



World Energy Outlook 2017

FIPI, 7 December 2017

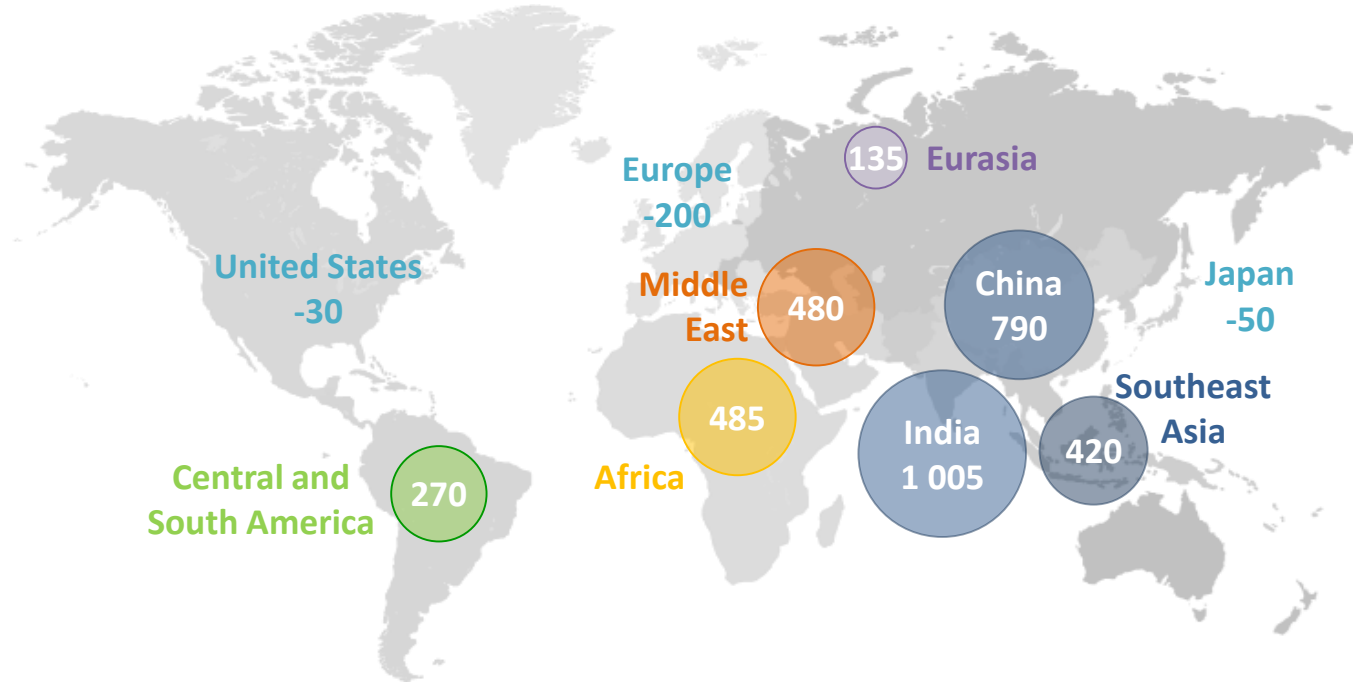
Tim Gould, IEA

Tipping the energy world off its axis

- Four large-scale upheavals in global energy set the scene for the new *Outlook*:
 - The **United States** is turning into the undisputed global leader for oil & gas production
 - **Solar PV** is on track to be the cheapest source of new electricity in many countries
 - **China's** new economic model & cleaner power mix is recasting its role in energy
 - The future is **electrifying**, spurred by cooling, electric vehicles & digitalisation
- These shifts brighten the prospects for affordable, sustainable energy at a time when a new group of countries, led by India, is moving to centre stage
- There are many possible pathways ahead & many potential pitfalls if governments or industry misread the signs of change

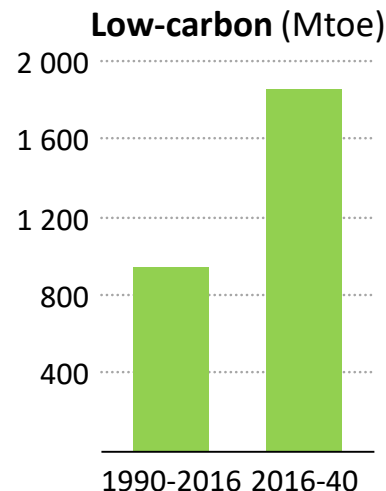
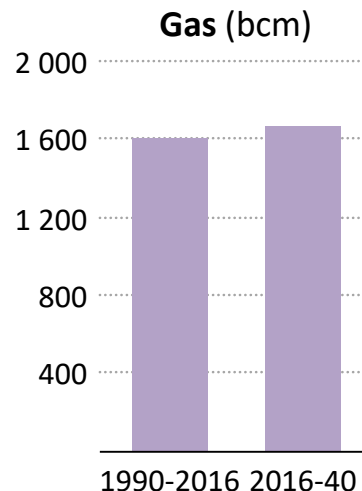
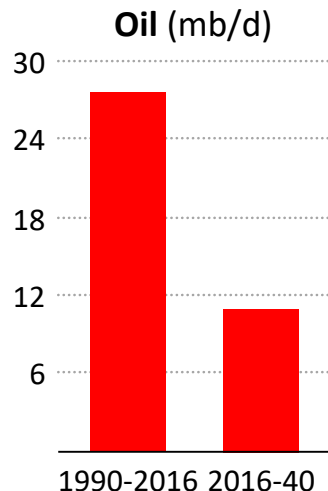
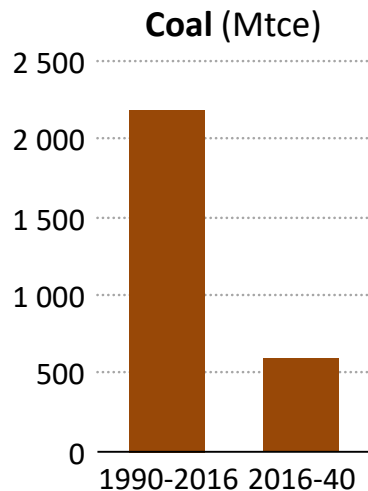
India takes the lead, as China energy growth slows

Change in energy demand, 2016-40 (Mtoe)



Old ways of understanding the world of energy are losing value as countries change roles: the Middle East is fast becoming a major energy consumer & the United States a major exporter

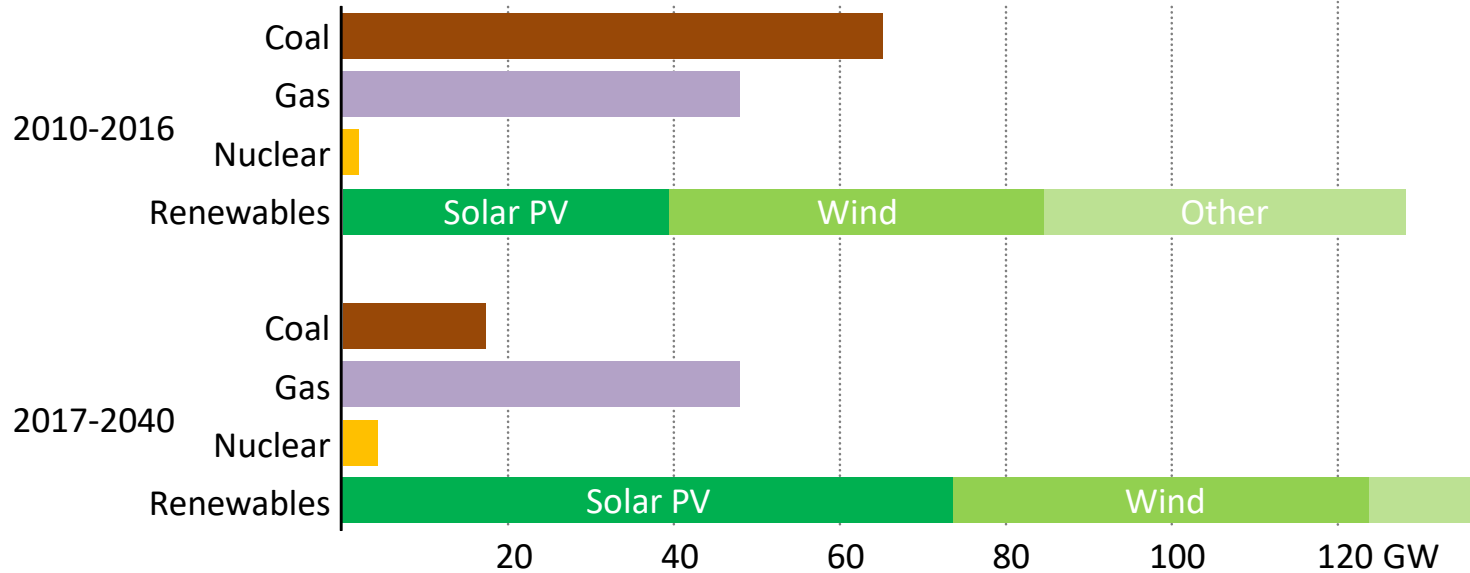
Change in world energy demand by fuel



*Low-carbon sources & natural gas meet 85% of the increase in worldwide demand:
India plays an increasingly influential role in determining a range of global trends*

Solar PV forges ahead in the global power mix

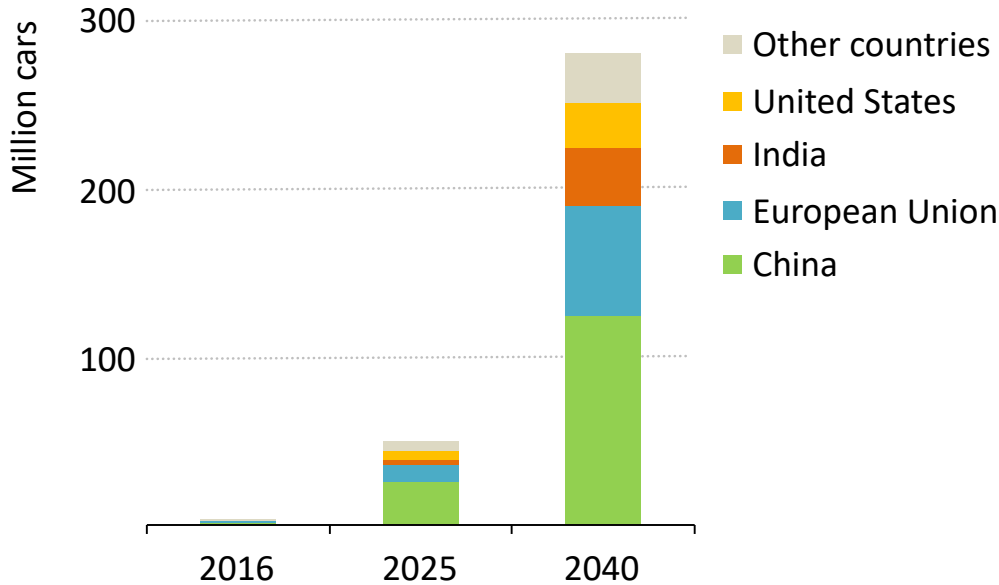
Global average annual net capacity additions by type



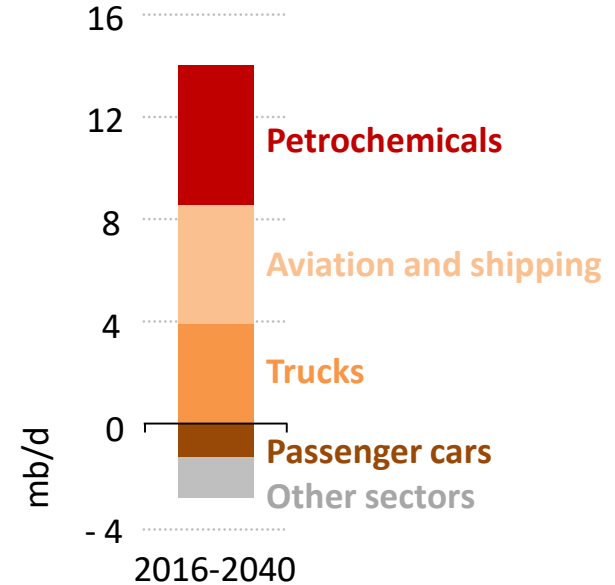
China, India & the US lead the charge for solar PV, while Europe is a frontrunner for onshore & offshore wind: rising shares of solar & wind require more flexibility to match power demand & supply

EVs are on the way, but oil demand still keeps rising

Electric car fleet



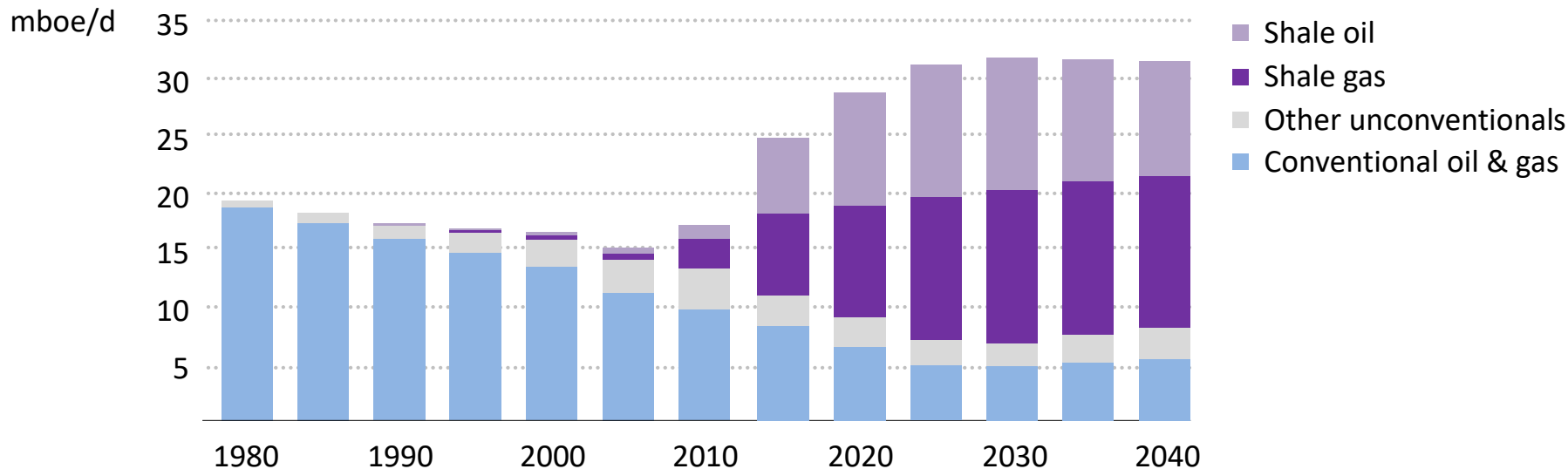
Change in global oil demand



Electric cars are helping to transform energy use for passenger cars, slowing the pace of growth in global oil demand: however, trucks, aviation, shipping & petrochemicals keep oil on a rising trend

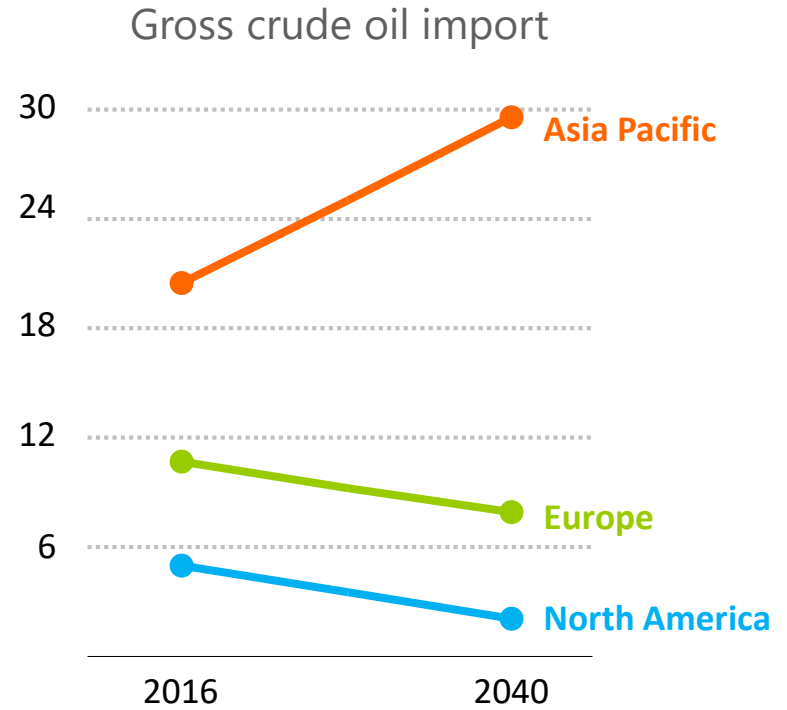
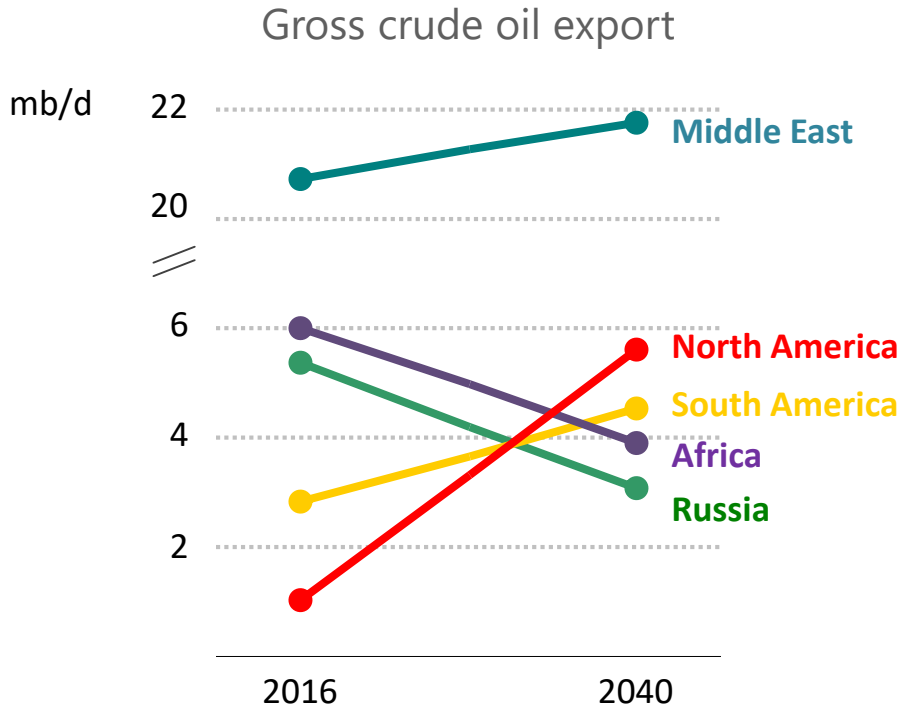
US becomes undisputed leader of oil & gas production

Oil and gas production in the United States



The US is already switching to become a net exporter of gas & becomes a net exporter of oil in the 2020s, helped also by the demand-side impact of fuel efficiency & fuel switching

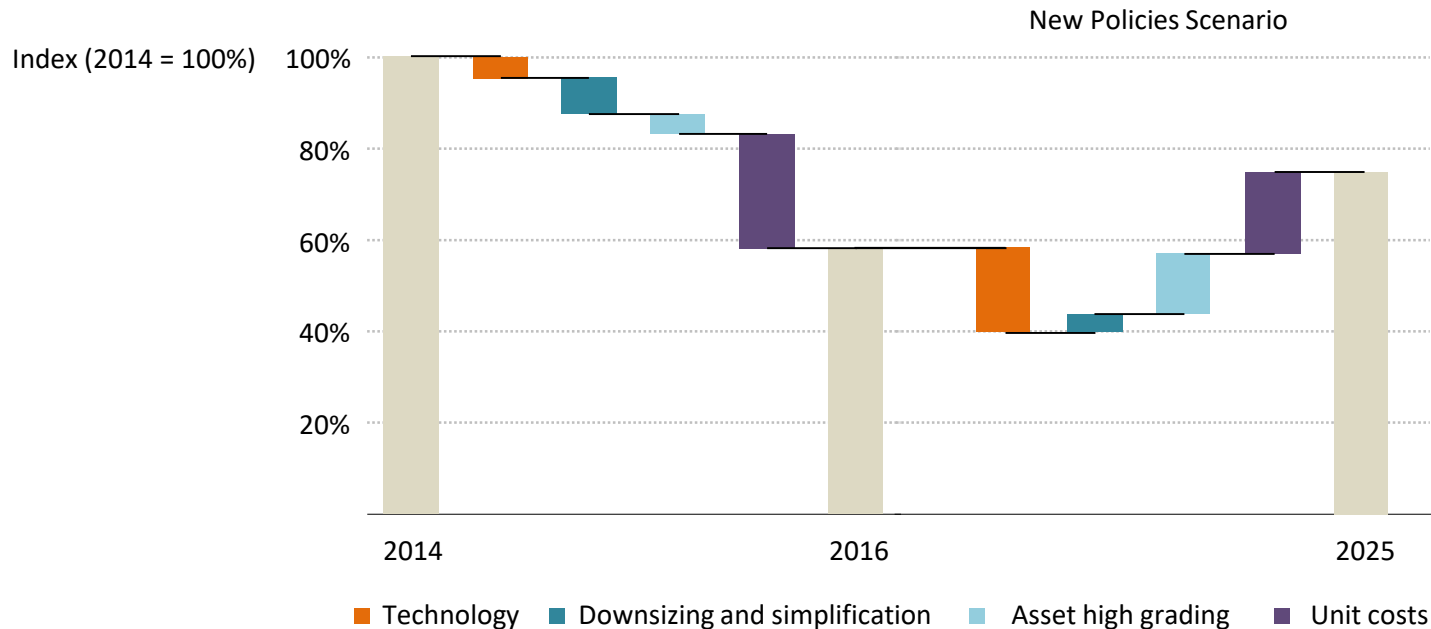
Traditional patterns of oil trade undergoing a major upheaval



North America becomes the second-largest gross crude oil exporter by 2040, while Asia Pacific's need for crude oil imports intensifies

Cost reductions: structural or cyclical?

Changes in capital costs per barrel for developing conventional oil projects



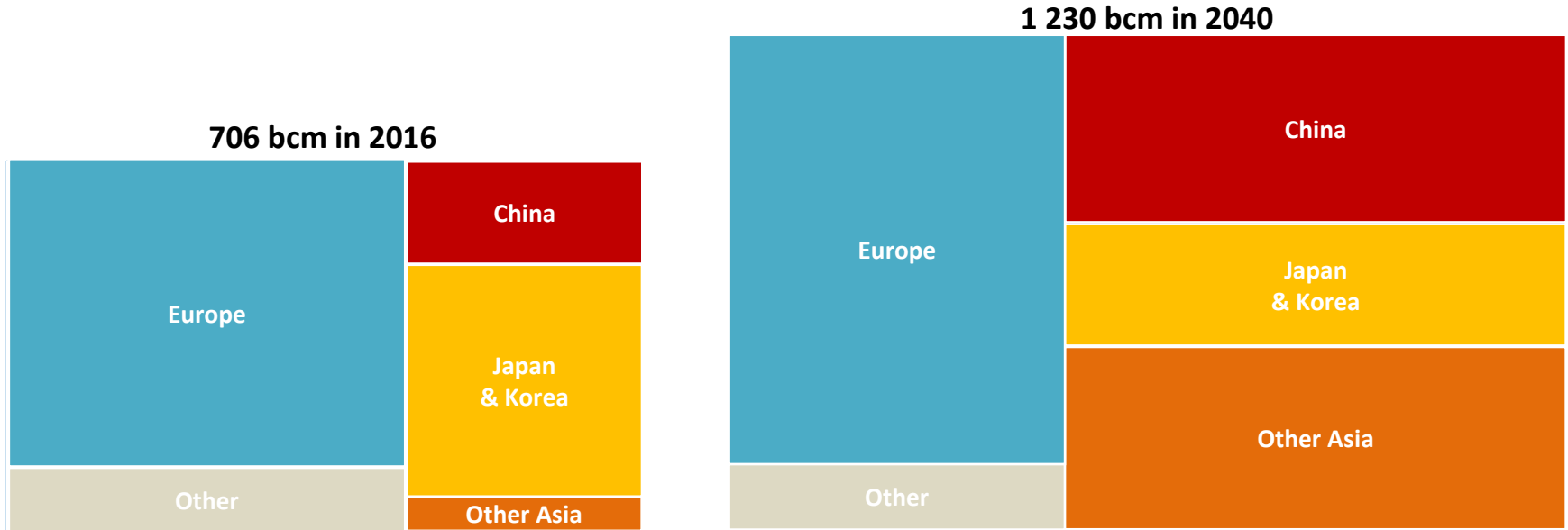
Costs have fallen by just over 40% since 2014, with unit costs accounting for nearly 60% of the reduction. How this evolves in the future will vary according to scenario

Could prices stay lower for longer?

- The New Policies Scenario is characterised by steady upward pressure on the oil price (\$83/barrel by 2025), but there is uncertainty about underlying assumptions
- A case with prices between \$50–70/bbl to 2040 is based on larger US tight oil resources, faster upstream cost reductions through digitalisation & greater uptake of electric cars
- Story to mid-2020s is supply-driven with US tight oil surging into the market in the event of any upswing in prices; but demand grows more quickly as a result
- Thereafter, the growth in electric cars makes a significant dent in the trajectory for oil demand, even though these declines are partially offset by rises elsewhere
- These supply and demand revolutions cannot be excluded, but the lower prices they engender make each revolution more difficult.

LNG ushers in a new global gas order

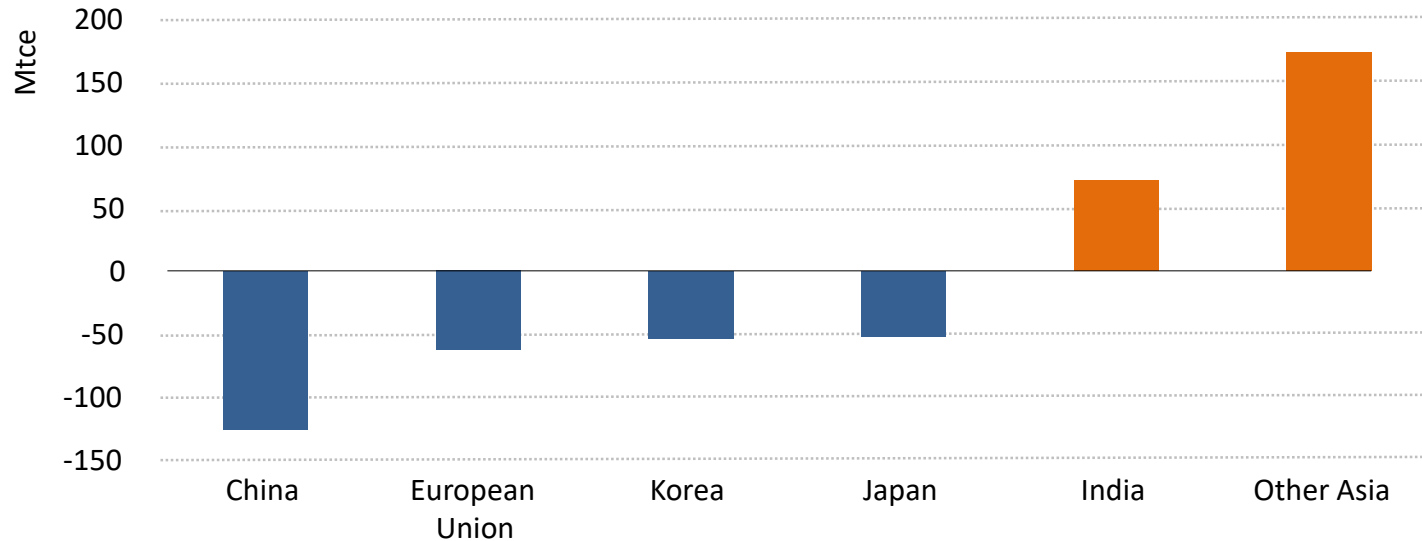
Gas importers



Asia's growing gas import requirements are largely met by LNG, with exports from the US accelerating a shift towards a more flexible, liquid global market

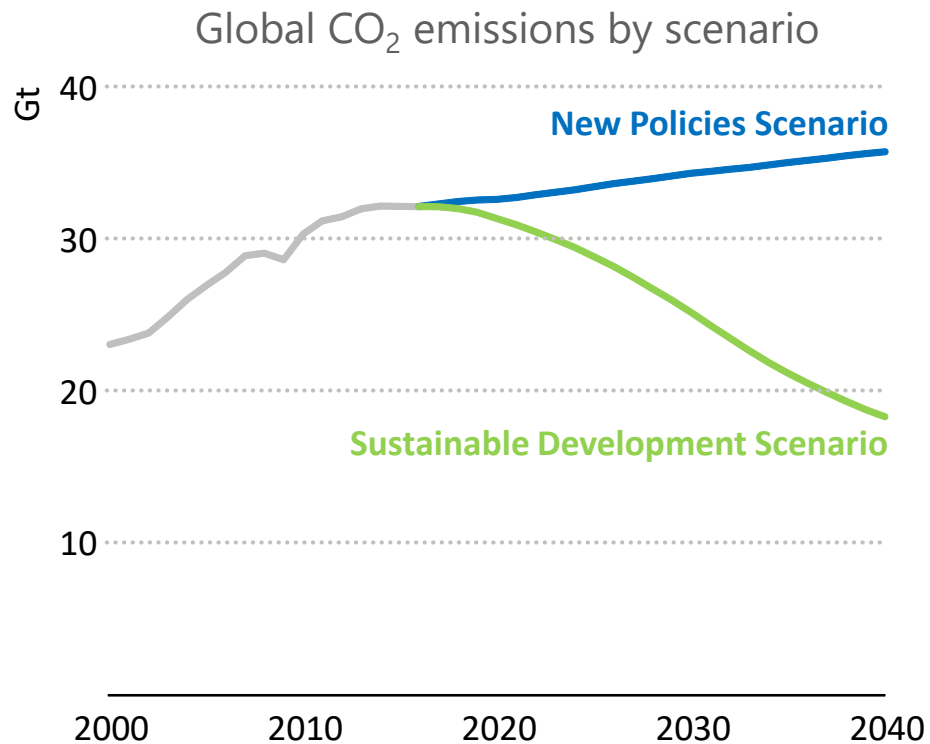
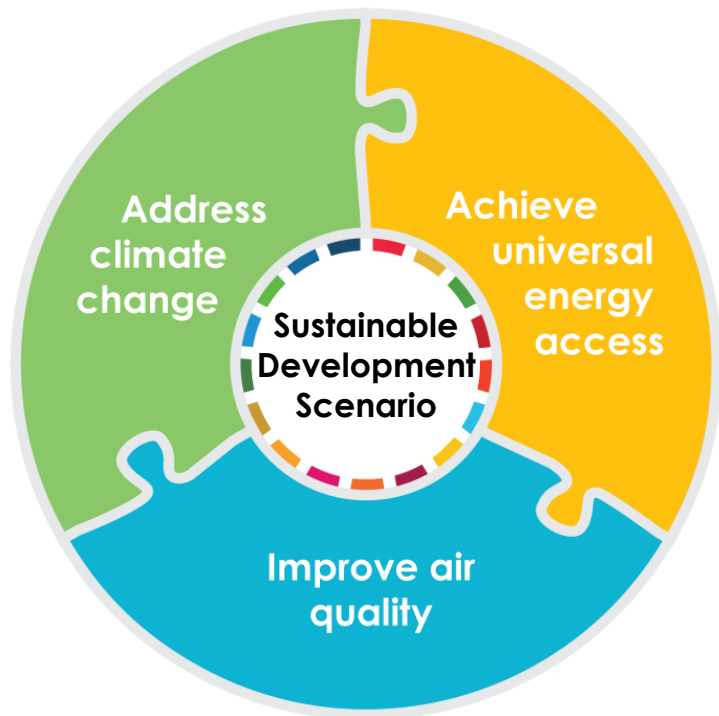
Coal trade: an Asian seesaw

Change in net coal imports in selected regions, 2016-2040



While LNG trade expands & diversifies, the range of international buyers for coal is narrowing & the falling cost of solar could squeeze coal trade even more

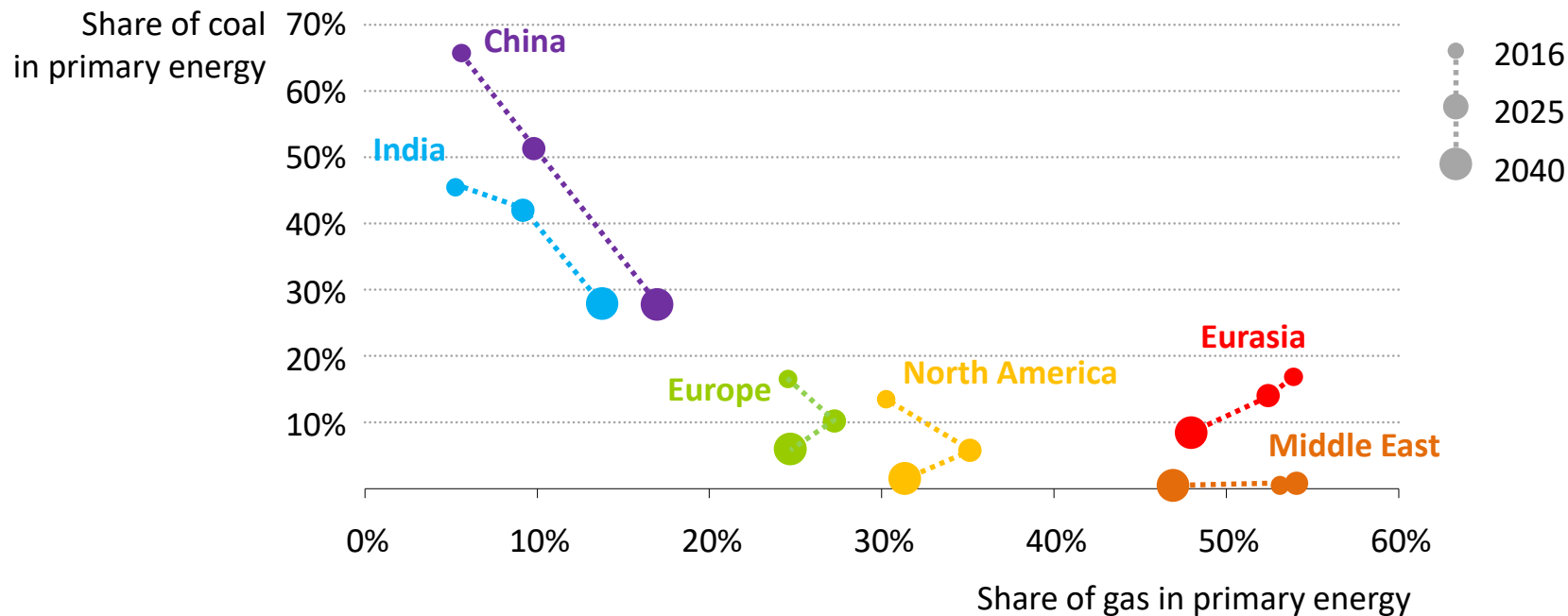
A new strategy for energy & sustainable development



The Sustainable Development Scenario reduces CO₂ emissions in line with the objectives of the Paris Agreement, while also tackling air pollution and achieving universal energy access

A complex picture for gas, a clear downward path for coal

Share of coal & gas in energy demand in selected regions in the Sustainable Development Scenario



The share of coal in total primary energy demand falls across all regions in the Sustainable Development Scenario, but opportunities for gas vary by country, by sector and over time



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