

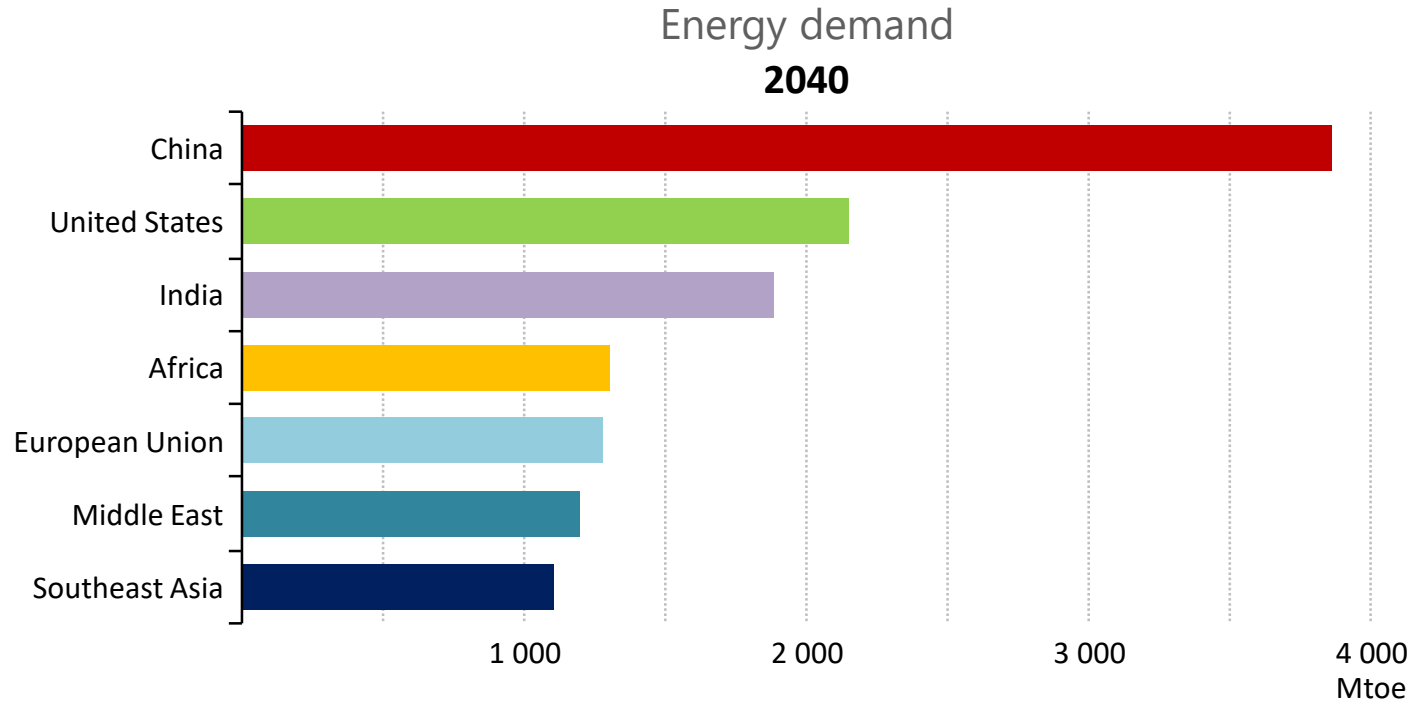
World Energy Outlook 2018



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- Mixed signals about the pace & direction of change in global energy:
 - Oil markets are entering a period of **renewed uncertainty & volatility**
 - **Natural gas is on the rise**: China's rapid demand growth is erasing talk of a 'gas glut'
 - **Solar PV has the momentum** while other key technologies & efficiency policies need a push
 - Our assessment points to **energy-related CO₂ emissions reaching a historic high in 2018**
 - For the first time, the global **population without access to electricity fell below 1 billion**
- **Electricity** is carrying great expectations, but questions remain over the extent of its reach in meeting demand & how the power systems of the future will operate
- Policy makers need well-grounded insights about different possible futures & how they come about. The *WEO* provides two key scenarios:
 - New Policies Scenario
 - Sustainable Development Scenario

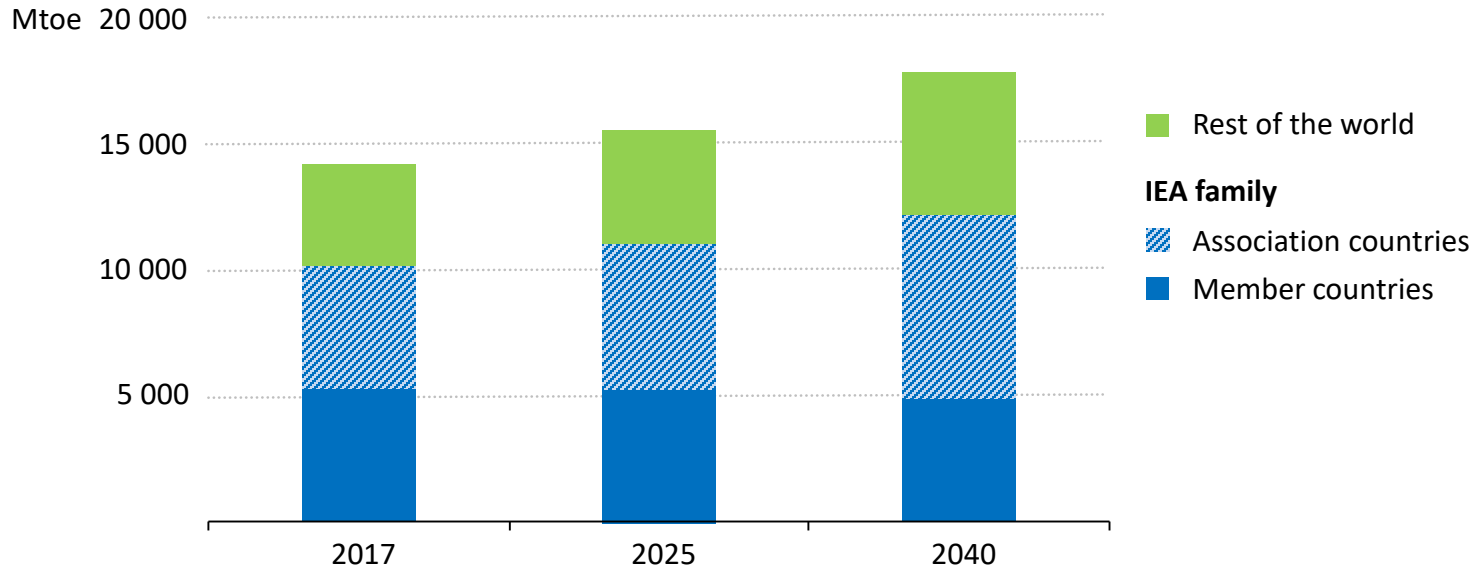
The new geography of energy *



In 2000, more than 40% of global demand was in Europe & North America and some 20% in developing economies in Asia. By 2040, this situation is completely reversed.

Global energy demand and the growing IEA Family

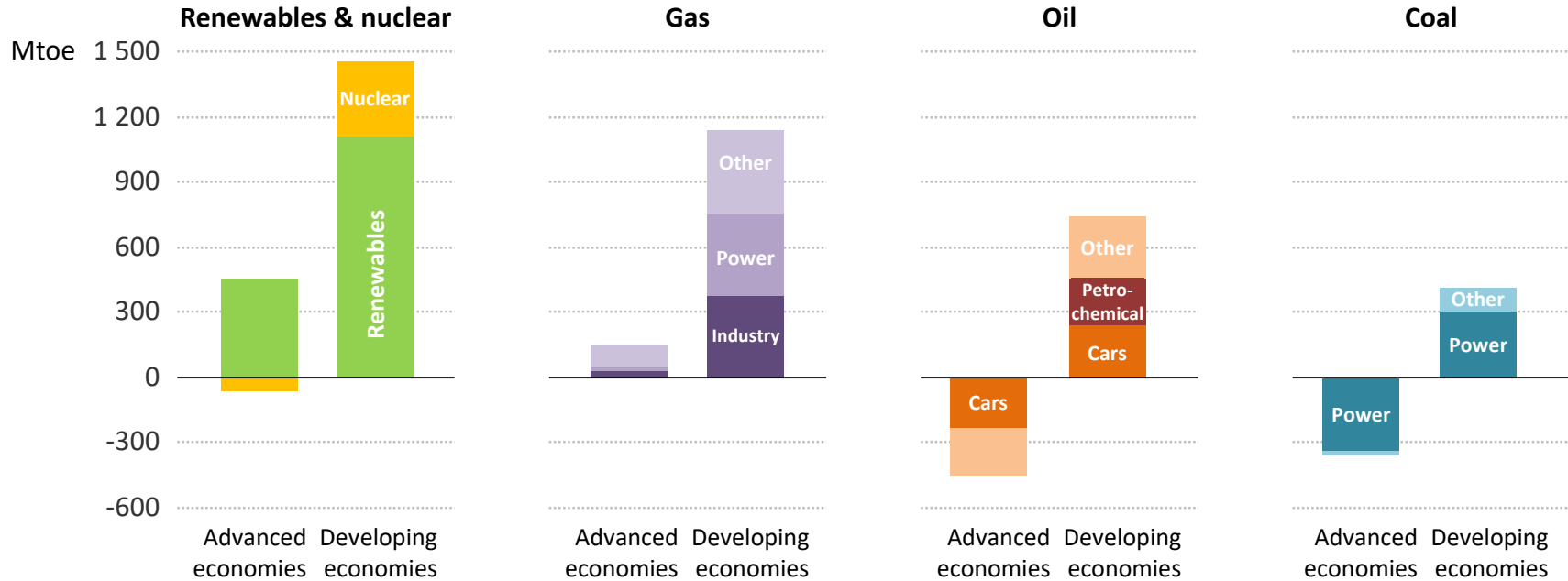
Share of IEA member and association countries in global energy demand



With South Africa the latest country to join the IEA as an Association member, the IEA Family now accounts for over 70% of global energy demand from under 40% in 2015

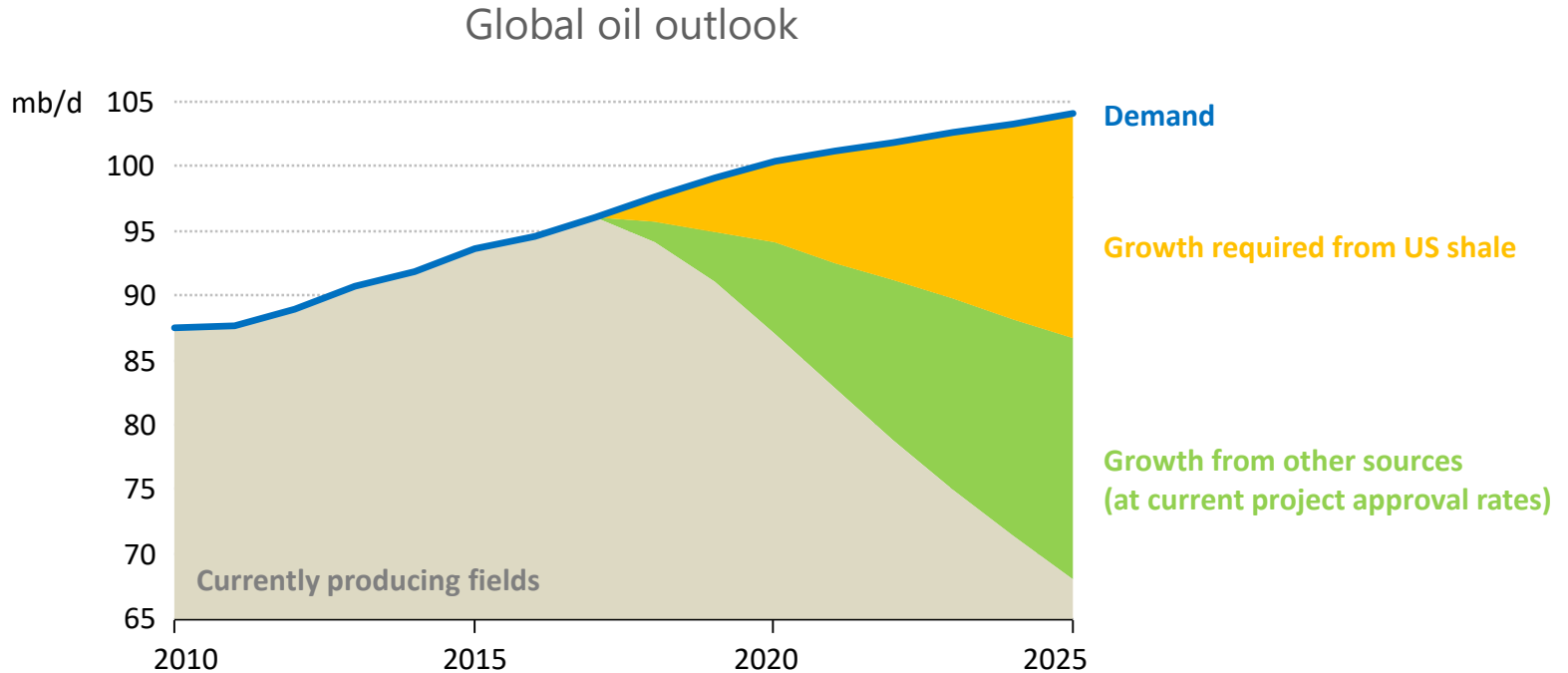
Fuelling the demand for energy

Change in global energy demand, 2017-2040



The increase in demand would be twice as large without continued improvements in energy efficiency, a powerful tool to address energy security & sustainability concerns

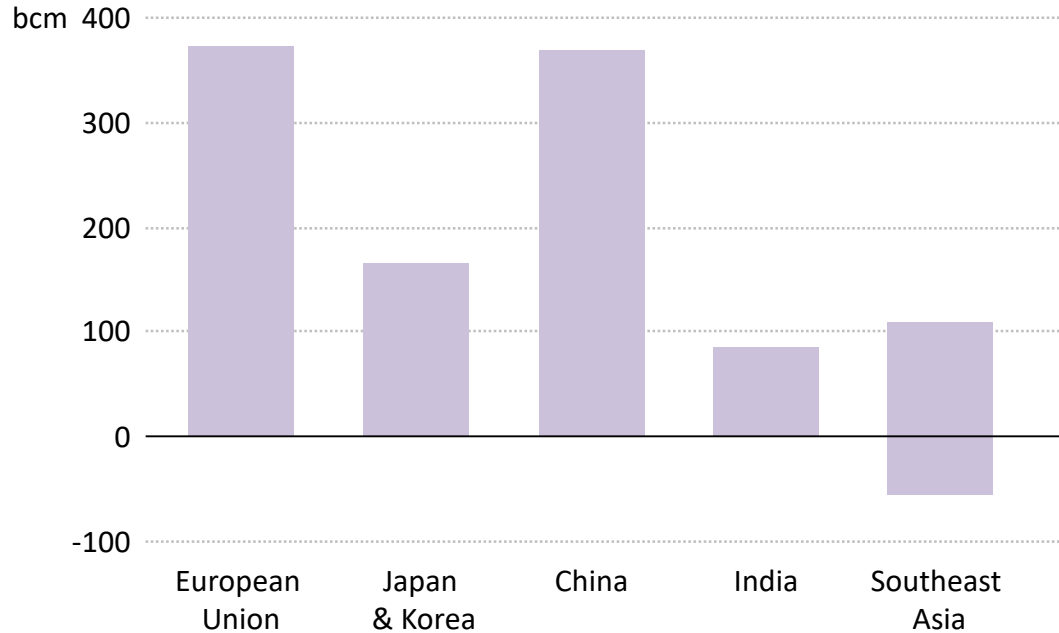
Can US shale alone avoid a turbulent oil market?



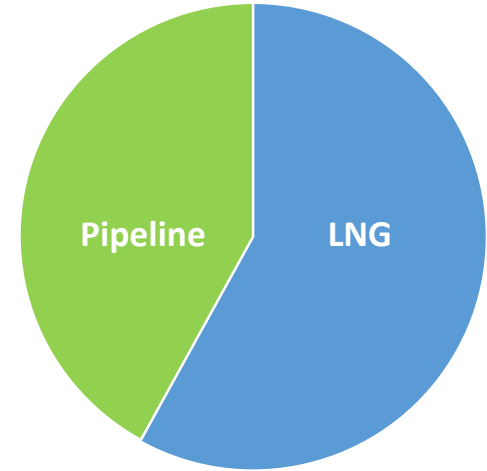
Oil demand looks robust in the near term; if approvals of new conventional projects remain low, market stability would require continuous exceptional growth in US shale

China – the emerging giant of gas demand*

Net gas imports in 2040



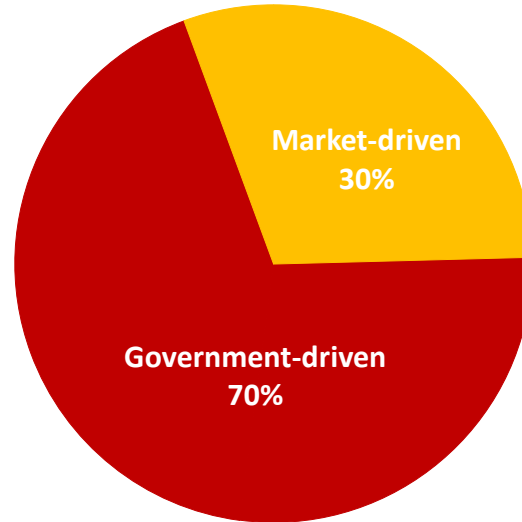
Shares in long-distance gas trade, 2040



Developing countries in Asia – led by China – dominate the rise in long-distance gas trade; more than 80% of the growth to 2040 comes in the form of LNG

Our energy destiny rests with governments

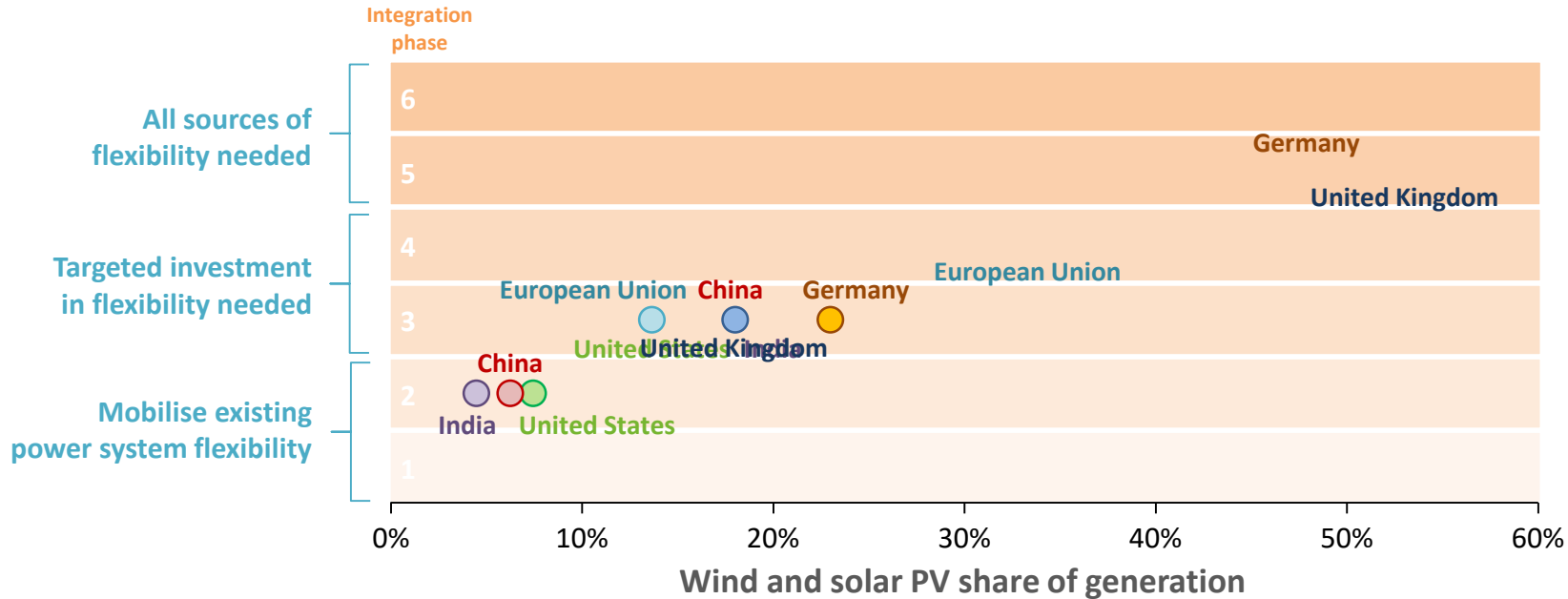
Total investment in energy supply to 2040:
\$42.3 trillion



More than 70% of the \$2 trillion required each year in energy supply investment either comes from state-directed entities or receives a full or partial revenue guarantee

Flexibility: the cornerstone of tomorrow's power systems

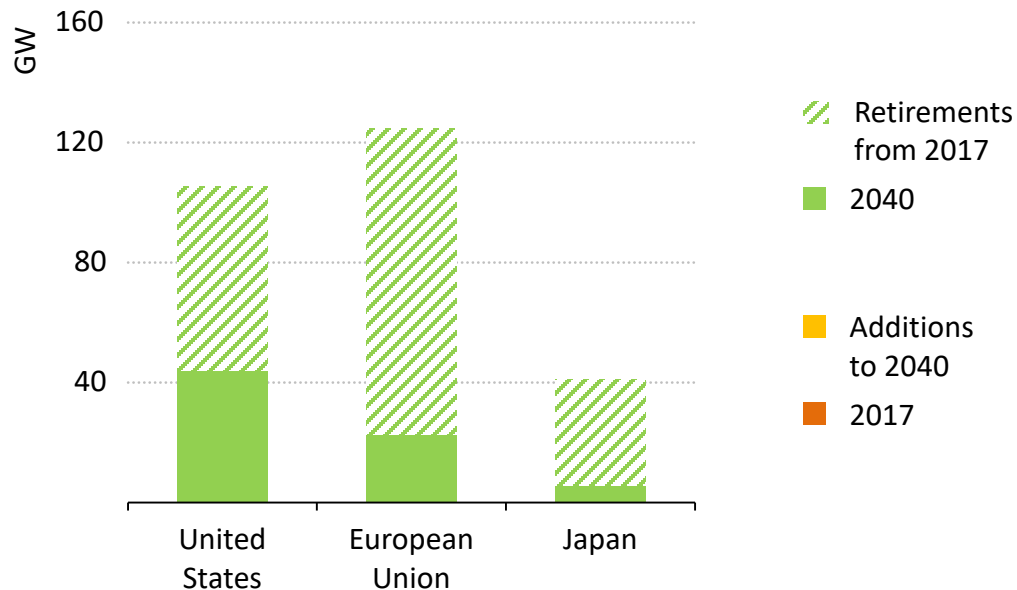
Phases of integration with variable renewables share, 2030



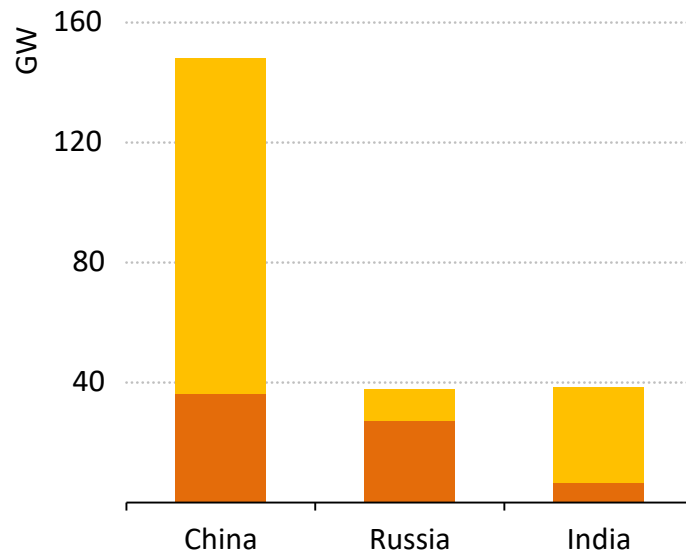
Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response

Two directions for nuclear power*

Without policy changes

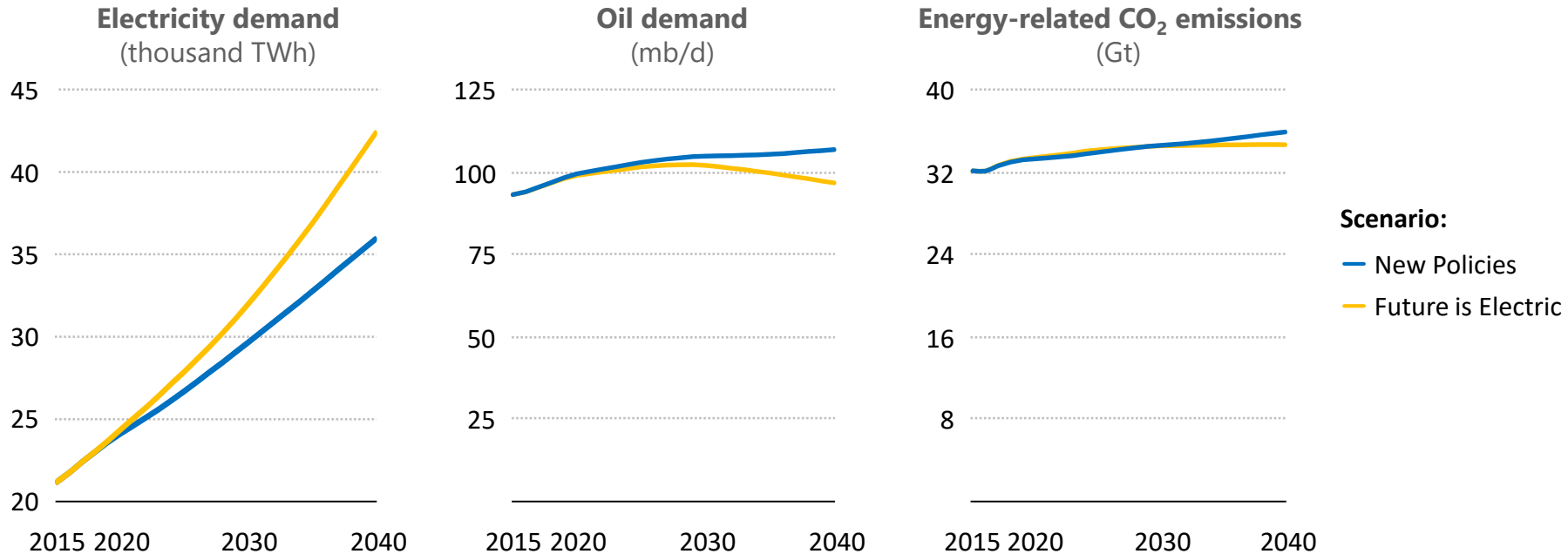


Growth markets



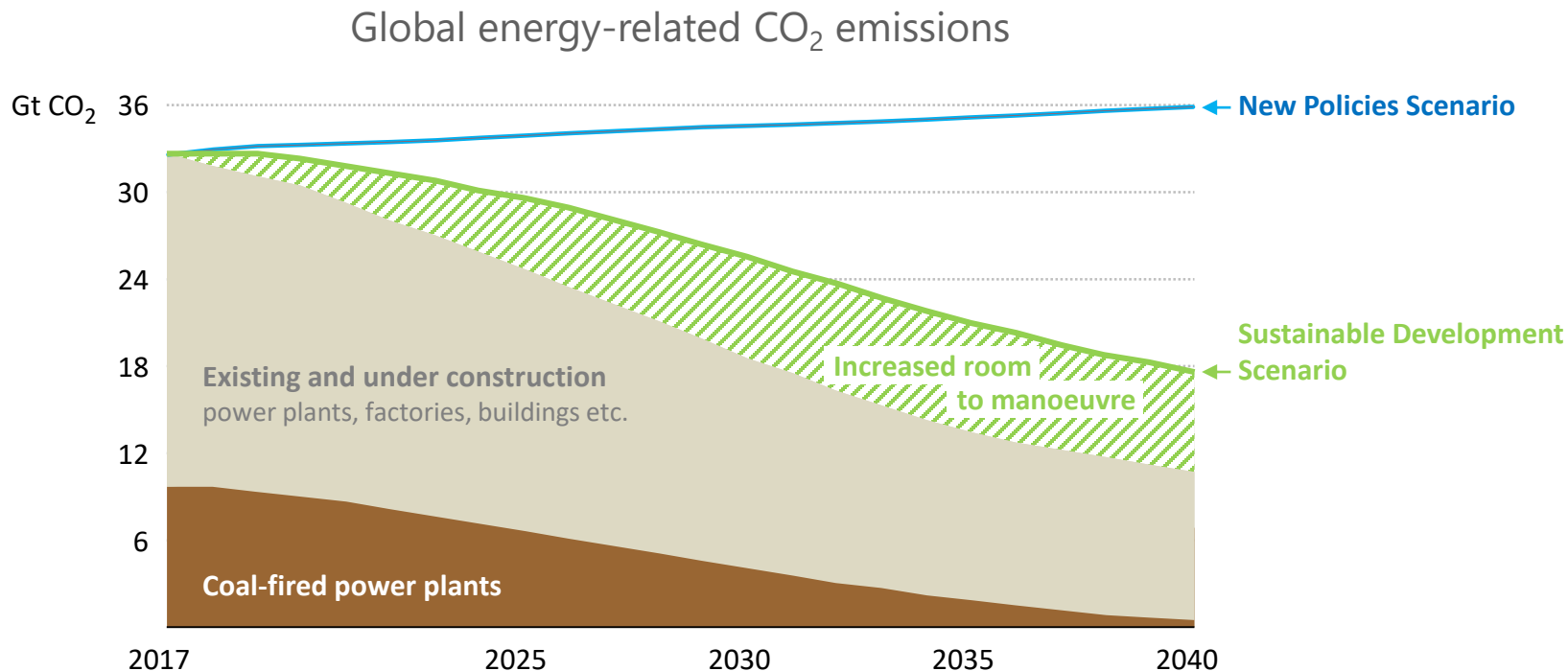
The contribution of nuclear power could decline substantially in leading markets, while large growth is coming, as China takes first position within a decade

What if the future is electric?



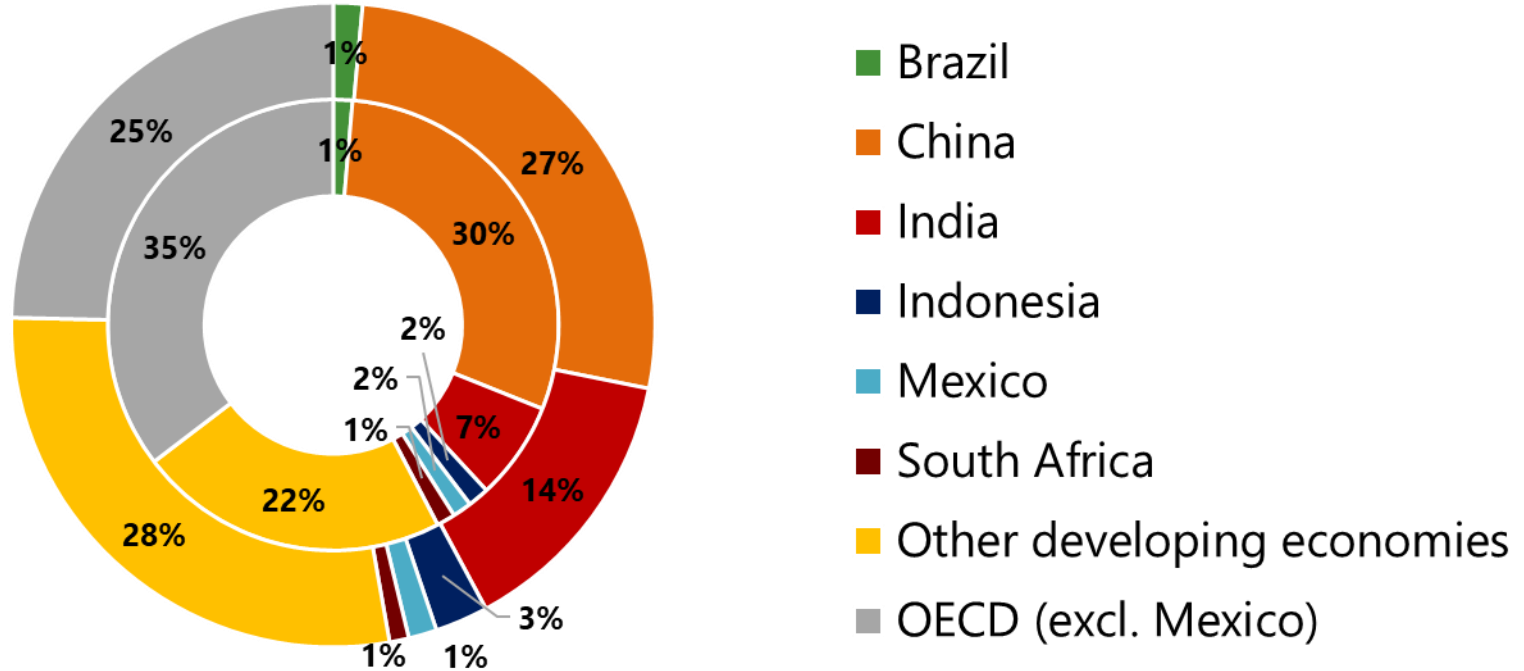
Increased electrification leads to a peak in oil demand, avoids 2 million air pollution-related premature deaths, but does not necessarily lead to large CO₂ emissions reductions

Can we unlock a different energy future?



Coal plants make up one-third of CO₂ emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation

CO₂ emissions: 2017 vs 2040



Developing economies are becoming the main source of CO₂ emissions

- The links between energy & geopolitics are strengthening & becoming more complex, a major factor in the outlook for energy security
- A mismatch between robust oil demand in the near term & a shortfall in new projects risks a sharp tightening of oil markets in the 2020s
- The rapid growth of electricity brings huge opportunities; but market designs need to deliver both electricity *and* flexibility to keep the lights on
- There is no single solution to turn emissions around: renewables, efficiency & a host of innovative technologies, including storage, CCUS & hydrogen, are all required
- The future pathway for energy is open: governments will determine where our energy destiny lies

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