



World Energy Outlook 2017

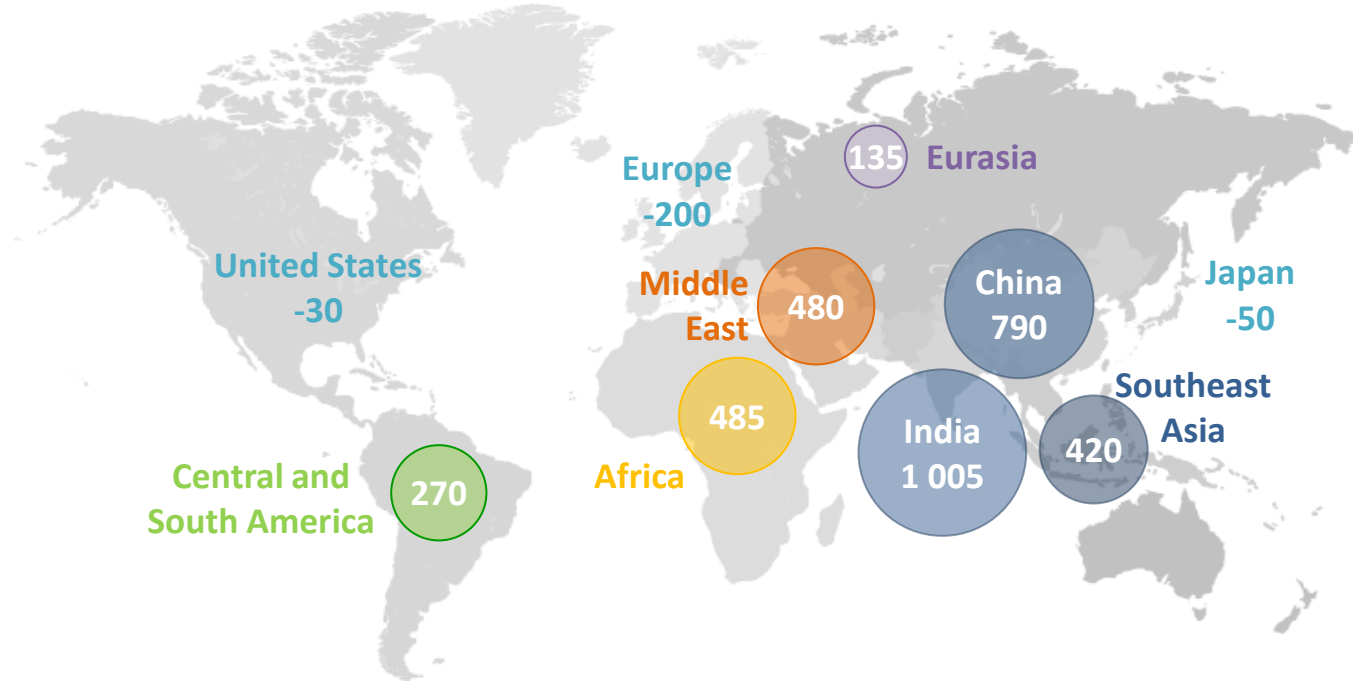
COP23, 16 November 2017

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
 - **Solar PV** is on track to be the cheapest source of new electricity in many countries
 - **China's** new drive to “make the skies blue again” is recasting its role in energy
 - The future is **electrifying**, spurred by cooling, electric vehicles & digitalisation
- These changes brighten the prospects for affordable, sustainable energy & require a reappraisal of approaches to energy security
- 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

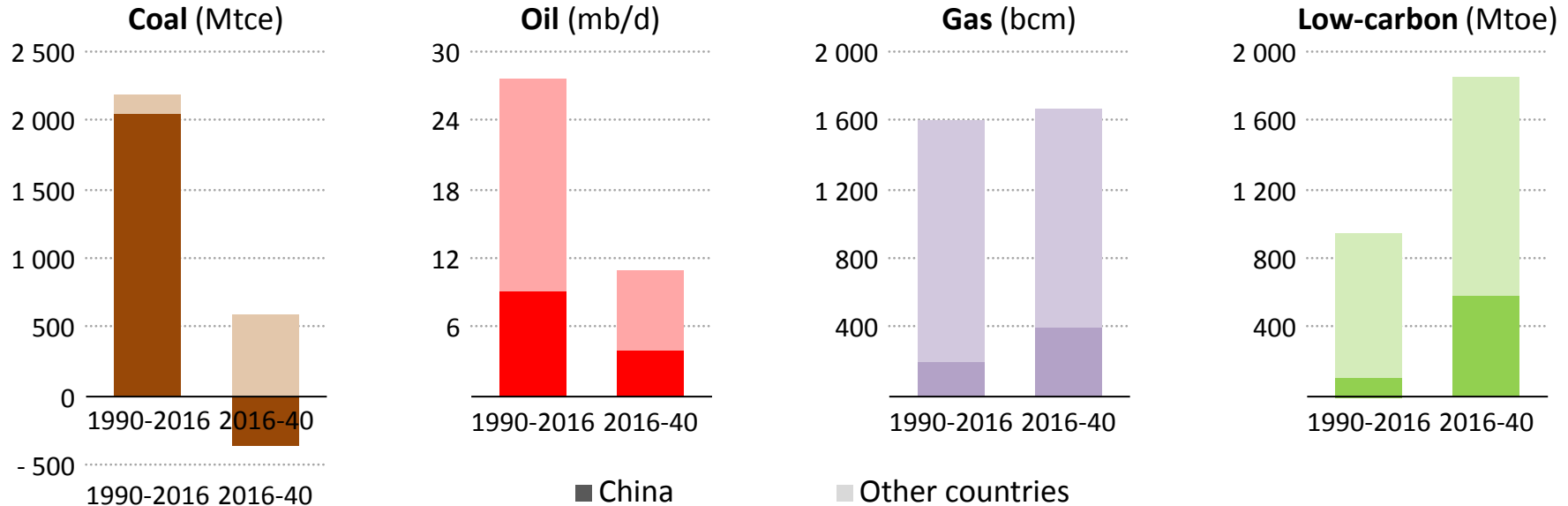
Change in energy demand, 2016-40 (Mtoe)



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

A world in transition: global energy markets, again

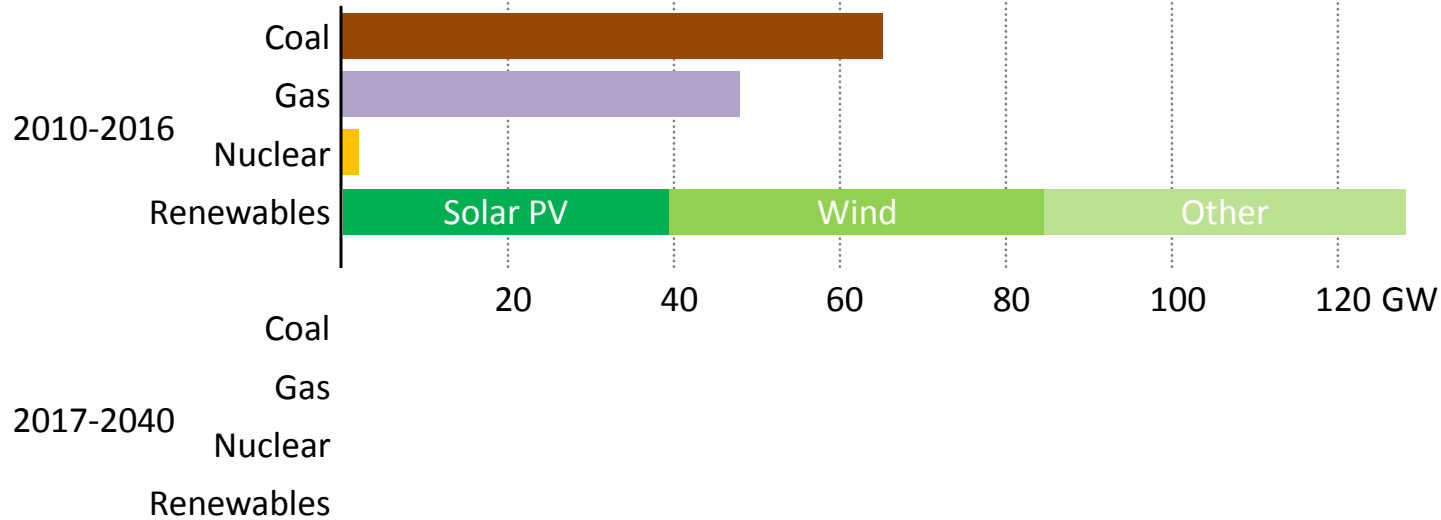
Change in world energy demand by fuel



Low-carbon sources & natural gas meet 85% of the increase in global demand: China's switch to a new economic model & a cleaner energy mix drives global trends

Solar PV forges ahead in the global power mix

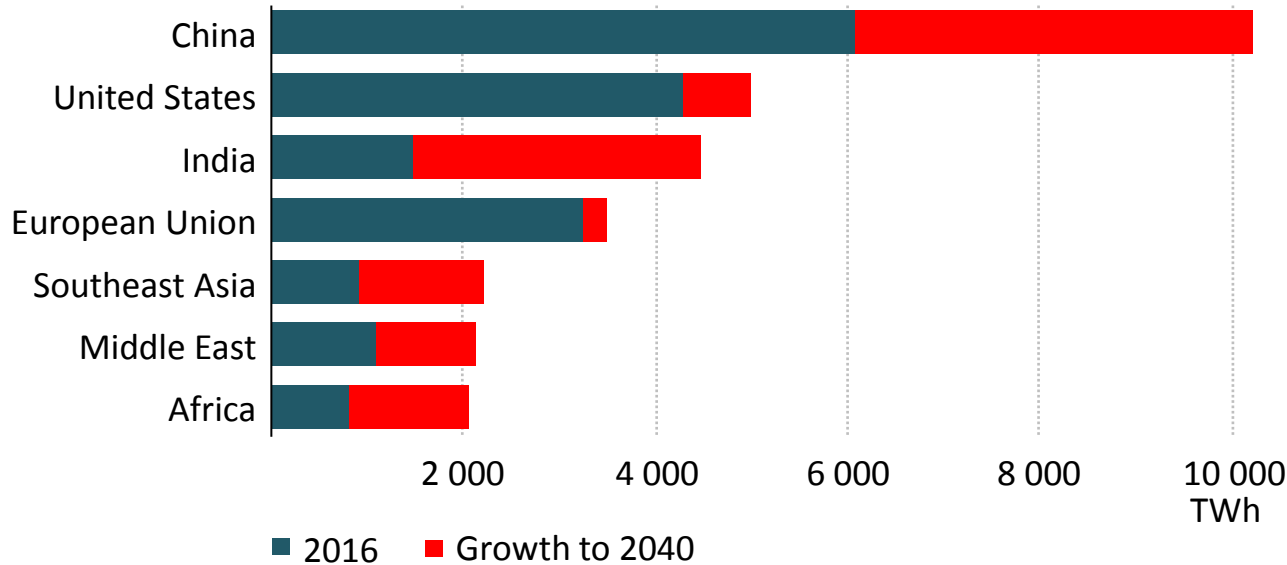
Global average annual net capacity additions by type



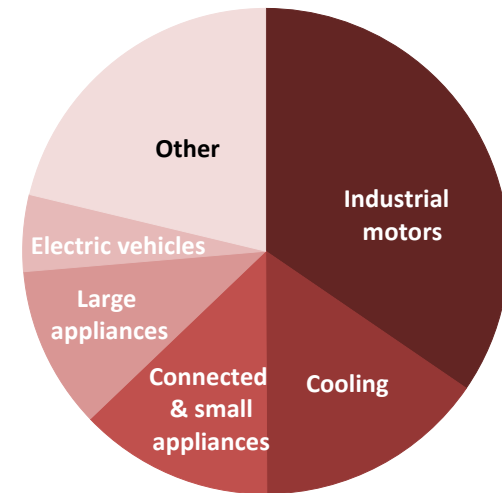
China, India & the US lead the charge for solar PV, while Europe is a frontrunner for onshore & offshore wind: rising shares of solar & wind require more flexibility to match power demand & supply

The future is electrifying

Electricity generation by selected region



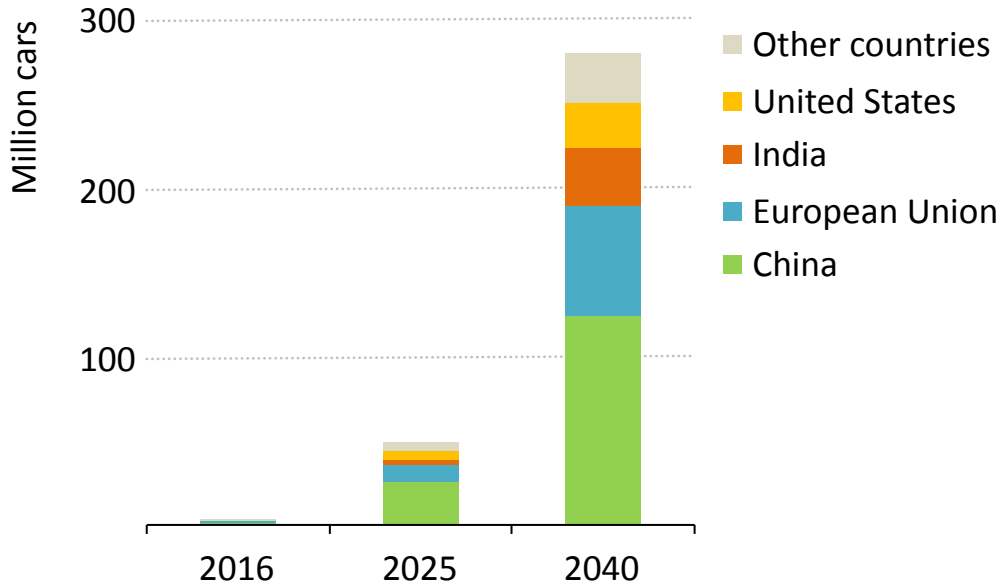
Sources of global electricity demand growth



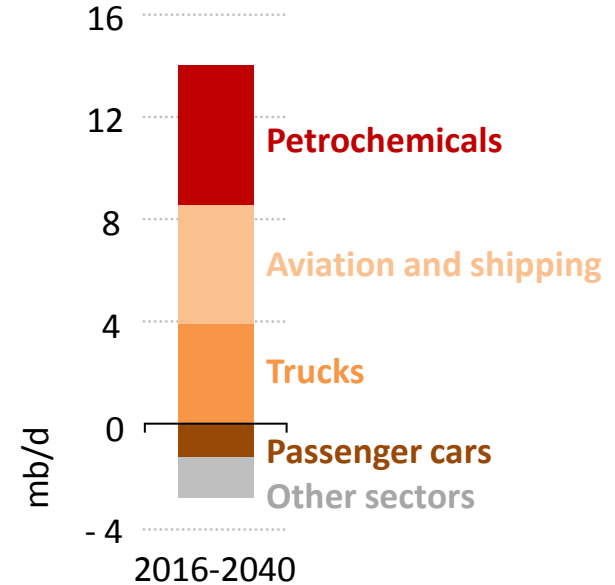
India adds the equivalent of today's European Union to its electricity generation by 2040, while China adds the equivalent of today's United States

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

Electric car fleet



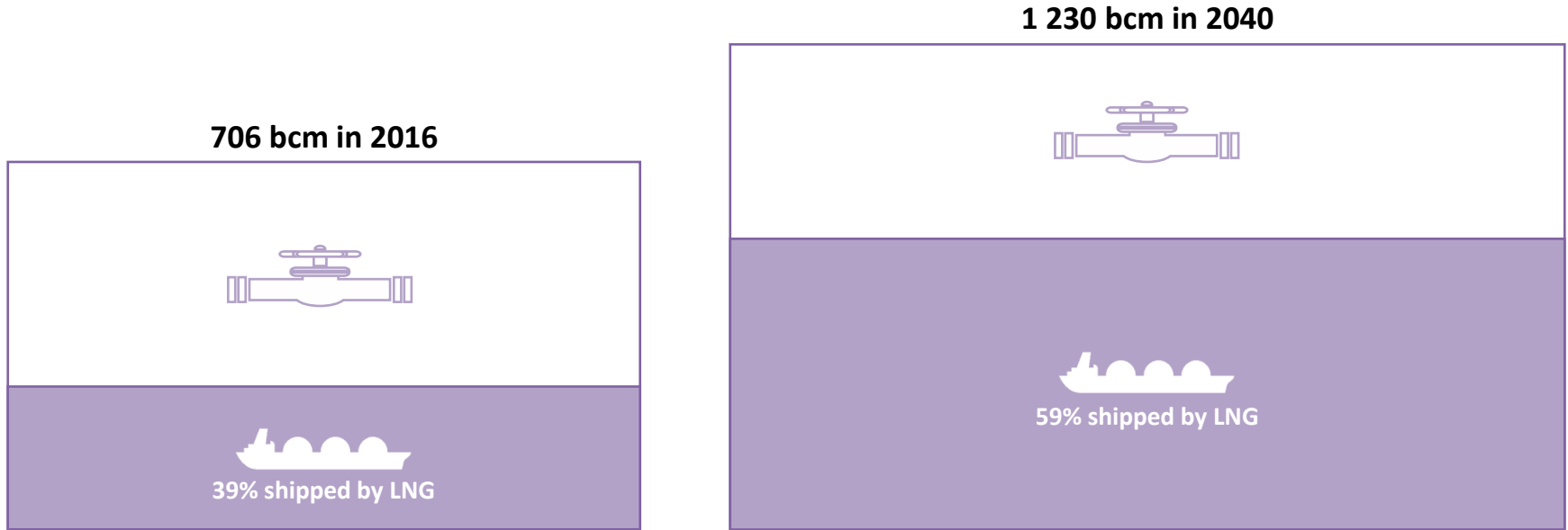
Change in global oil demand



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

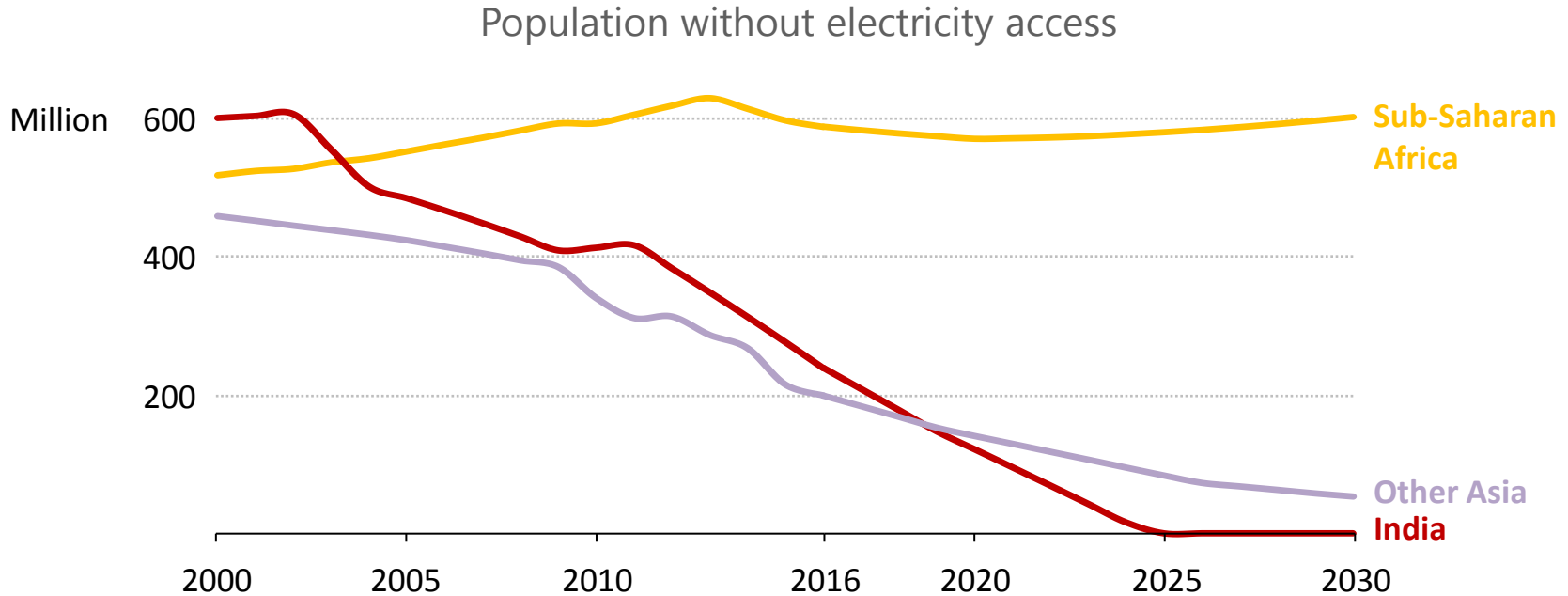
LNG ushers in a new global gas order

Global gas trade



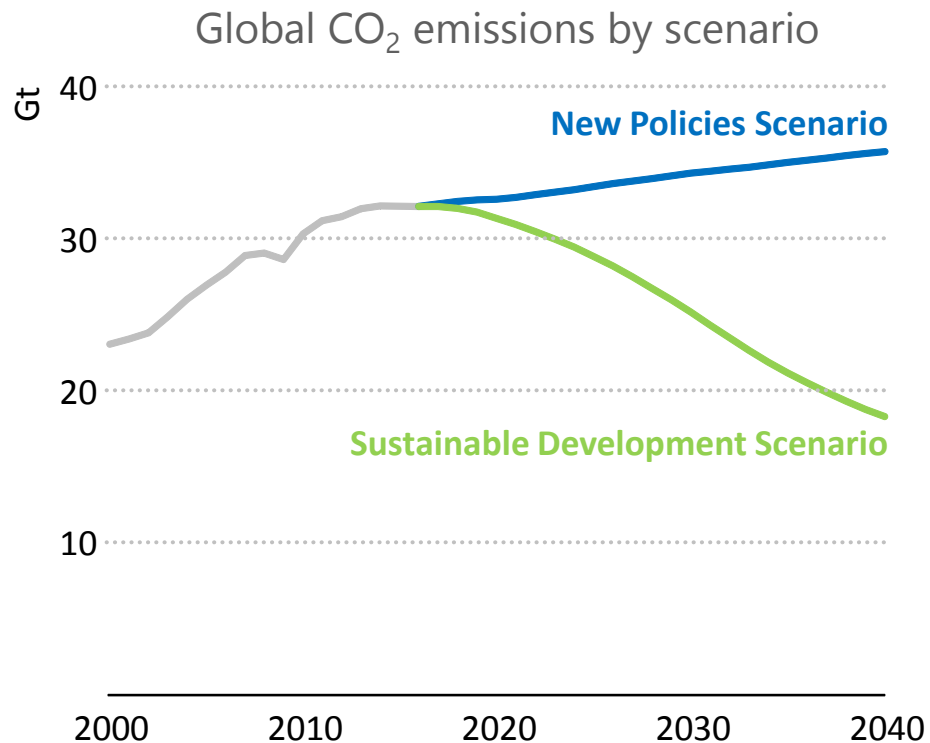
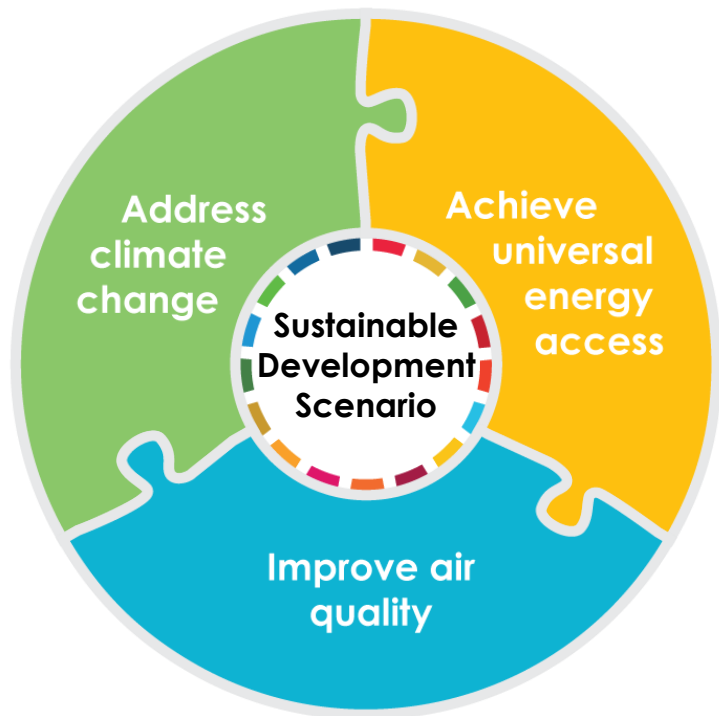
Asia's growing gas import requirements are largely met by LNG, with exports from the US accelerating a shift towards a more flexible, liquid global market

Progress in electricity access is seen in all world regions, but sub-Saharan Africa lags behind



Many countries, led by India, are on track to achieving full electrification by 2030, but – despite recent progress – efforts in sub-Saharan Africa need to redouble

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

Stronger policies for a more sustainable world

The Sustainable Development Scenario in 2040

875

million electric
vehicles

2 times
more efficient
than today

3 250_{GW}

global solar PV capacity

580_{bcm}

additional gas demand

Only 15% additional investment is required to 2040 to achieve the Sustainable Development Scenario, with two-thirds of energy supply investment going to electricity generation & networks

- The oil & gas boom in the United States is shaking up the established order, with major implications for markets, trade flows, investment & energy security
- The versatility of natural gas means that it is well placed to grow, but it cannot afford price spikes or uncertainty over methane leaks
- China continues to shape global trends, but in new ways as its “energy revolution” drives cost reductions for a wide range of clean energy technologies
- Our strategy for sustainable energy shows that concerted action to address climate change is fully compatible with global goals on universal access & air quality
- Electrification & digitalisation are the future for many parts of the global energy system, creating new opportunities but also risks that policy makers have to address



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