

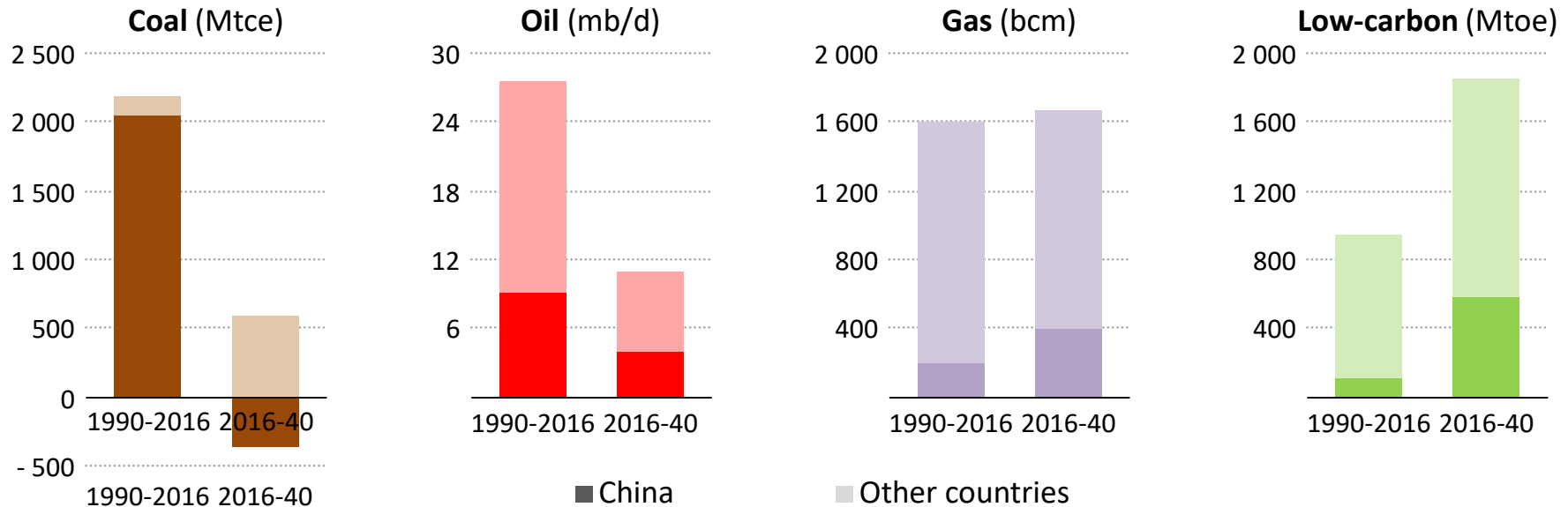
World Energy Outlook 2017

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IGU Diplomatic Gas Forum Oslo
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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
- There are many possible pathways ahead & many potential pitfalls if governments or industry misread the signs of change

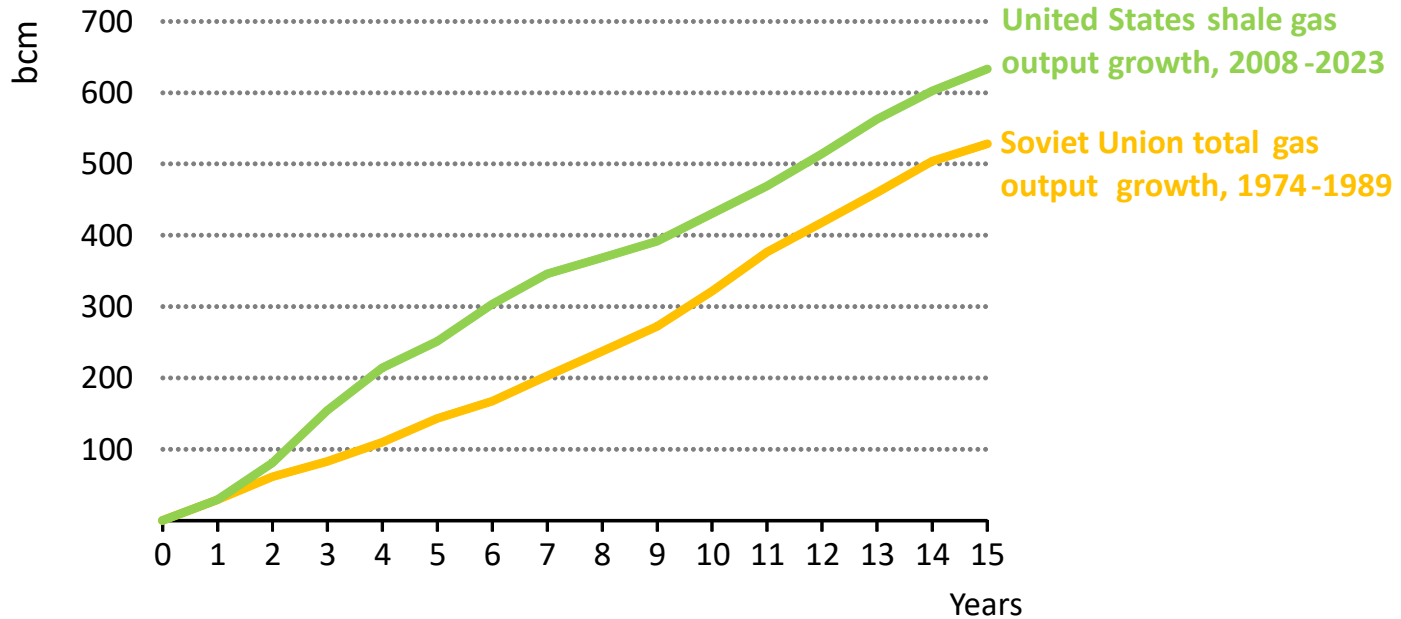
Change in world energy demand by fuel



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

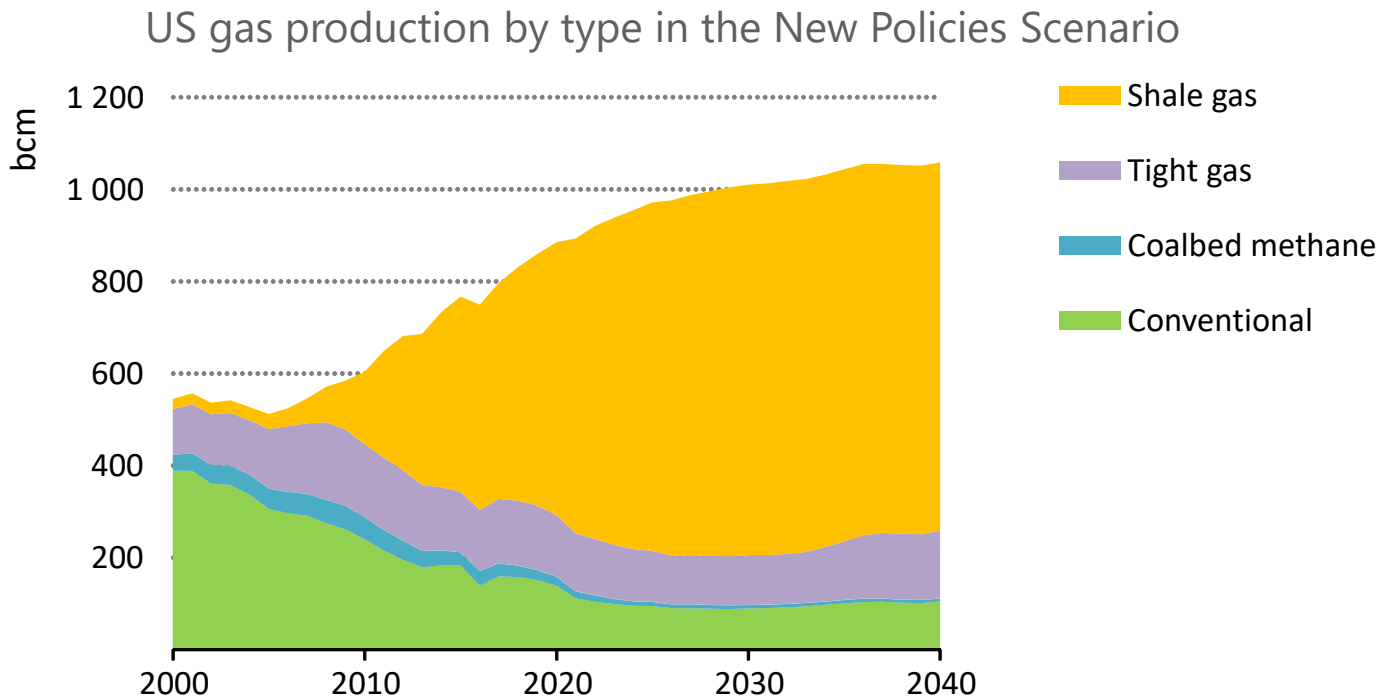
US remains undisputed leader of gas production

Rise in US shale gas output versus the steepest ramp-up in gas production in the Soviet Union



US shale growth between 2008 and 2023 is probably unprecedented in gas markets, exceeding the growth achieved by the Soviet Union between 1974 and 1989

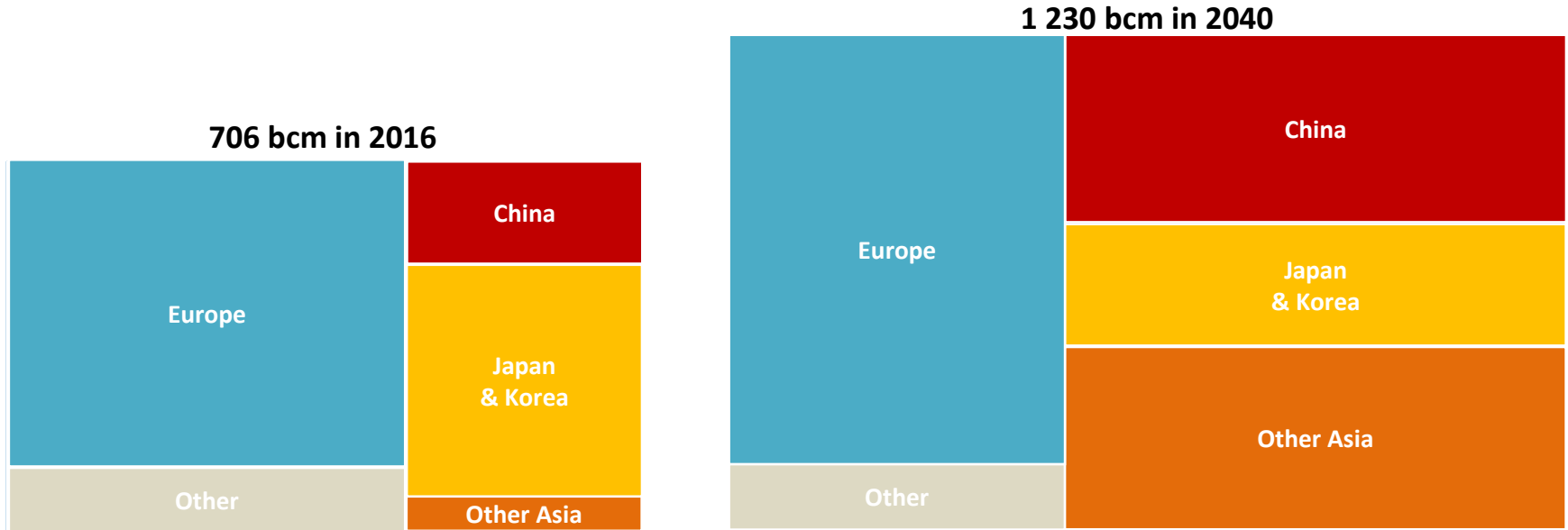
Shale boom is turning US into major energy exporter



The US is set to become the largest LNG exporter by the mid-2020s and a net-exporter of oil in the late 2020s

LNG ushers in a new global gas order

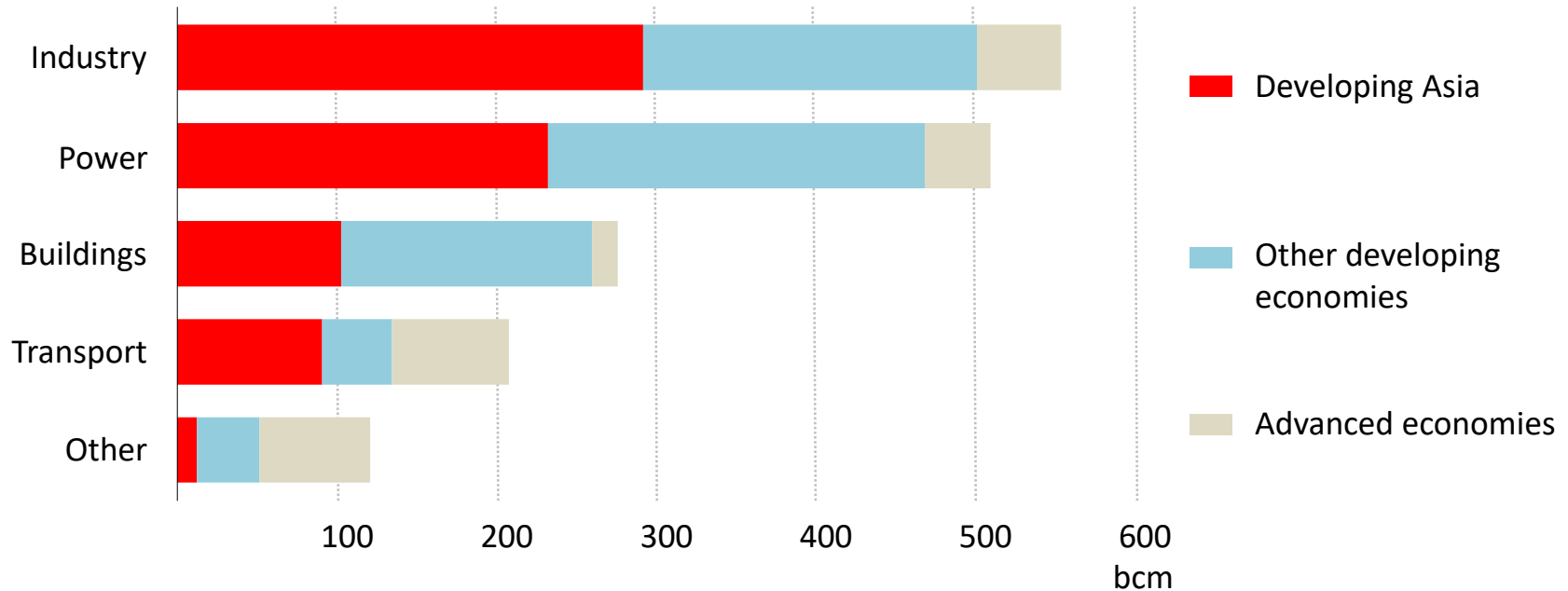
Gas importers



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

Industry leads the growth in gas demand

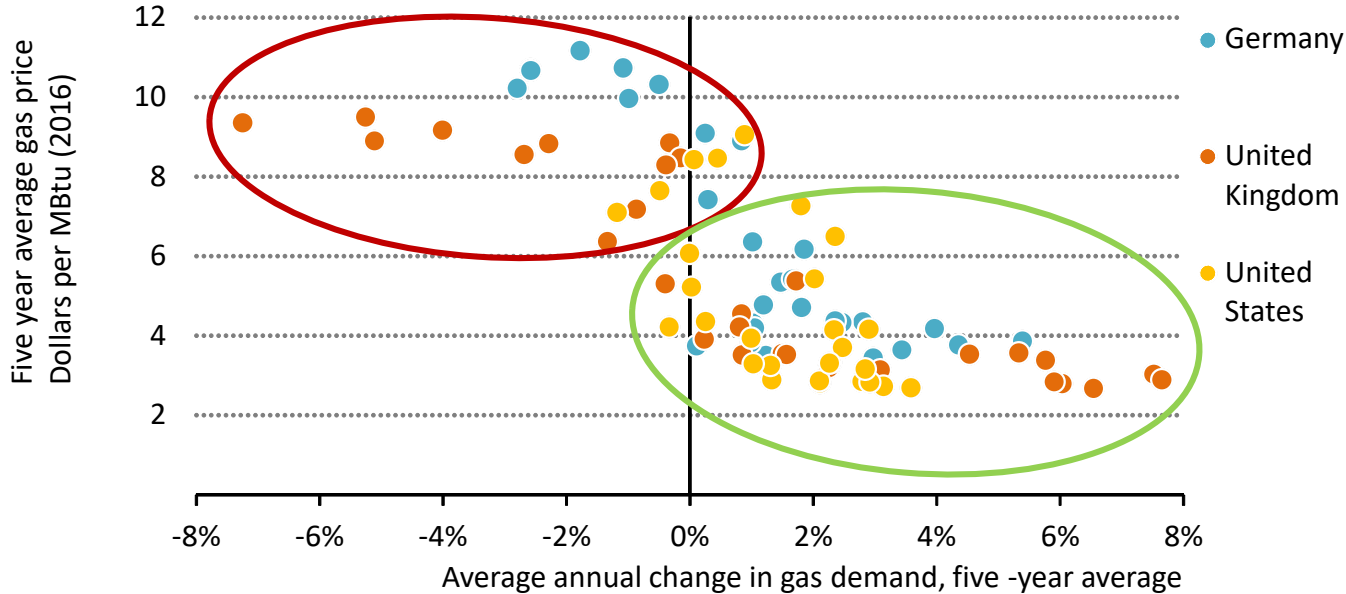
Growth in natural gas demand by sector 2016-2040



Gas demand growth in industry – especially in the geographically dispersed light industries – requires costly infrastructure roll-out

Economics 101: gas demand is price sensitive

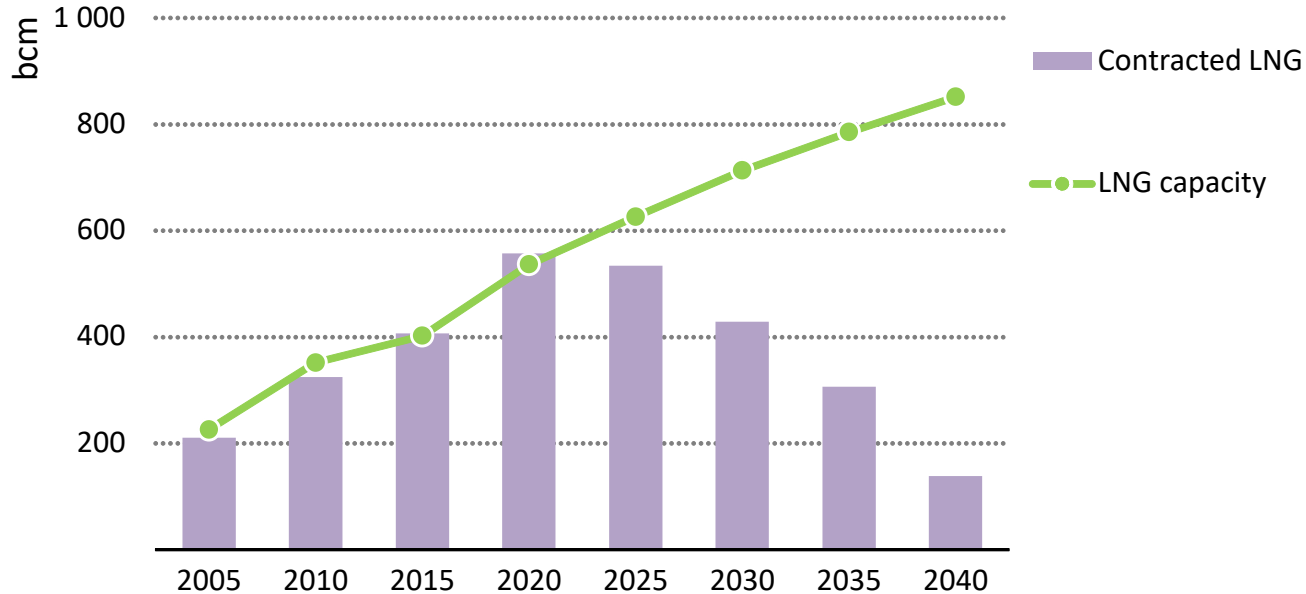
Change in gas use versus price in Germany, the United Kingdom and the United States, 1983-2016



Analysis of historical demand trends in the US, the UK and Germany shows that gas use increased at prices below \$6/MBtu, but declined at prices above \$8/MBtu

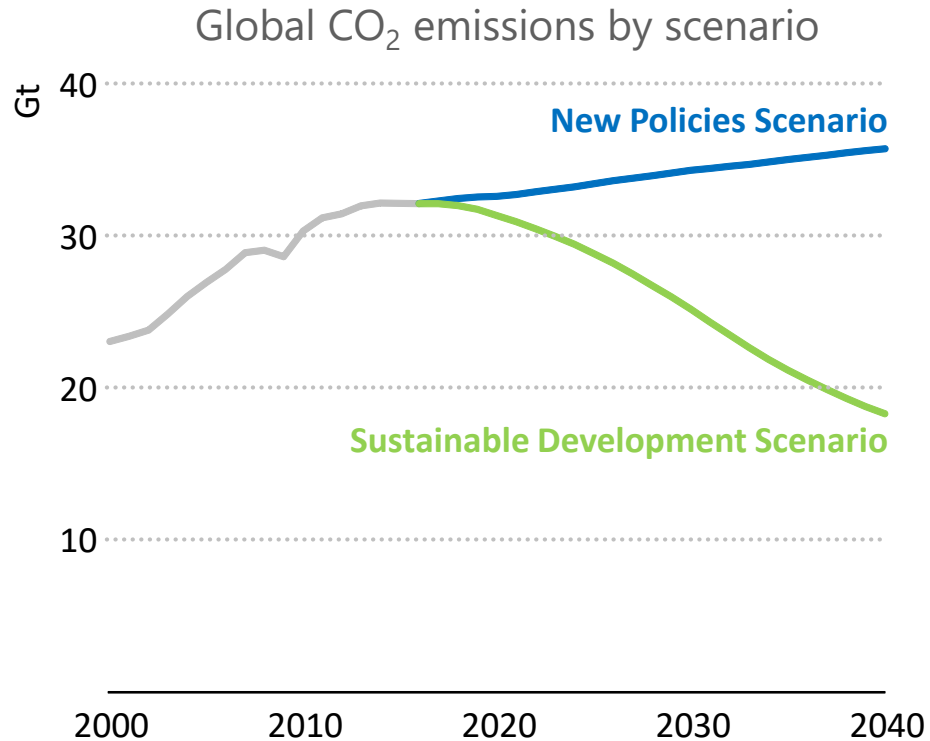
Financing new projects gets trickier

Already contracted versus projected global LNG capacity in the New Policies Scenario



From the early 2020s onwards, new contracts may be needed to underpin investment decisions for the construction of additional liquefaction capacities

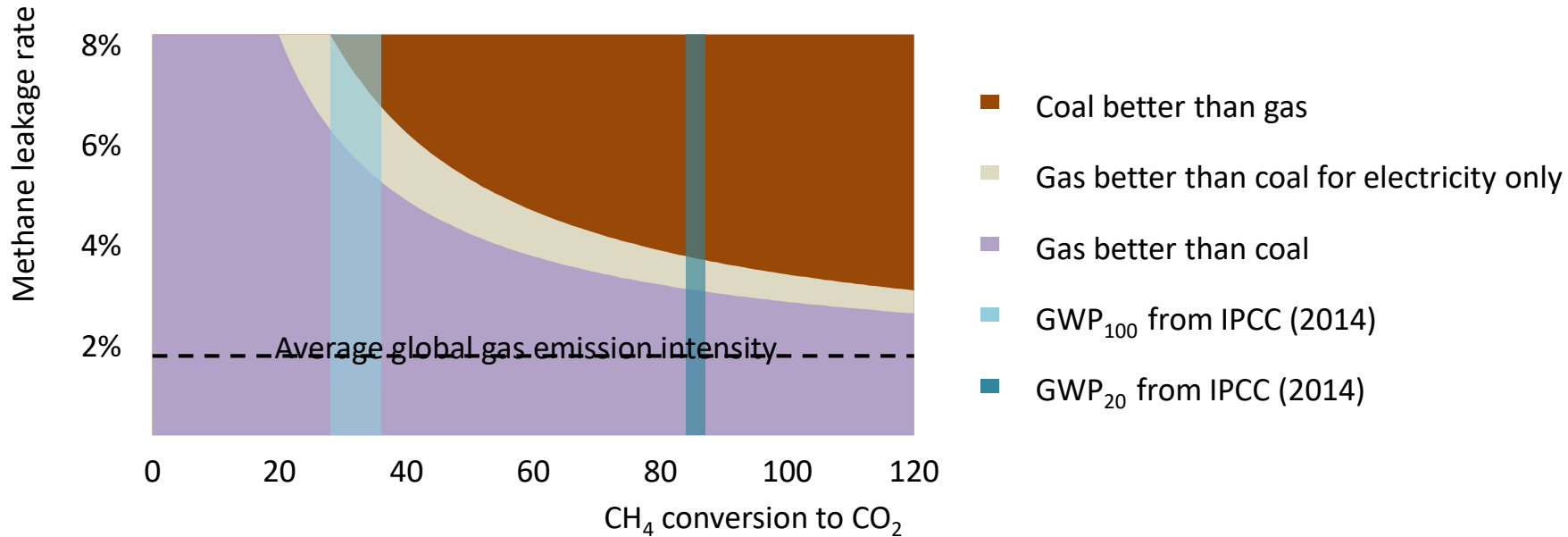
A new strategy for energy & sustainable development



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

The lifecycle emissions of gas are lower than coal

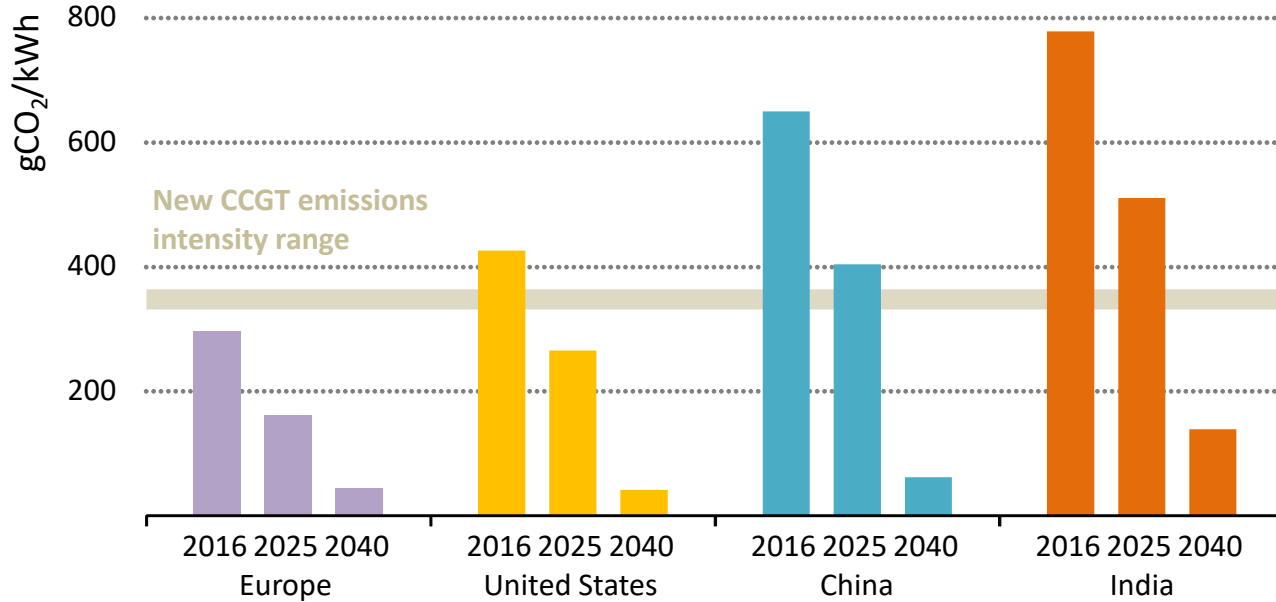
Greenhouse-gas emission intensity of natural gas compared with coal



The global average emission intensity of gas is low enough for gas to result in fewer GHG emissions than coal regardless of the timeframe considered

How long is the bridge?

Average CO₂ emissions intensity of power generation in the Sustainable Development Scenario



The situation varies by region, but the role of gas-fired generation evolves quickly as the power sector decarbonises



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