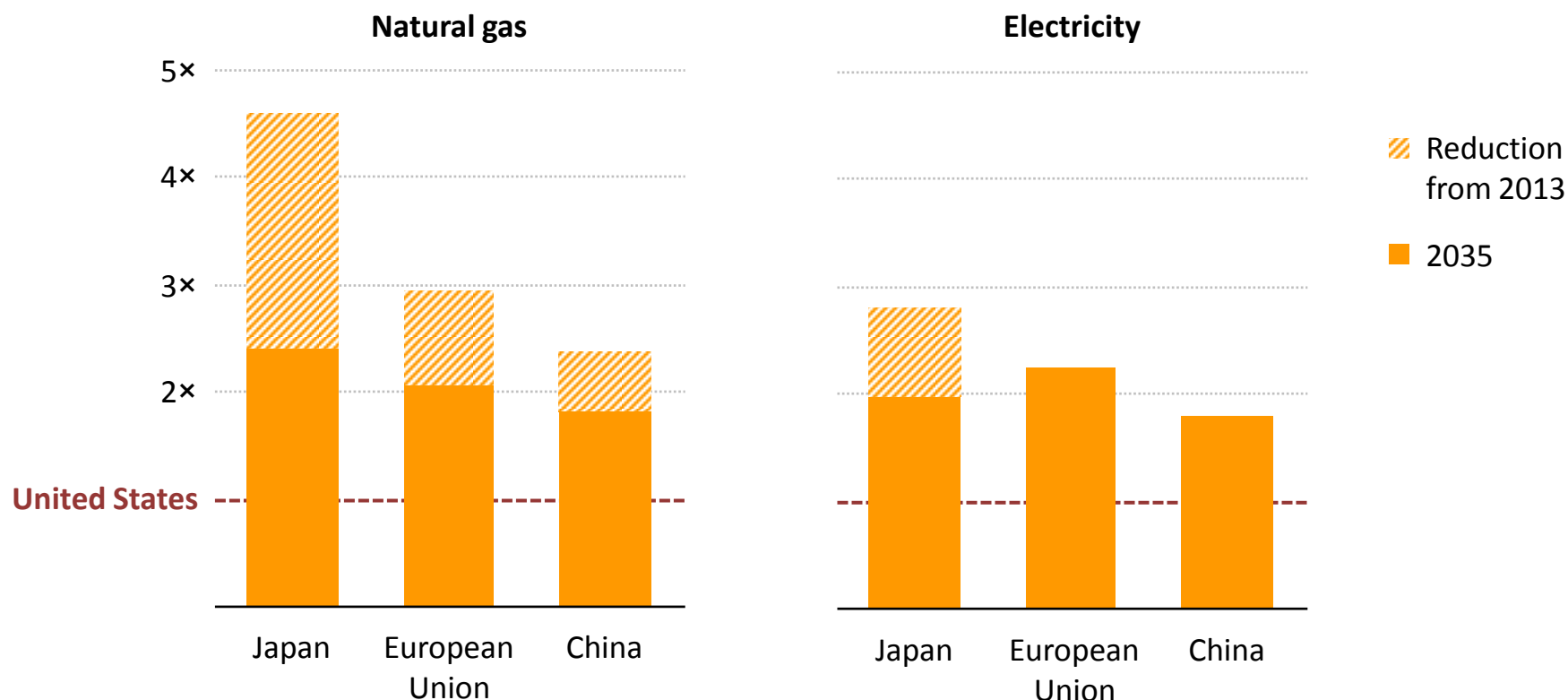
Japan electricity generation by source



With some nuclear plants expected to restart & increased use of renewables, expensive oil- & gas-fired generation is projected to fall, lowering fuel import bills

Who has the energy to compete?

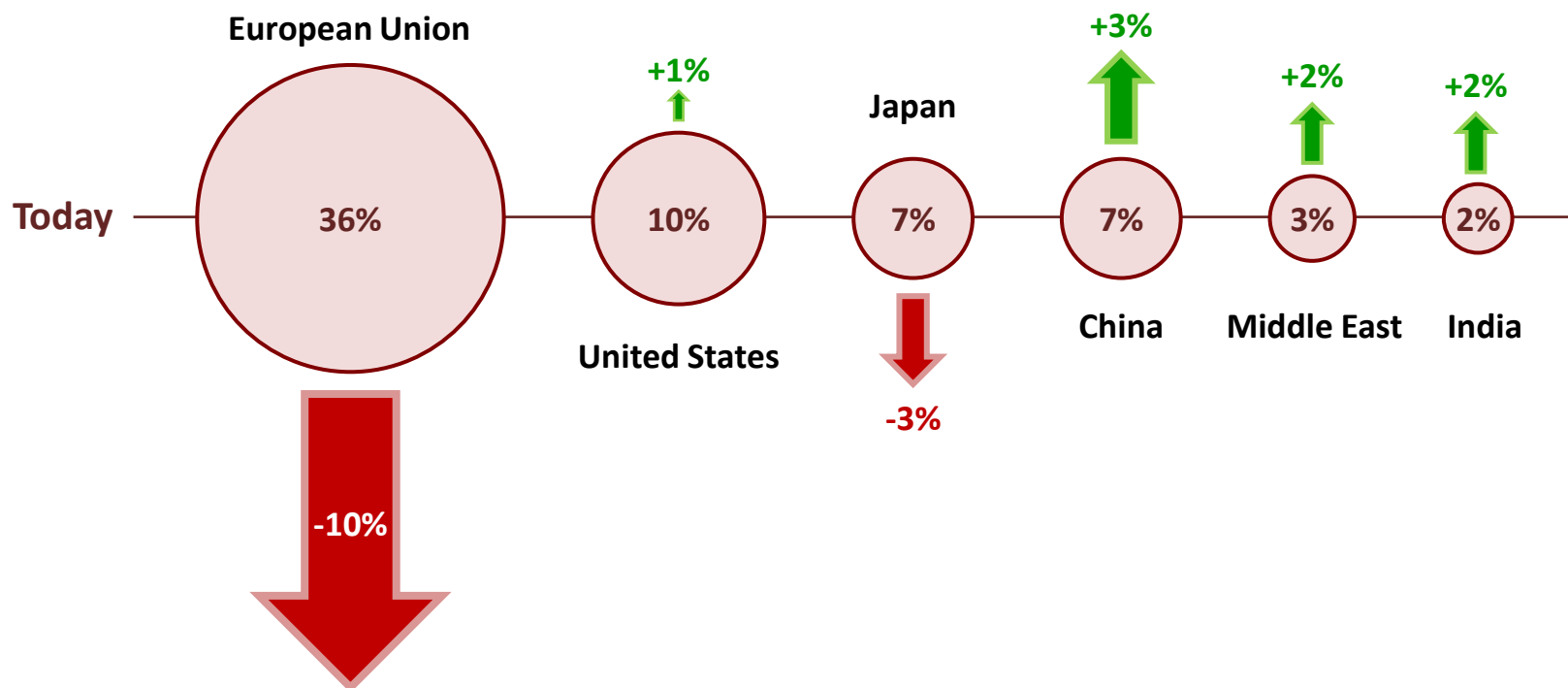
Ratio of industrial energy prices relative to the United States



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

An energy boost to the economy?

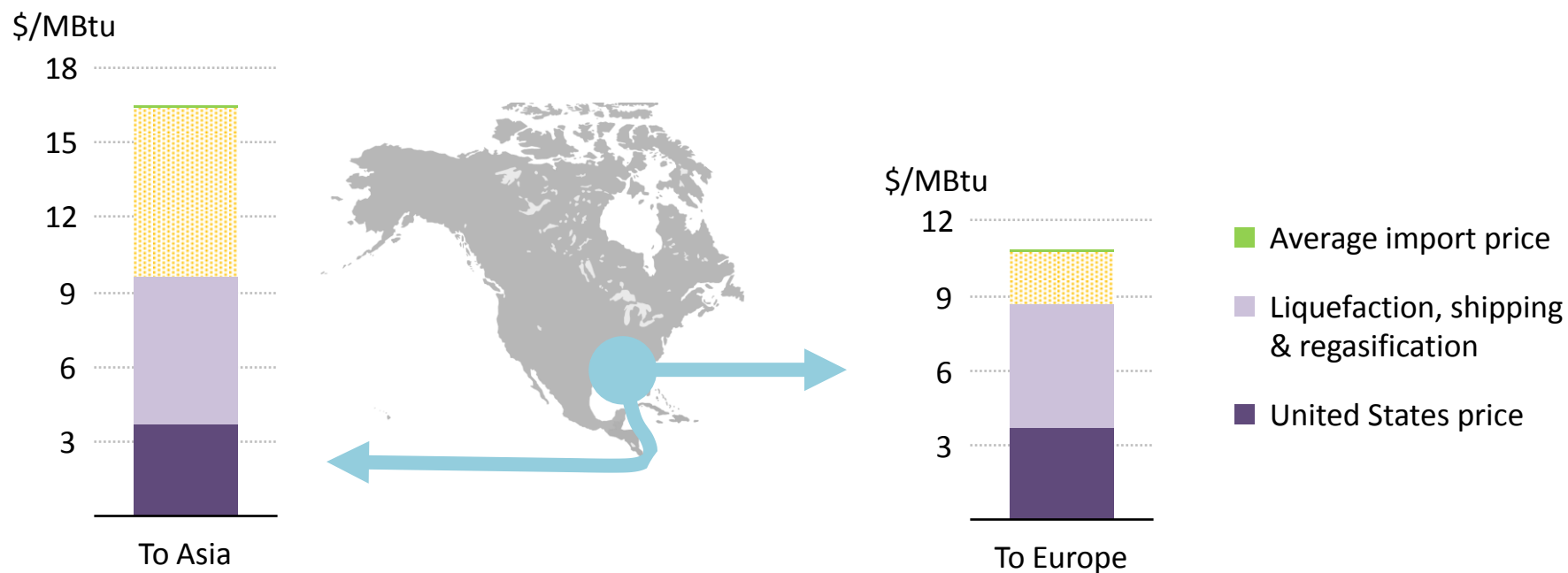
Share of global export market for energy-intensive goods



The US, together with key emerging economies, increases its export market share for energy-intensive goods, while the EU and Japan see a sharp decline

LNG from the United States can shake up gas markets

Indicative economics of LNG export from the US Gulf Coast (at current prices)



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

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

- **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 North America could 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 – and sometimes re-designed – if they are to achieve their objectives in the most cost-effective way**