

World Energy Outlook 2016

**Challenges & Opportunities
Facing The Global Energy System**

CERI, 25 January 2017

Tim Gould, IEA

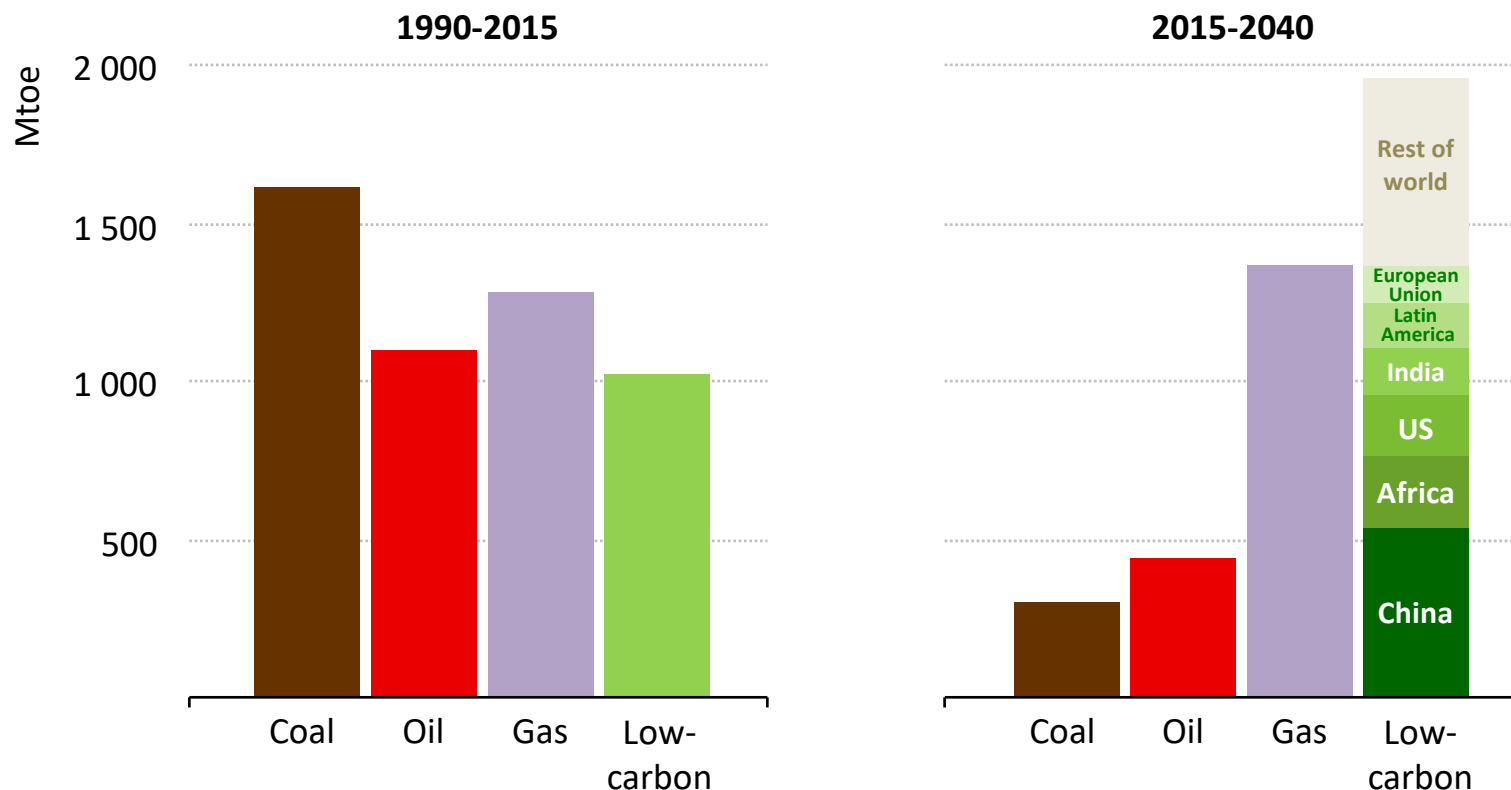
■ Key points of orientation:

- *Middle East share in global oil production in 2016 at highest level for 40 years*
- *Transformation in gas markets deepening with a 30% rise in LNG*
- *Additions of renewable capacity in the power sector higher in 2015 than coal, gas, oil and nuclear combined*
- *Energy sector in the spotlight as the Paris Agreement enters into force*
- *Billions remain without basic energy services*

■ **There is no single story about the future of global energy; policies will determine where we go from here**

A new 'fuel' in pole position

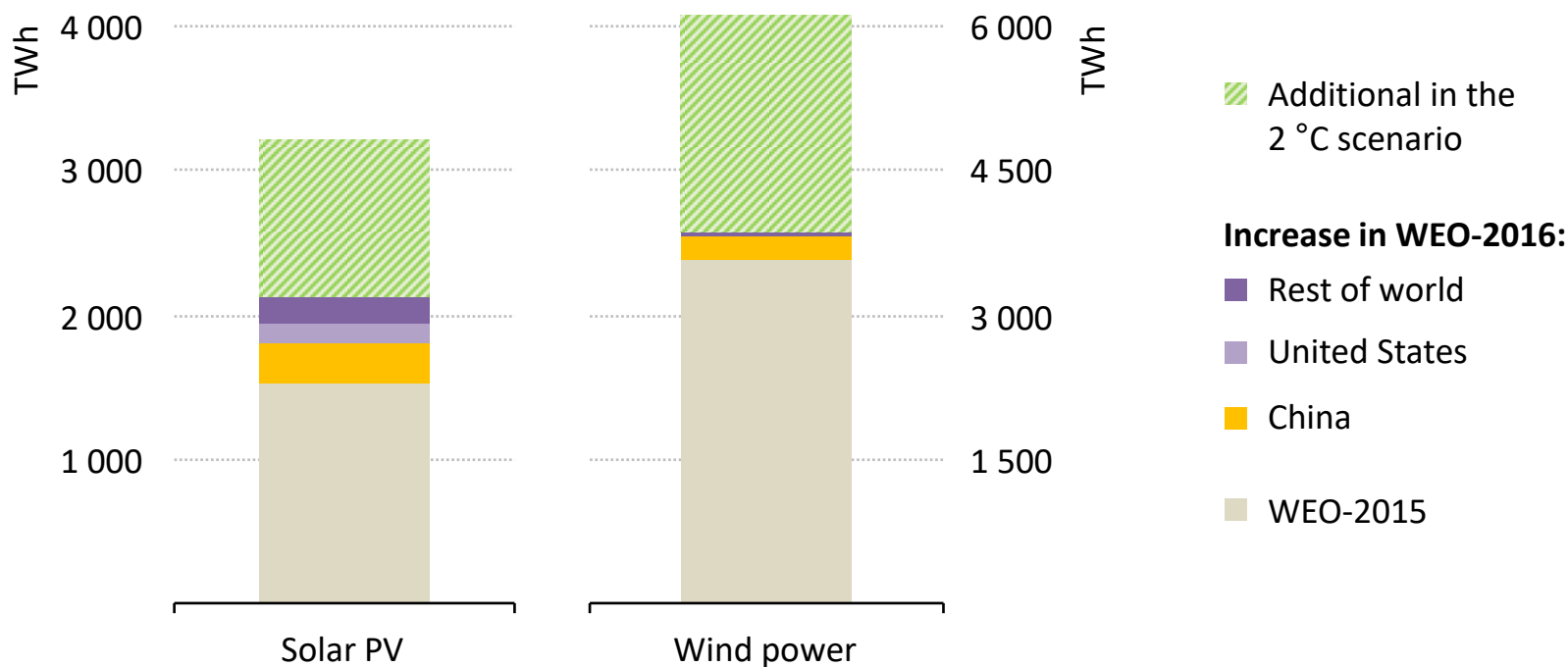
Change in total primary energy demand



Low-carbon fuels & technologies, mostly renewables, supply nearly half of the increase in energy demand to 2040

Greater policy support boosts prospects for solar PV and wind

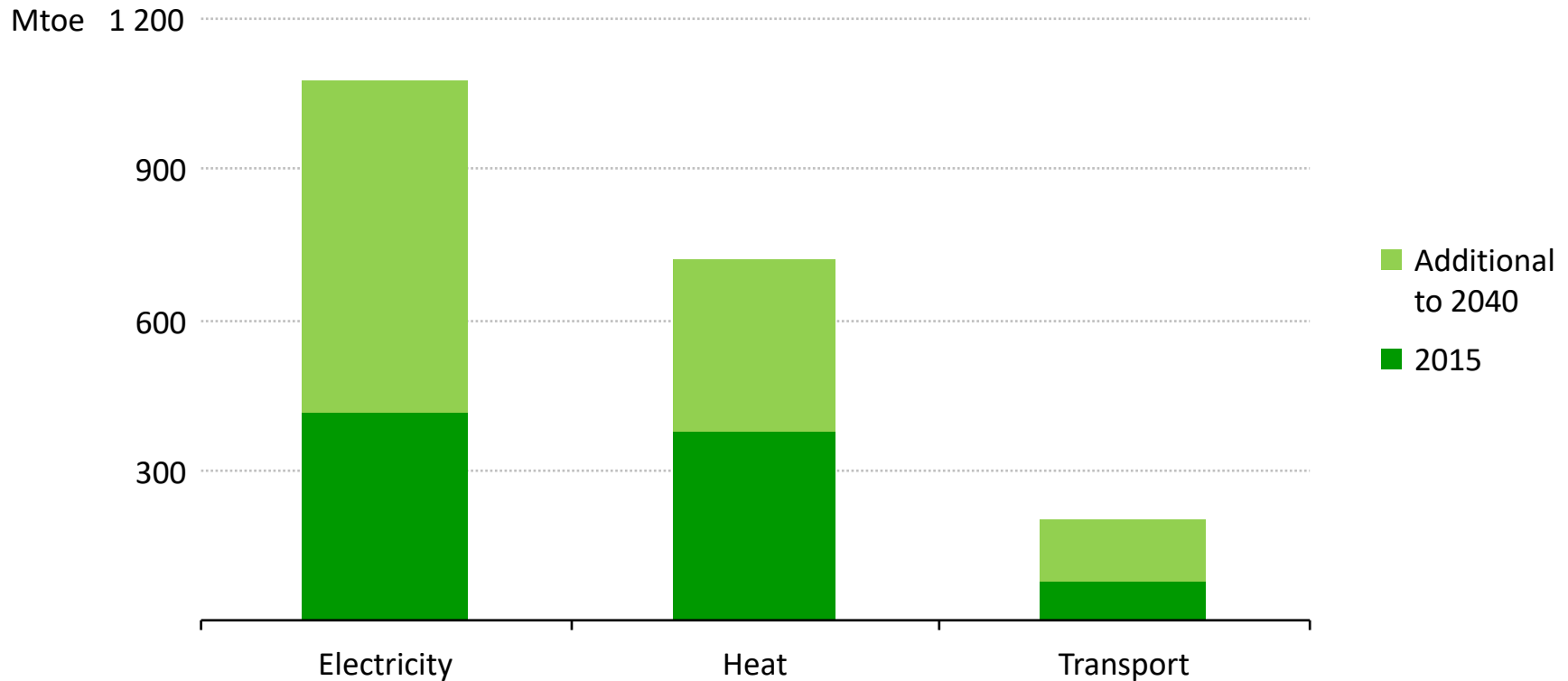
Solar PV and wind generation, 2040



Stronger policies on solar PV and wind help renewables make up 37% of electricity generation in 2040 in our main scenario – & nearly 60% in the 2 °C scenario

The next frontiers for renewables are heat and transport

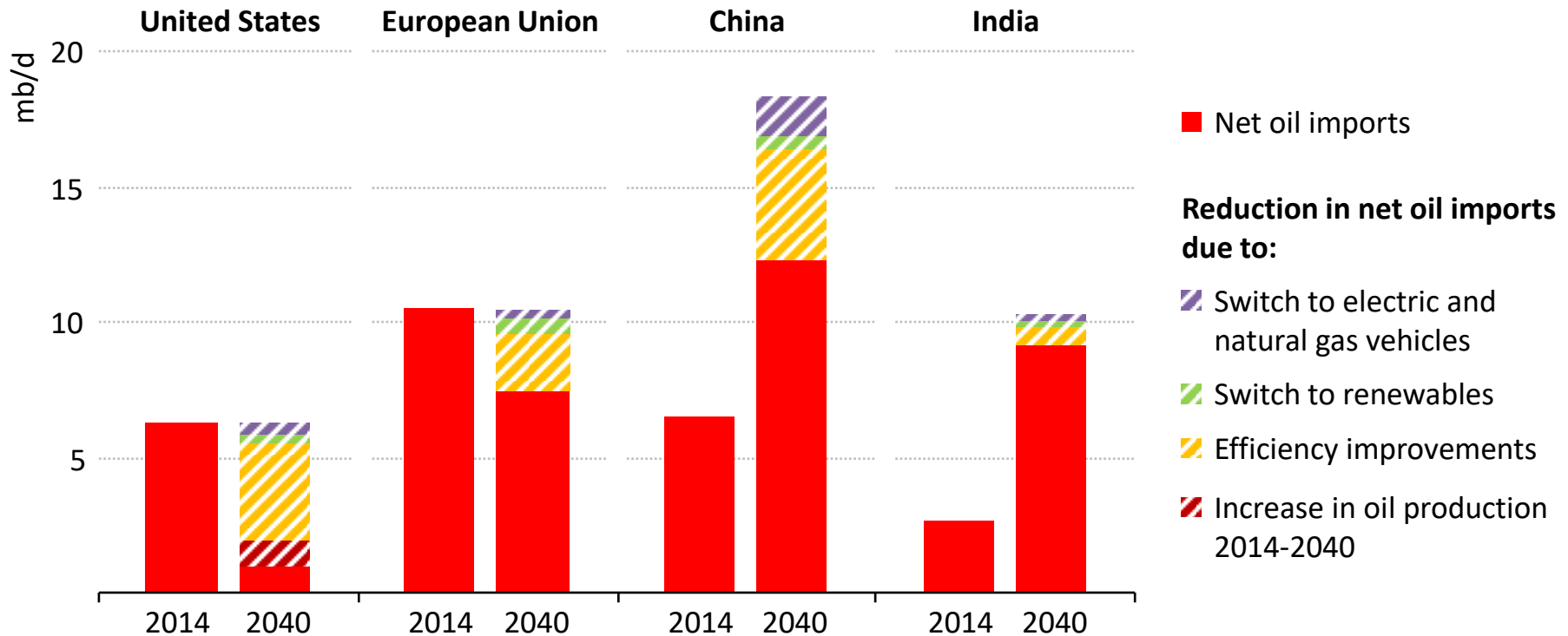
Renewable energy use by sector



Today renewables in electricity and heat use are nearly at par; by 2040, the largest untapped potential lies in heat and transport

A suite of tools to address energy security

Net oil imports



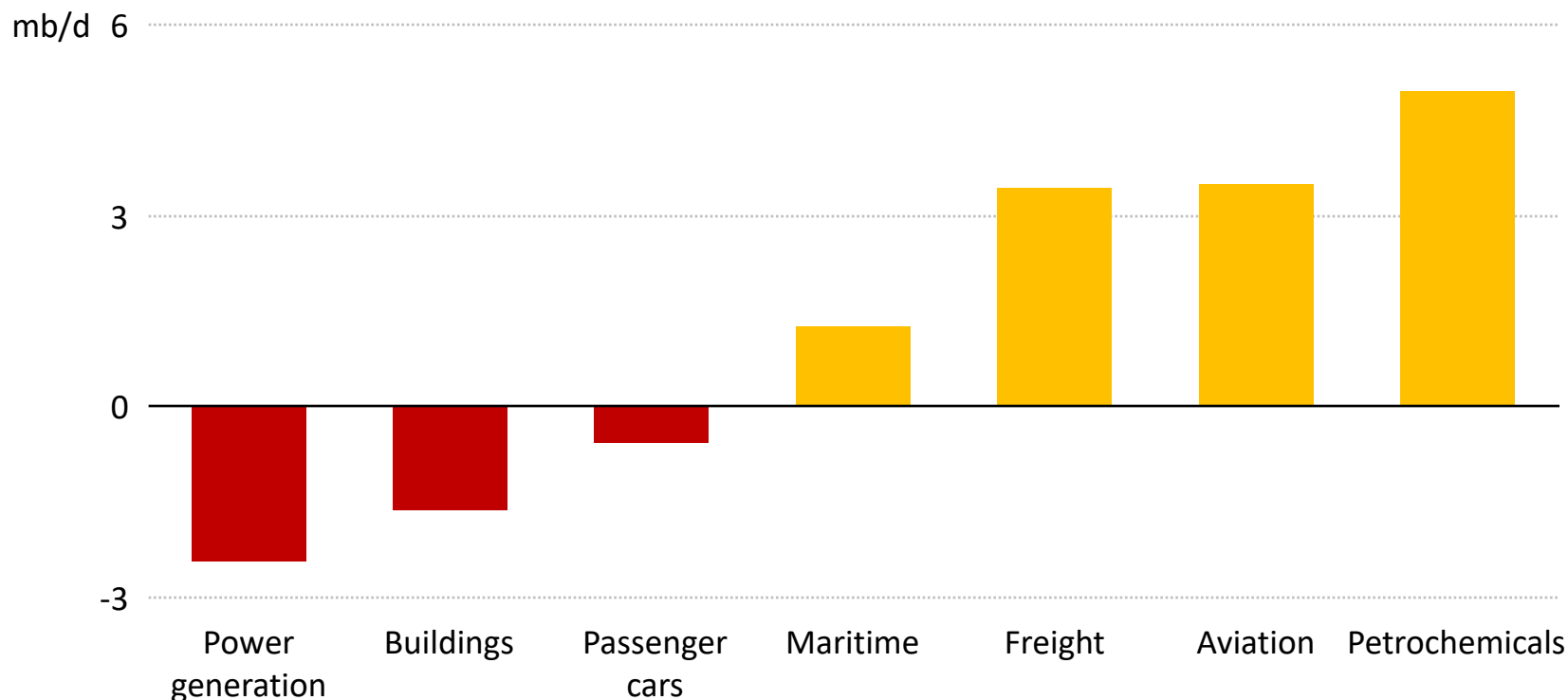
The energy transition provides instruments to address traditional energy security concerns, while shifting attention to electricity supply

Entering a period of greater oil market volatility

- Approvals of new conventional crude oil projects in 2015-2016 have fallen to the lowest level since the 1950s
- If approvals remains low in 2017, an unprecedented effort will be needed to avoid a supply-demand gap in a few years' time
- US tight oil provides a potential lifeline, but cannot be relied upon to cover a major shortfall in the 'baseload' of oil supply
- Without a pick-up in investment, or a rapid slowdown in demand growth, the stage is set for the next boom-and-bust cycle for oil

No peak yet in sight, but a slowdown in growth for oil demand

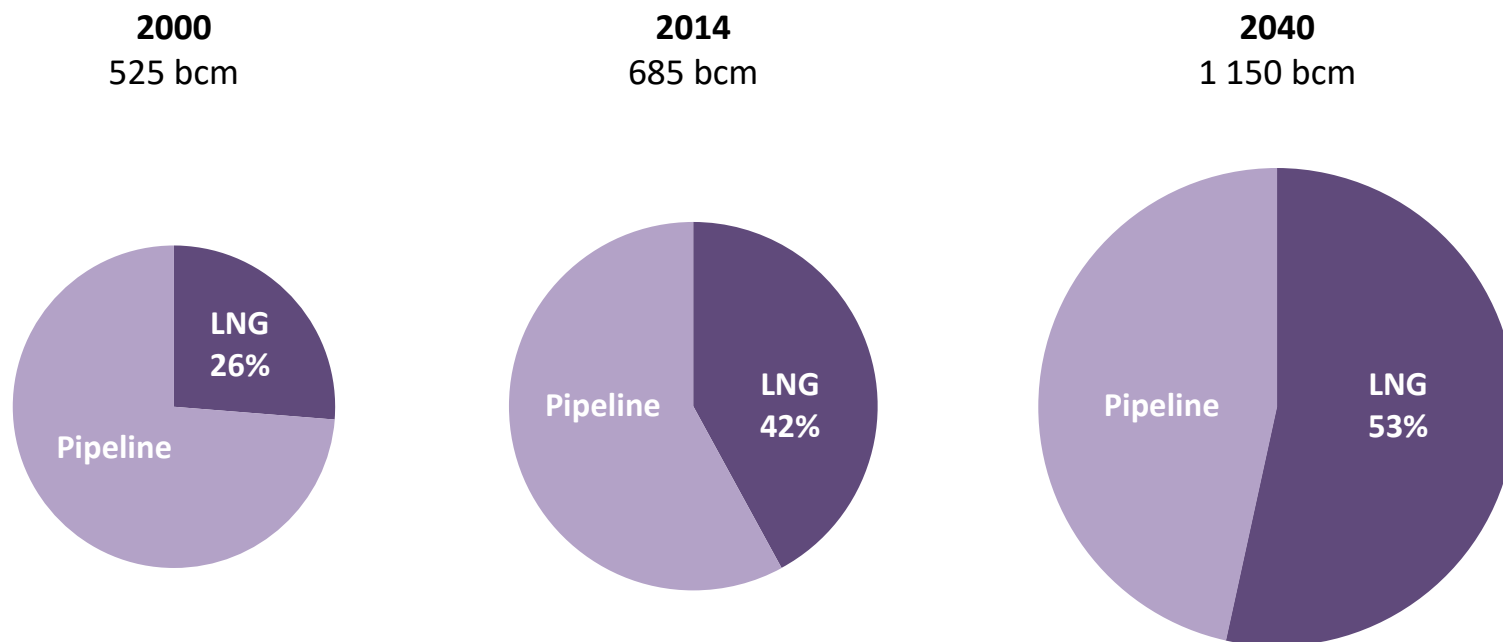
Change in oil demand by sector, 2015-2040



The global car fleet doubles, but efficiency gains, biofuels & electric cars reduce oil demand for passenger cars; growth elsewhere pushes total demand higher

A wave of LNG spurs a second natural gas revolution

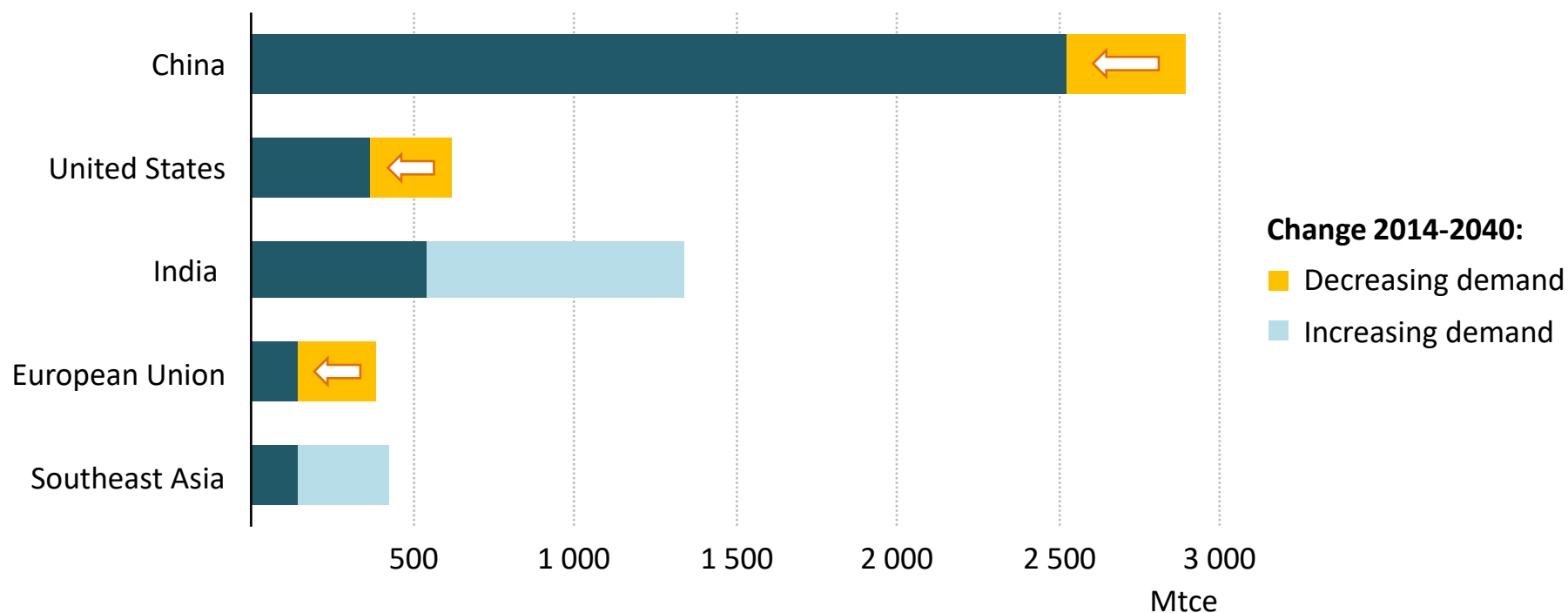
Share of LNG in global long-distance gas trade



Contractual terms and pricing arrangements are all being tested as new LNG from Australia, the US & others collides into an already well-supplied market

Coal: a rock in a hard place

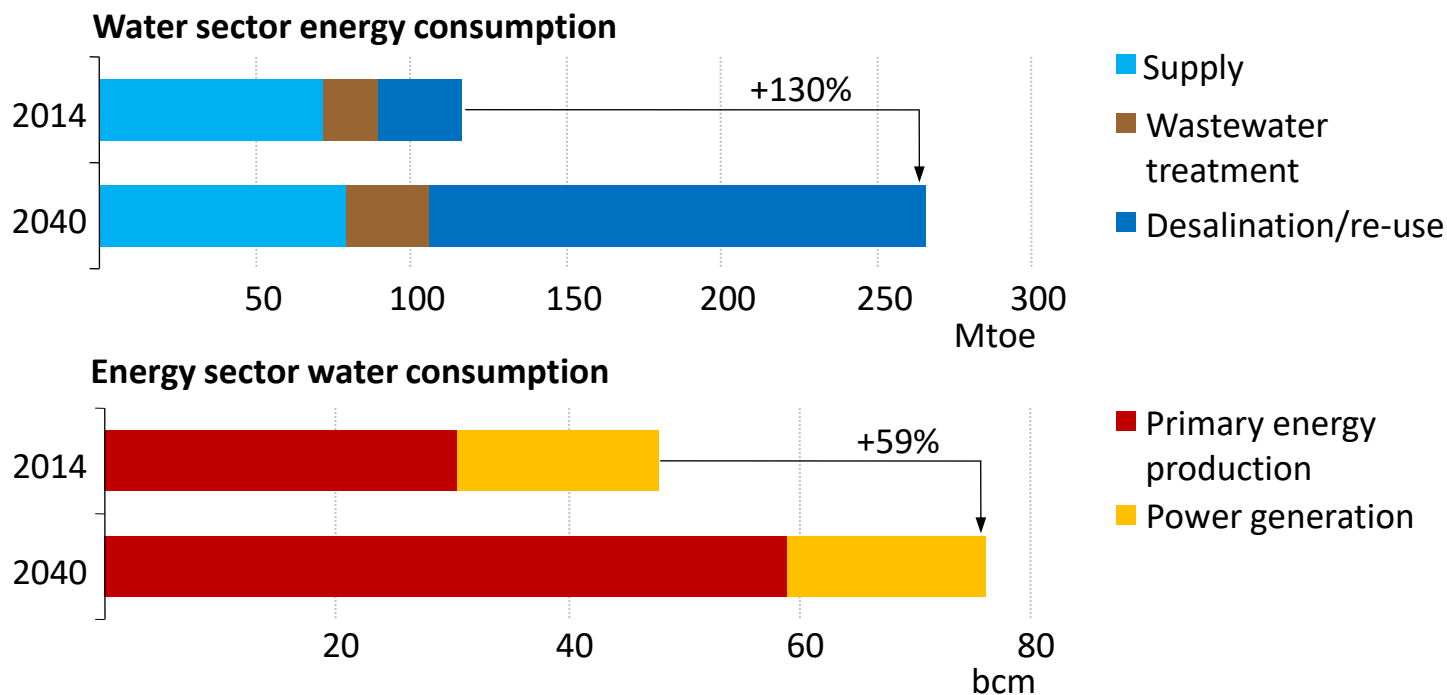
Coal demand in key regions



The peak in Chinese demand is an inflexion point for coal; held back by concerns over air pollution & carbon emissions, global coal use is overtaken by gas in the 2030s

The water-energy dependence deepens

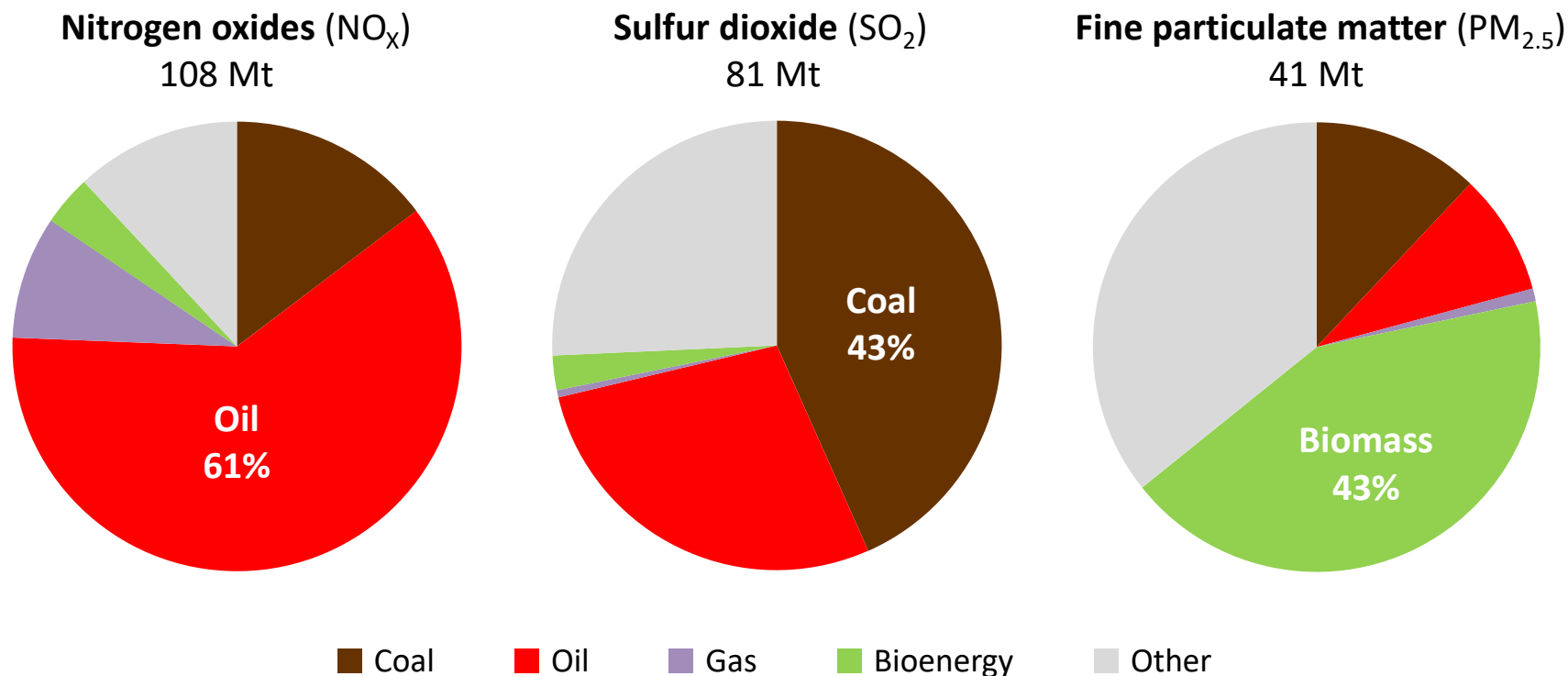
Global energy use in the water sector and water use in the energy sector



Managing energy-water linkages is pivotal to the prospects for realisation of a range of development & climate goals

Air pollution is an energy problem

Pollutant emissions, 2015

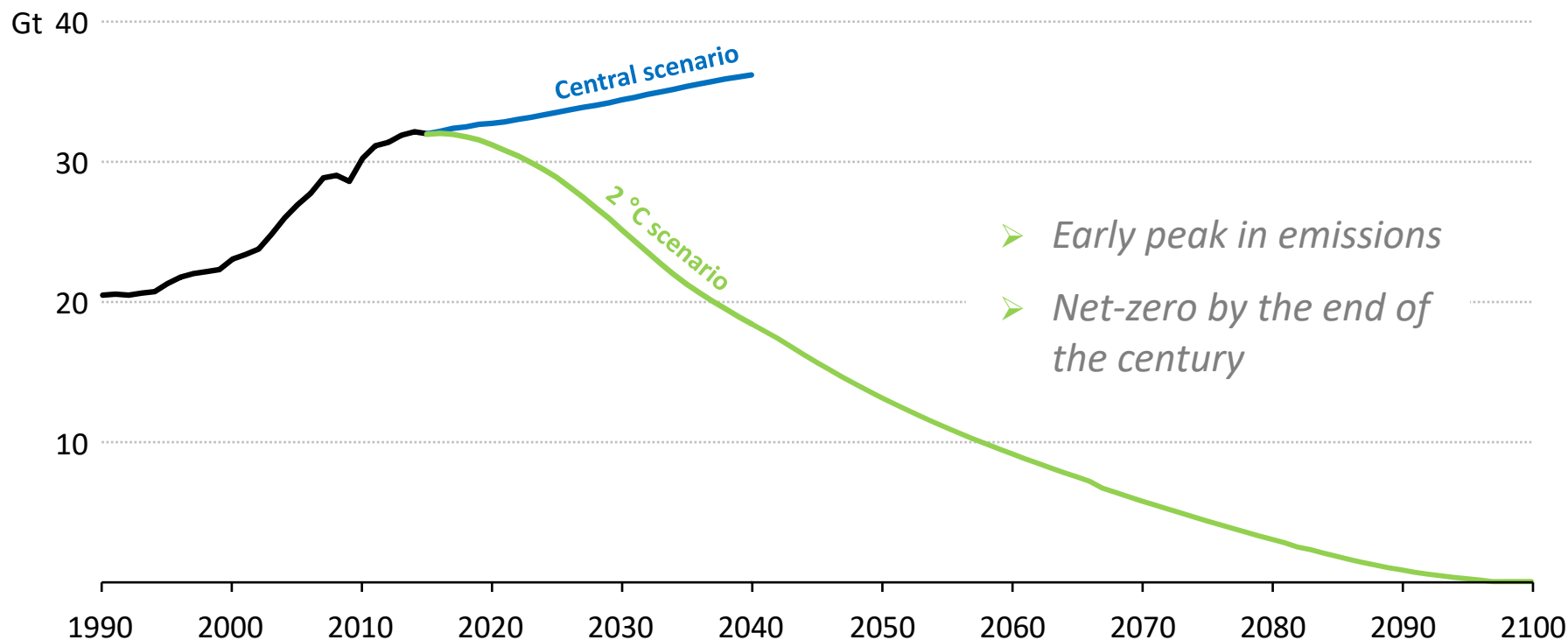


Source: WEO Special Report: Energy and Air Pollution

Energy is the single most important cause of emissions of all main pollutants

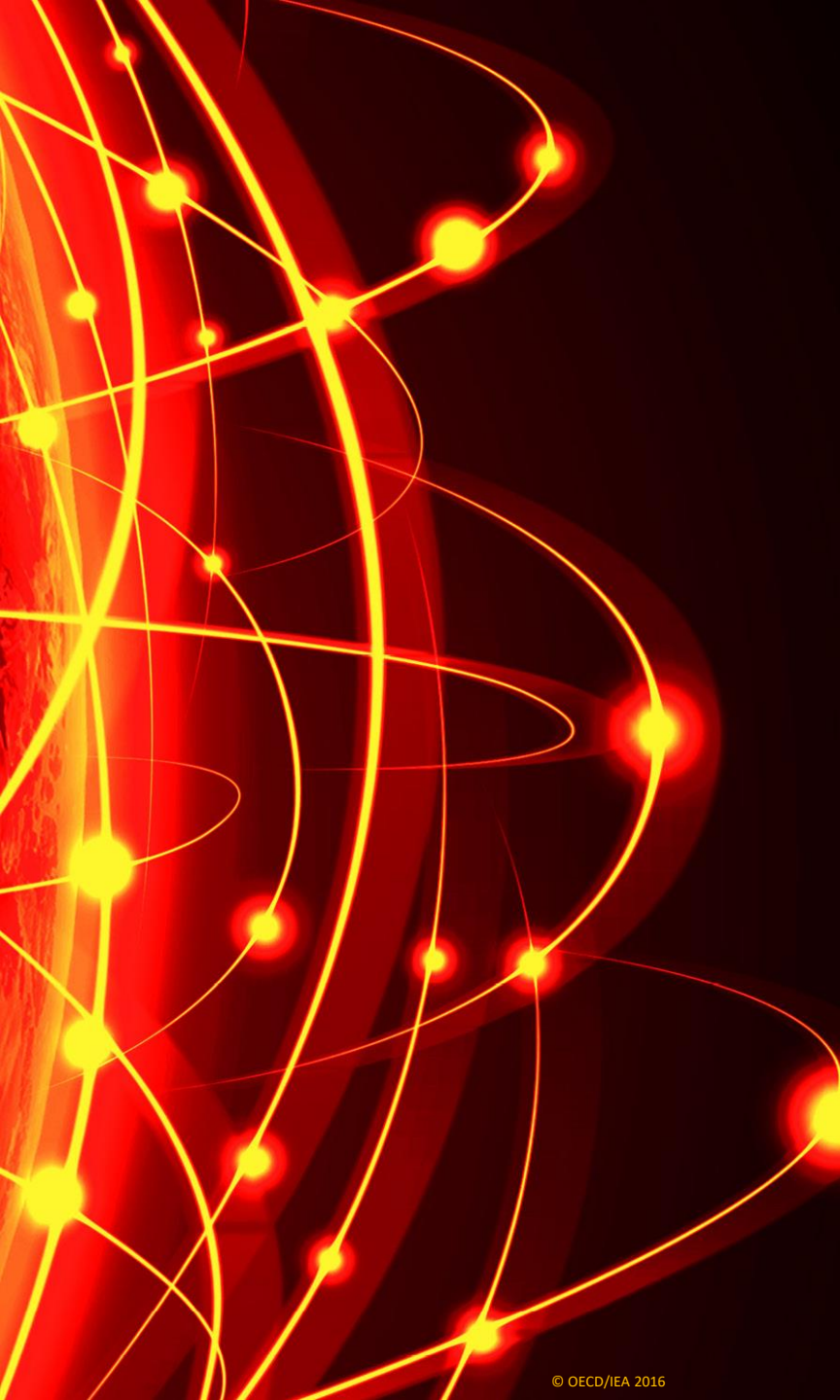
Still a long way from a pathway to energy sector decarbonisation

Energy-sector CO₂ emissions



Current pledges fall short of limiting the temperature increase to below 2 °C; raising ambition to 1.5 °C is uncharted territory

- **Energy security remains a major concern; potential vulnerabilities are growing, so too is the range of tools available to address them**
- **New oil market dynamics & subdued upstream investment are ushering in a period of greater market volatility**
- **A wave of LNG is the catalyst for a second natural gas revolution, with far-reaching implications for gas pricing & contracts**
- **The next chapter in the rise of renewables requires policies to push their role in heat & transport & changes in power market design**
- **The Paris Agreement is a framework; its impact on energy depends on how its goals are translated into real government policy actions**



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