



# World Energy Outlook 2017

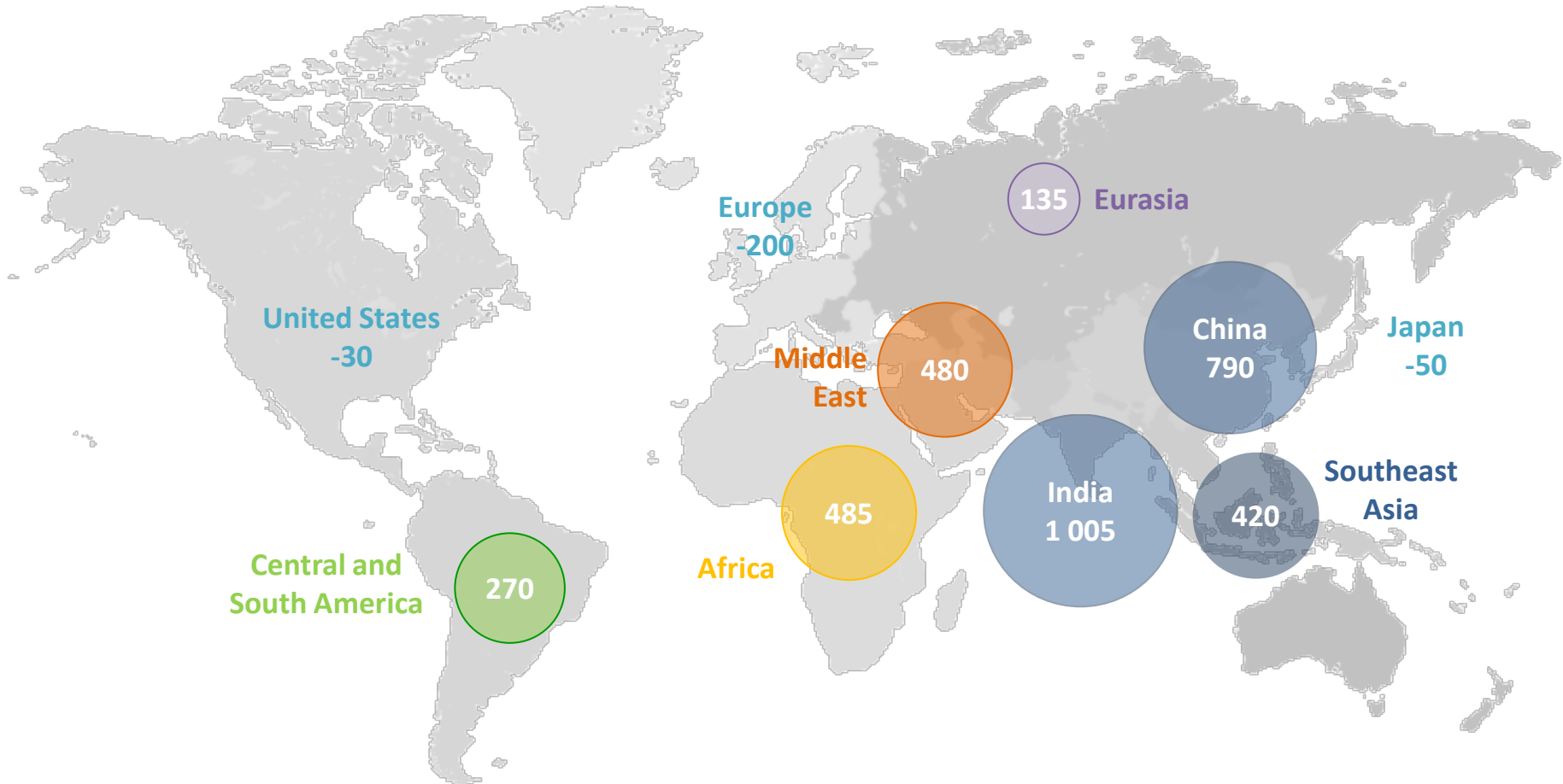
Tokyo, 14 December

# 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

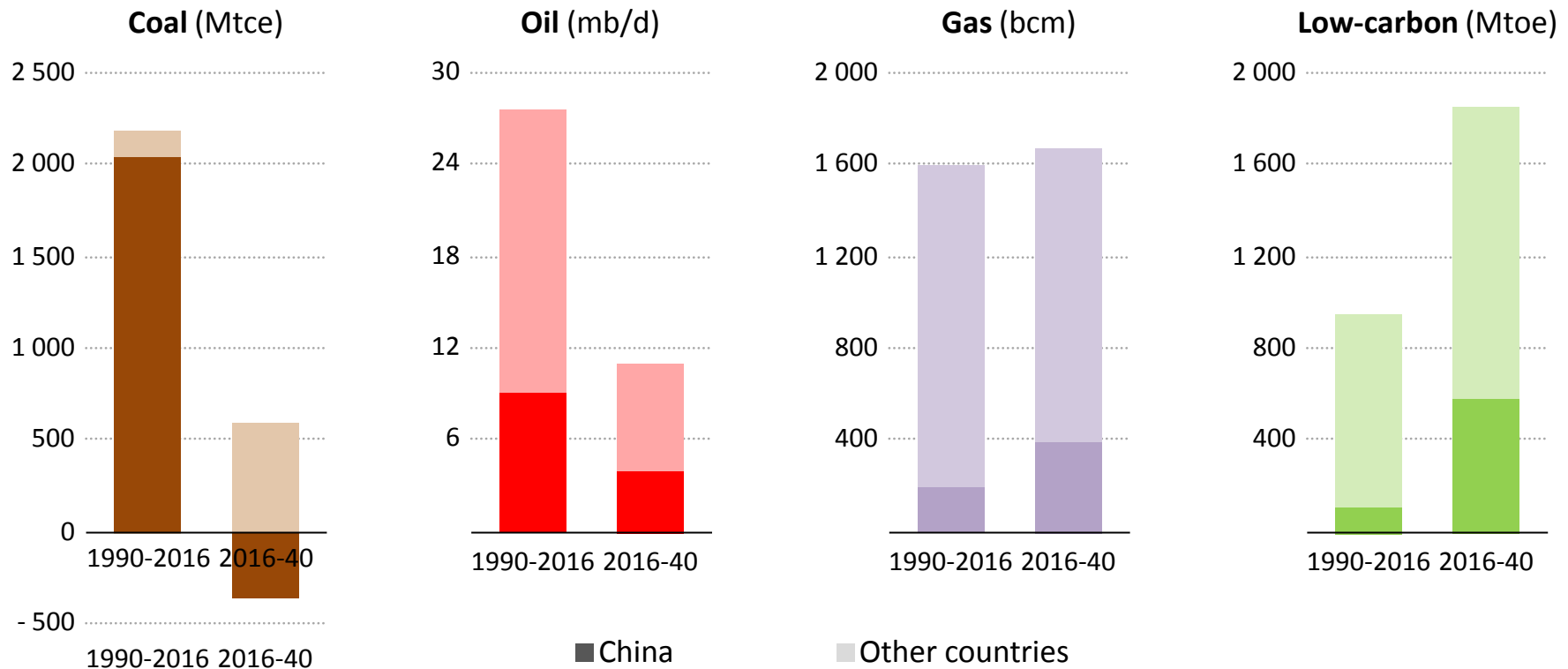
# India takes the lead, as China energy growth slows

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*

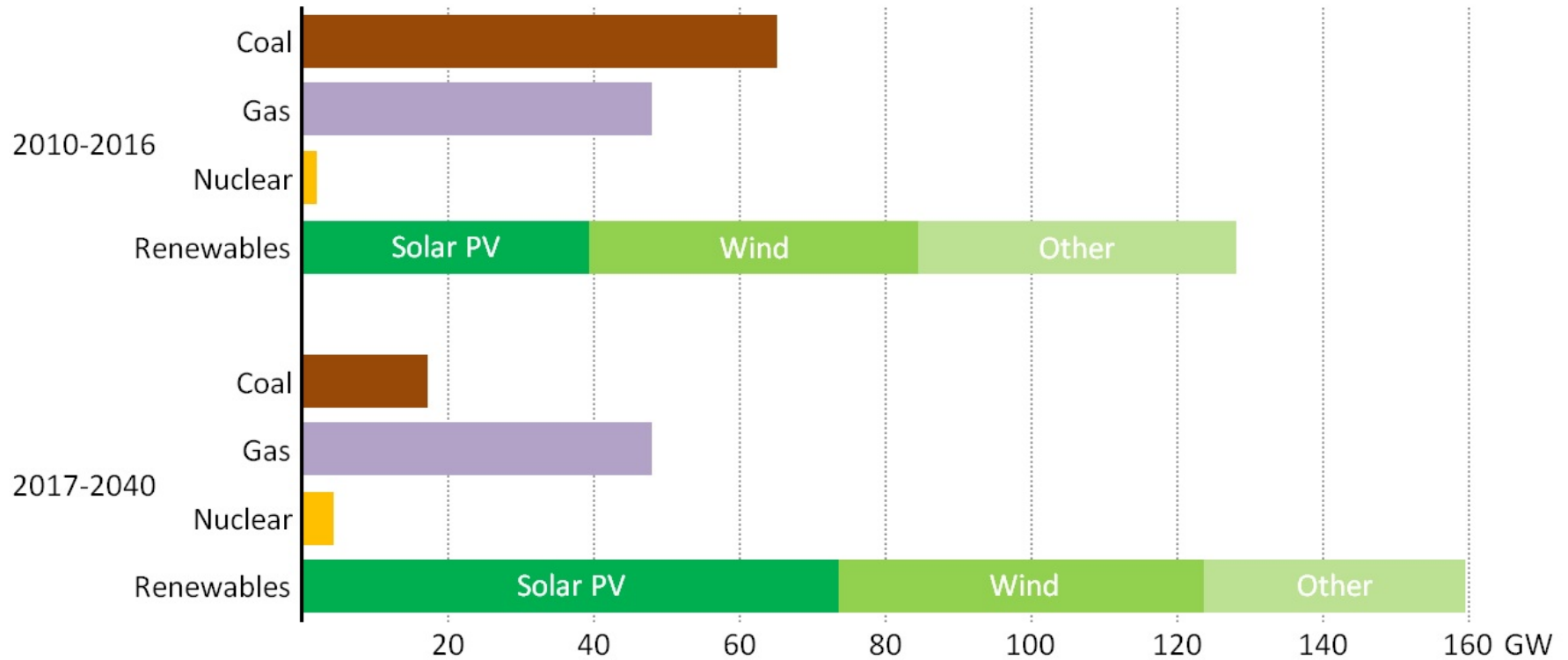
## Change in world energy demand by fuel



*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

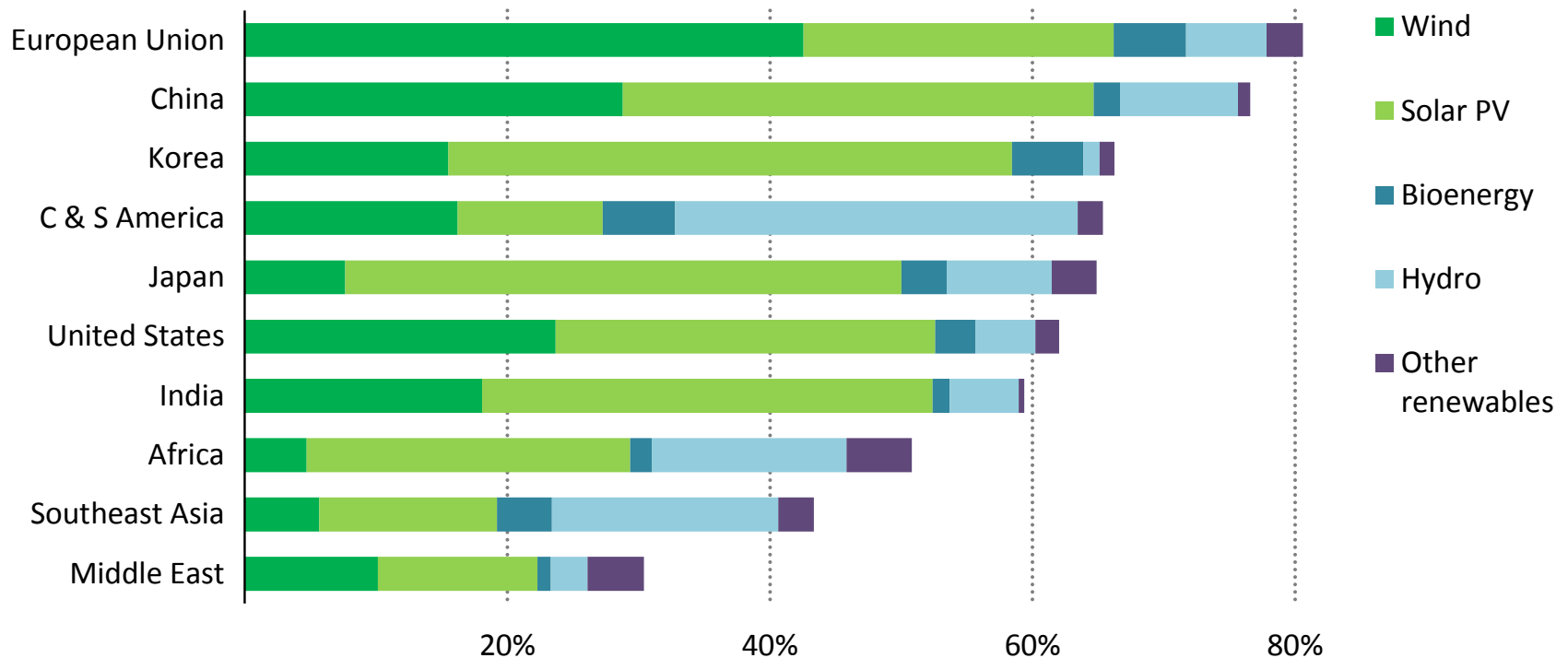
Global average annual net capacity additions by type



*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*

# Renewables enter the mainstream

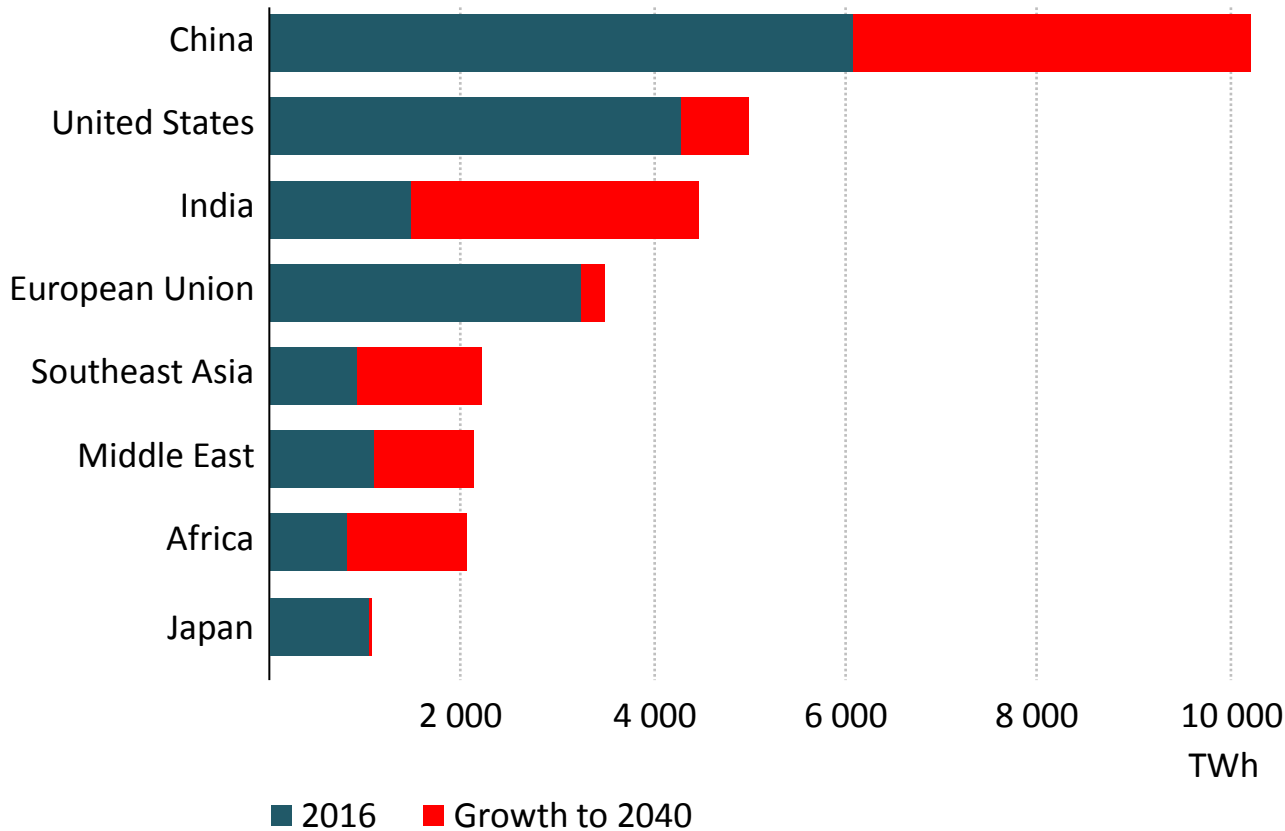
Share of renewables in total capacity additions by region in the New Policies Scenario



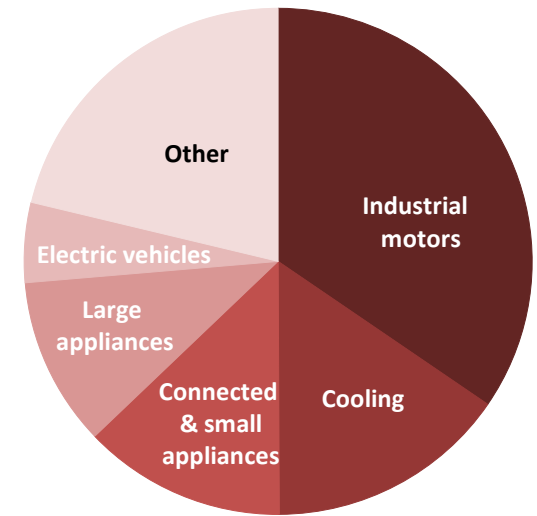
*Two-thirds of global investment in new capacity goes to renewables, bringing their average share in global power generation up to 40% by 2040*

# The future is electrifying

Electricity generation by selected region



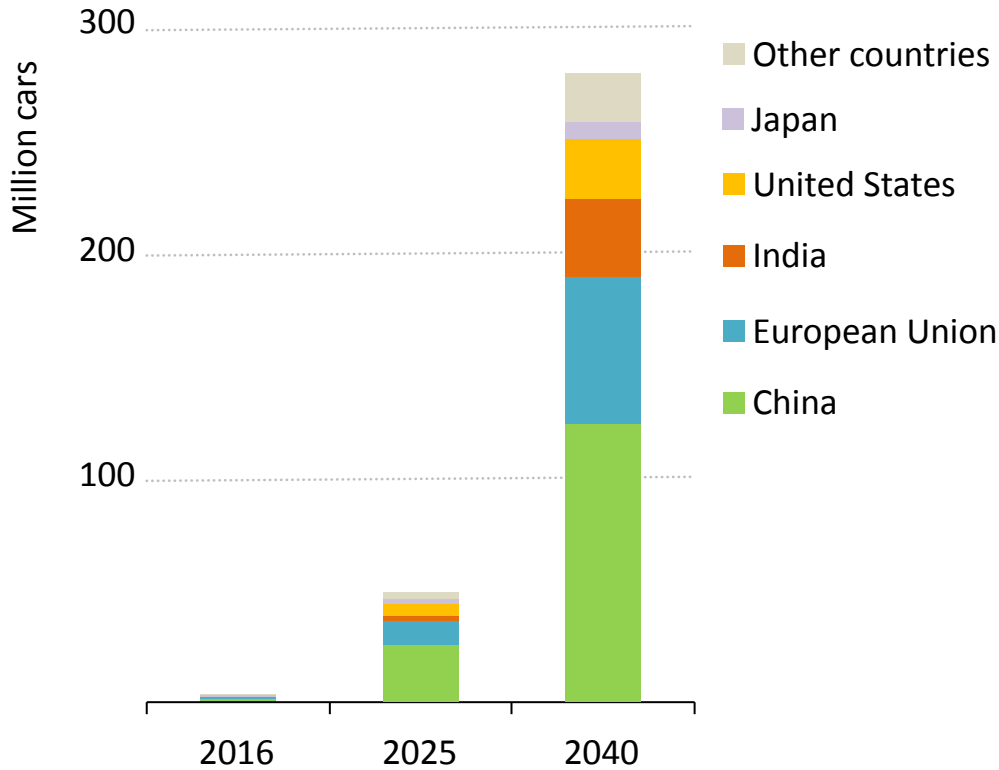
Sources of global electricity demand growth



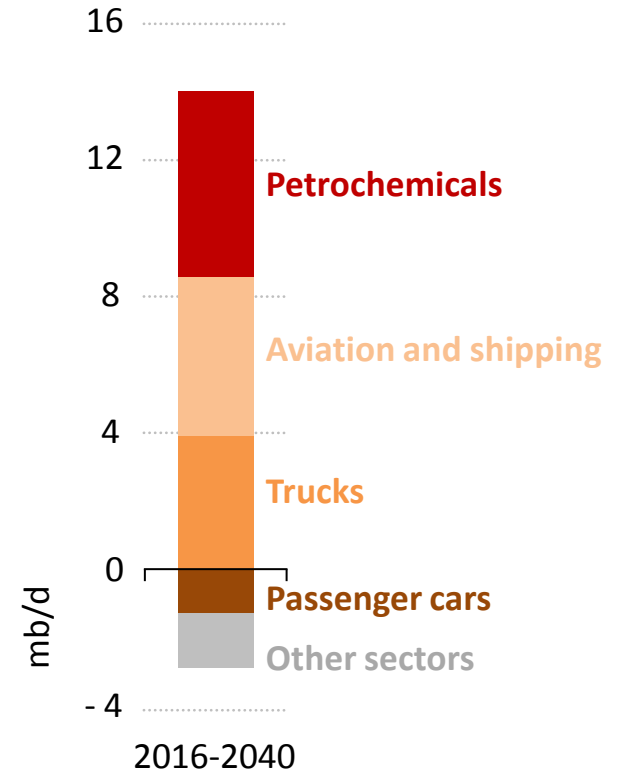
*India adds the equivalent of today's European Union to its electricity generation by 2040, while China adds the equivalent of today's United States*

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

Electric car fleet



Change in global oil demand

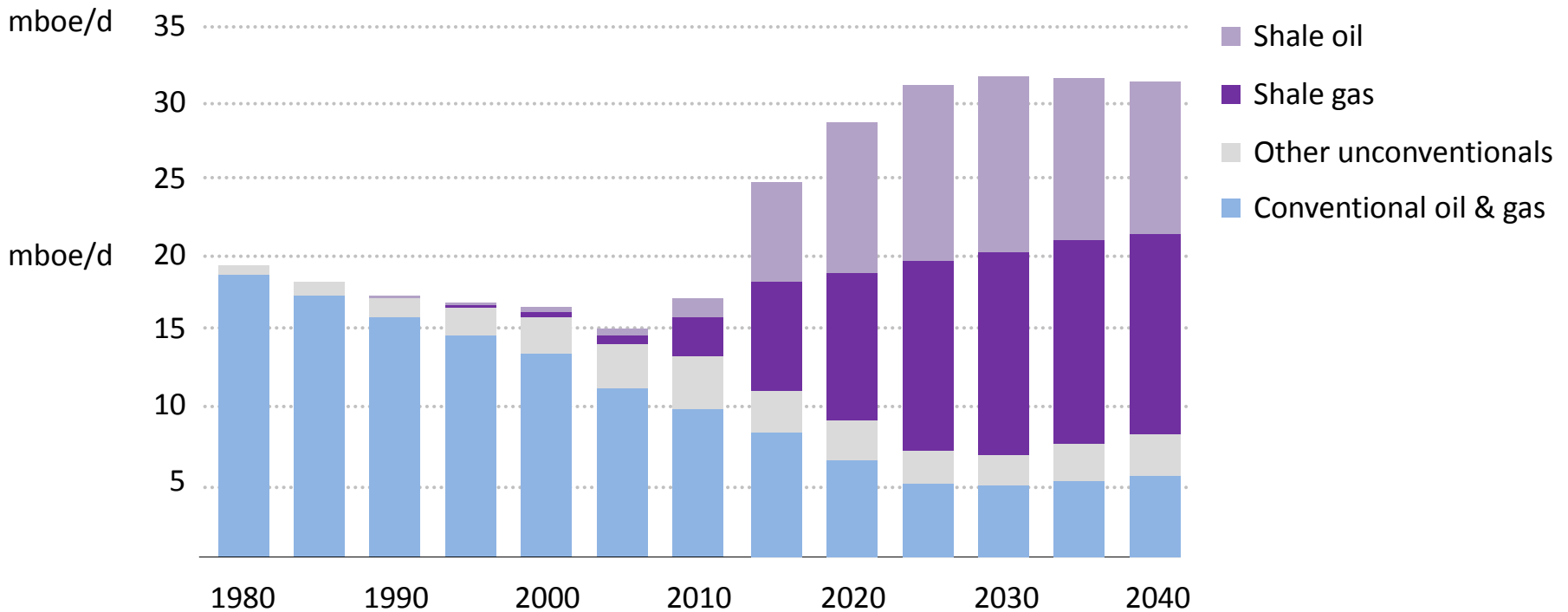


*Electric cars are helping to transform energy use for passenger cars, slowing the pace of growth in global oil demand: however, trucks, aviation, shipping & petrochemicals keep oil on a rising trend*



# US becomes undisputed leader of oil & gas production

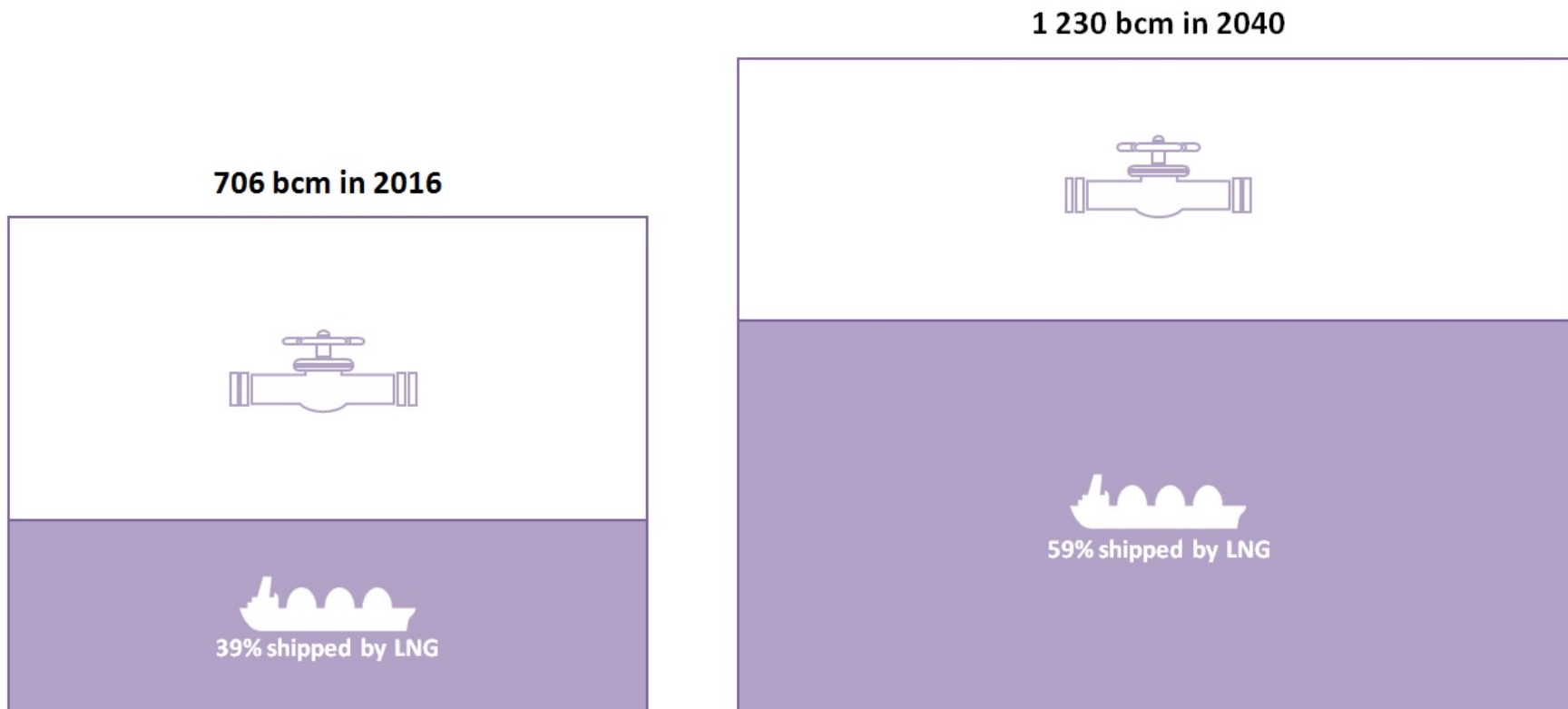
## Oil and gas production in the United States



*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*

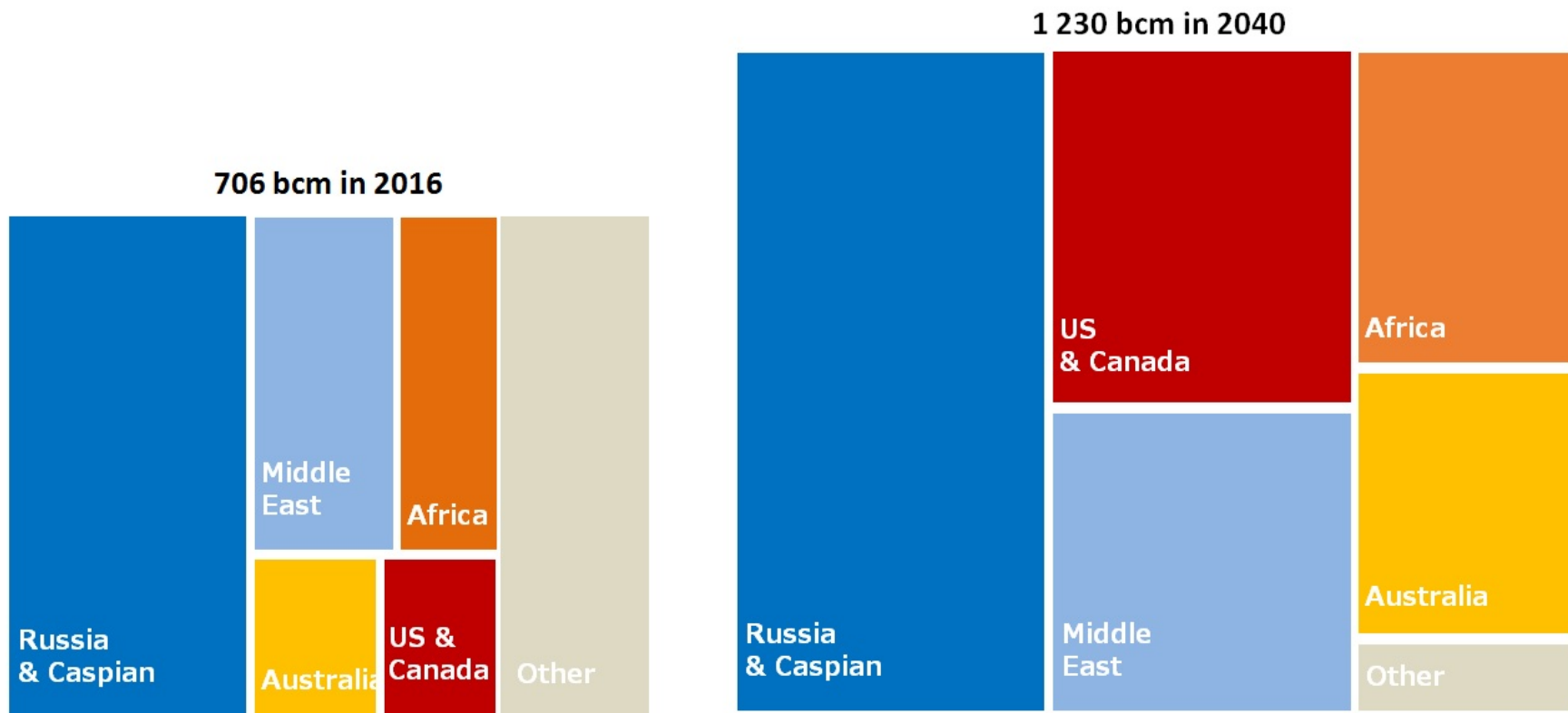
# LNG ushers in a new global gas order

## Global gas trade



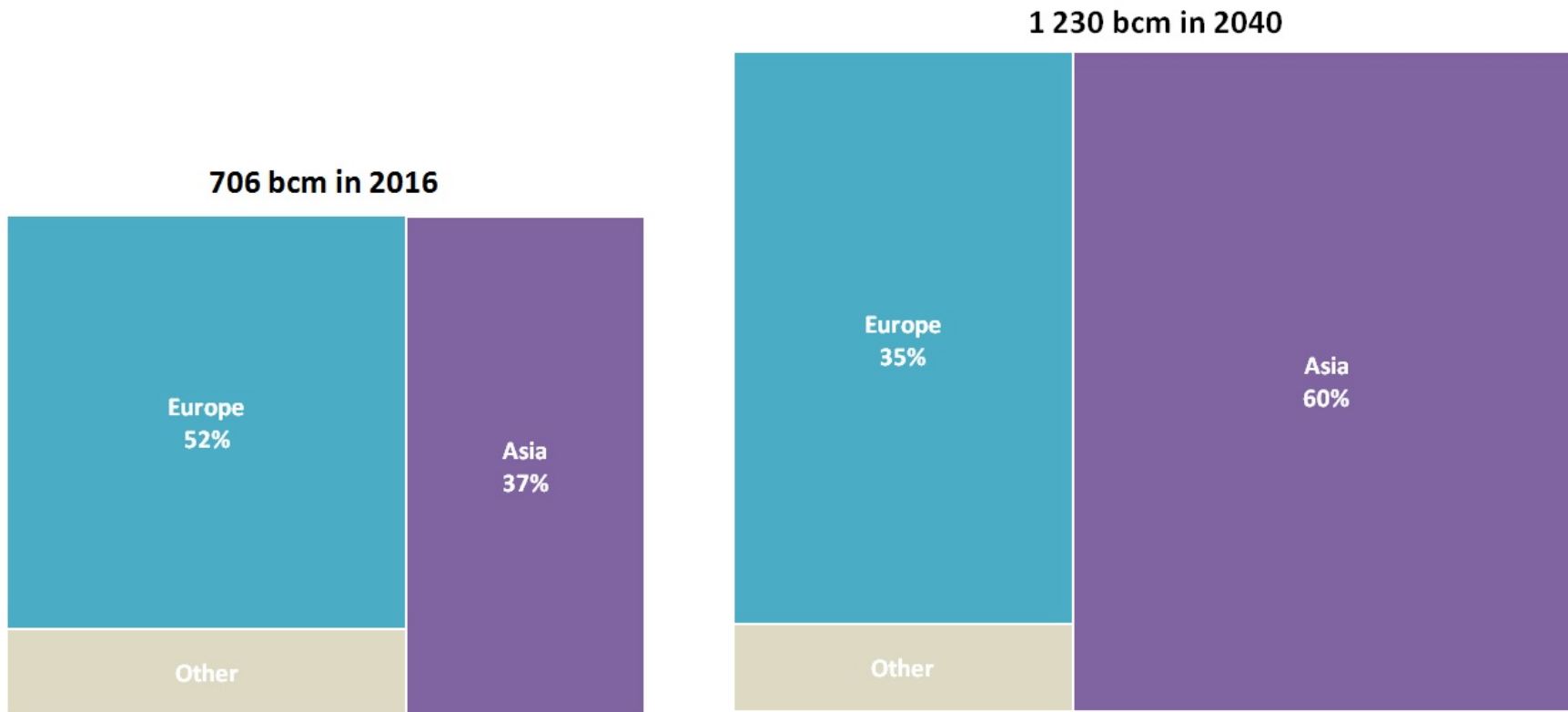
# LNG ushers in a new global gas order

## Gas exporters



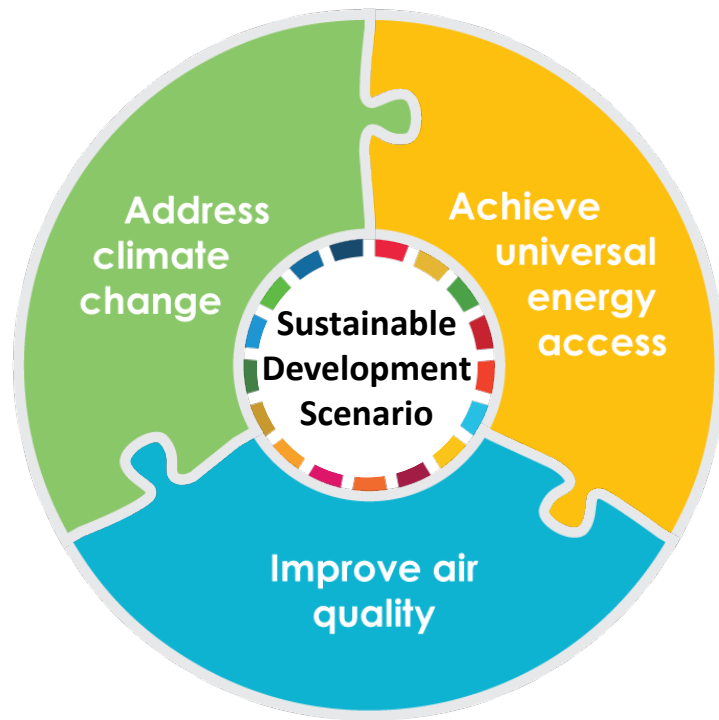
# LNG ushers in a new global gas order

## Gas importers

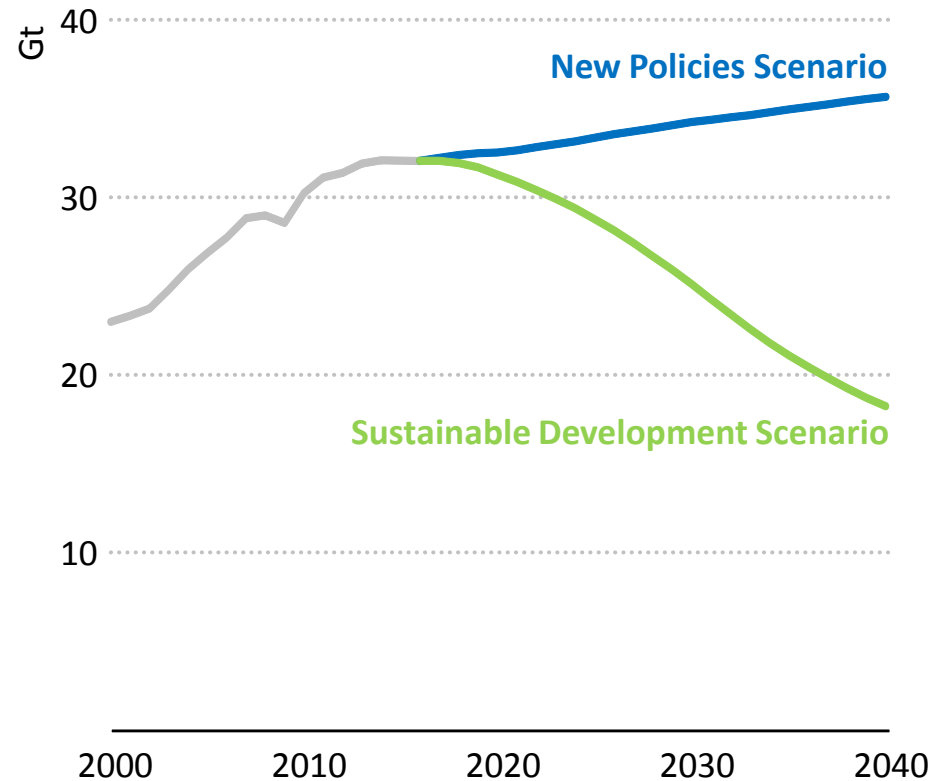


*Growing gas import requirements in developing Asia, Japan and Korea are largely met by LNG, with exports from the US accelerating a shift towards a more flexible, liquid global market*

# A new strategy for energy & sustainable development



Global CO<sub>2</sub> emissions by scenario



*The Sustainable Development Scenario reduces CO<sub>2</sub> 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<sub>GW</sub>  
global solar PV capacity

580<sub>bcm</sub>  
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*

# Conclusions

- 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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