

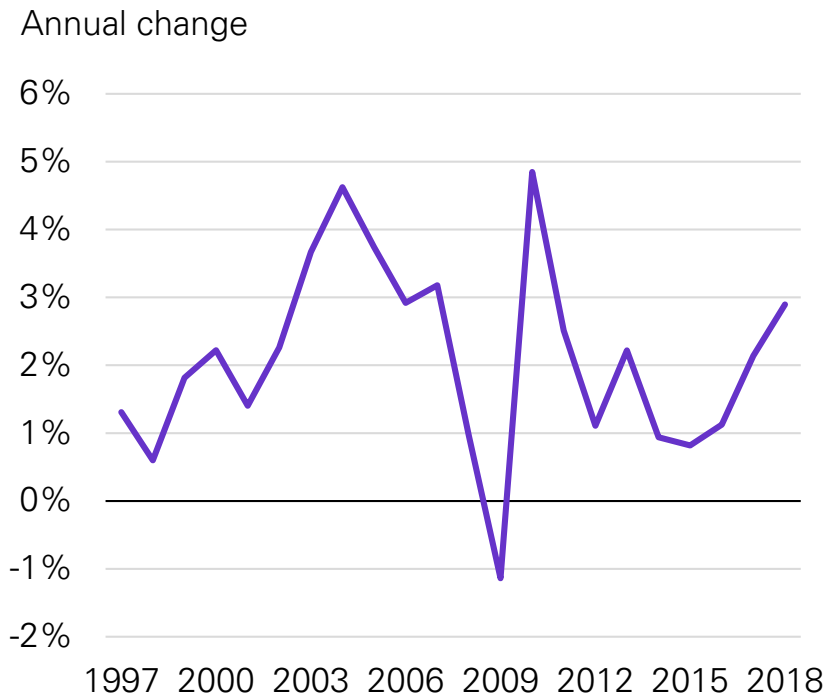
**Transition to low-carbon
energy system**
BP Statistical Review and
Energy Outlook 2019

Spencer Dale
Group chief economist

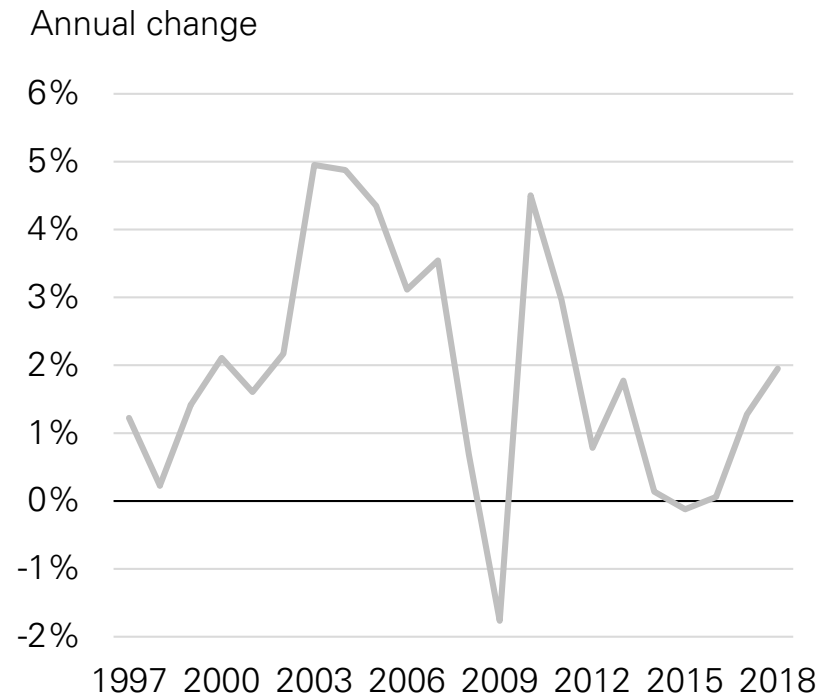
Growth in primary energy and CO₂ emissions



Primary energy growth



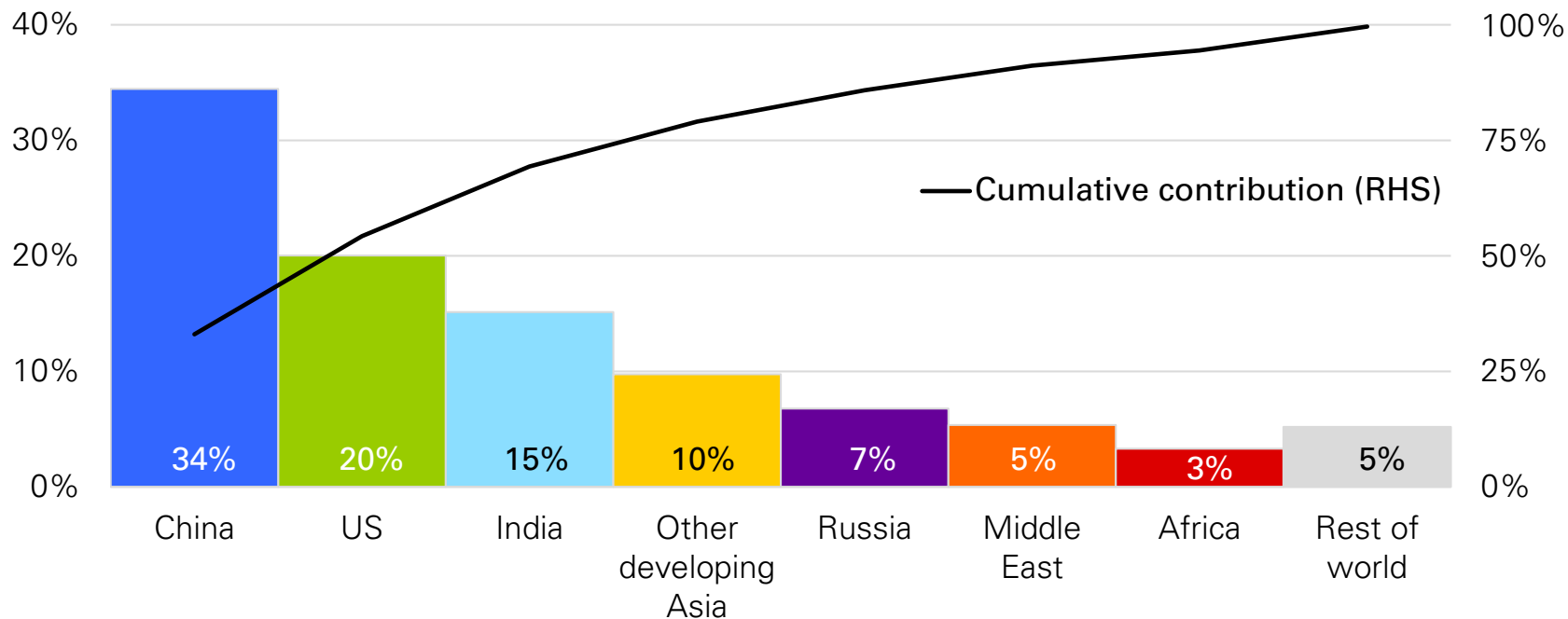
CO₂ emissions from energy use



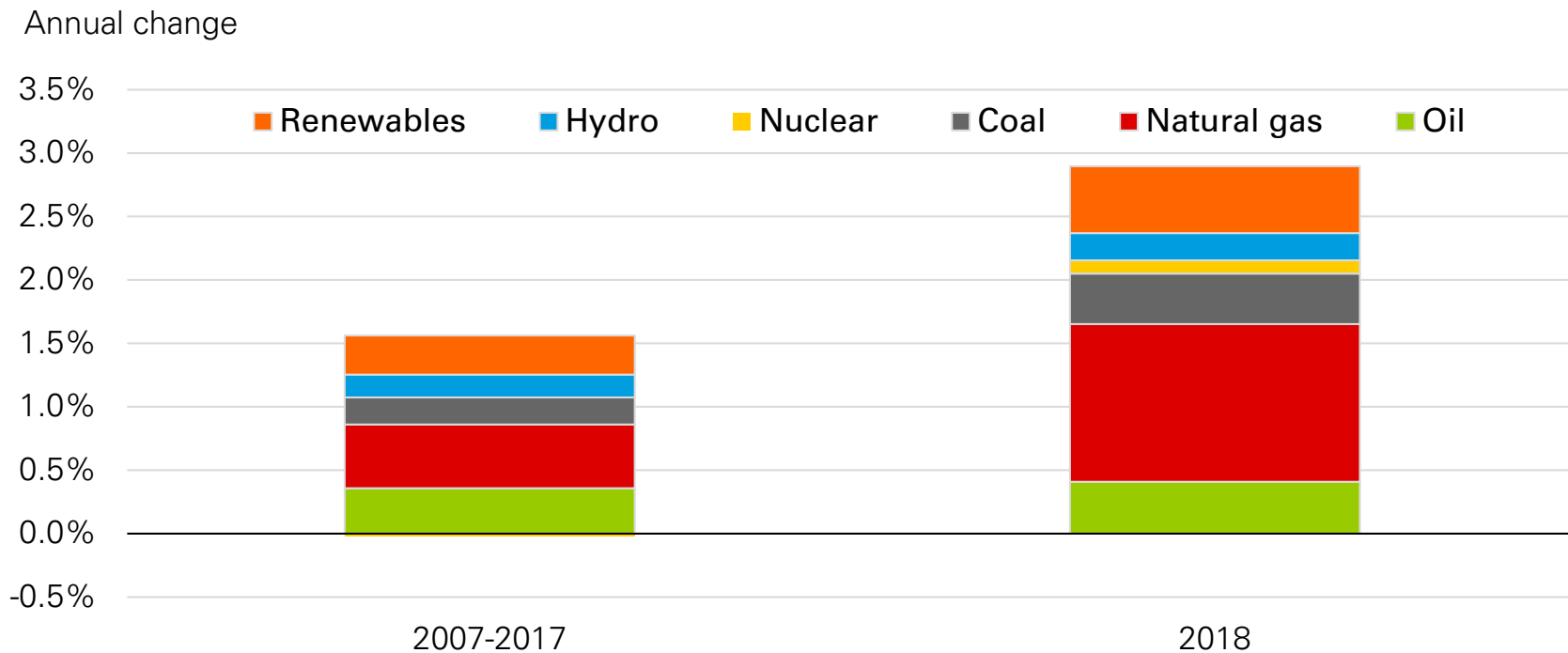
Primary energy



Contribution to primary energy growth in 2018



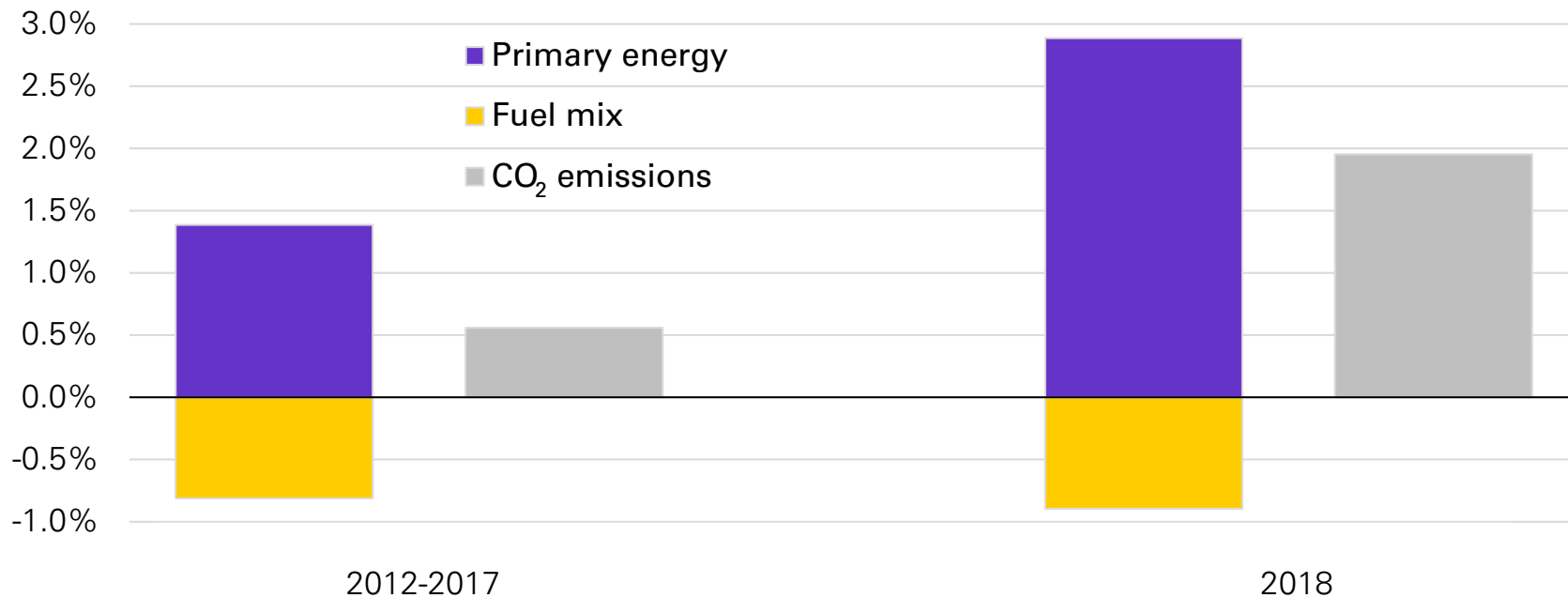
Primary energy growth by fuel



Energy demand and carbon emissions



Annual change



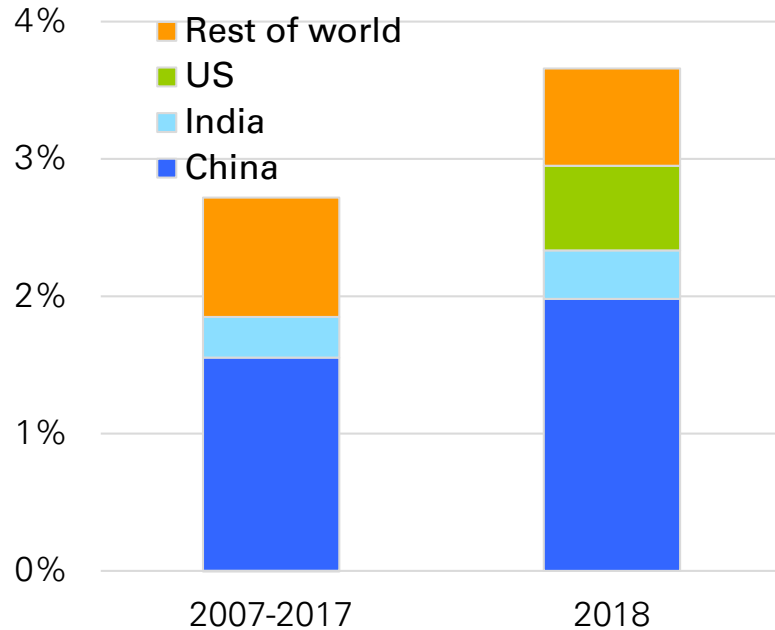


Power

Growth in power generation

Contributions by region

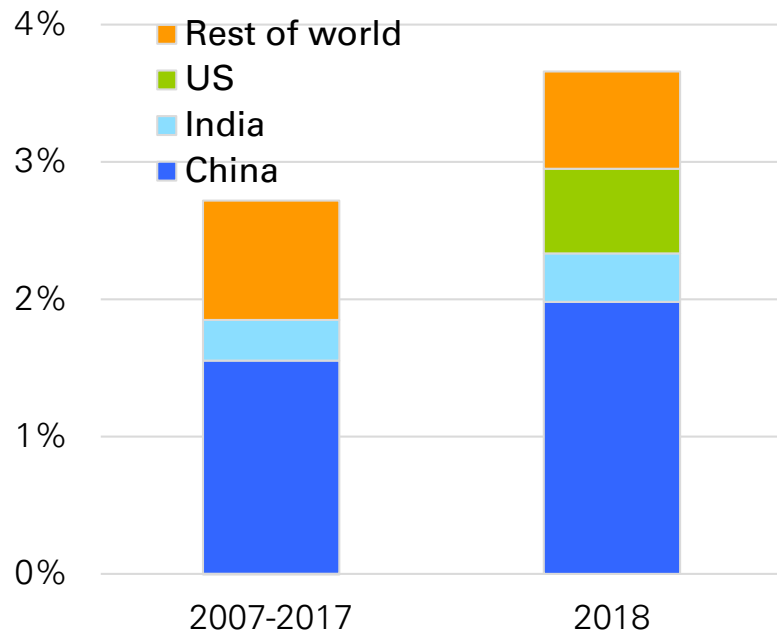
Annual change



Growth in power generation

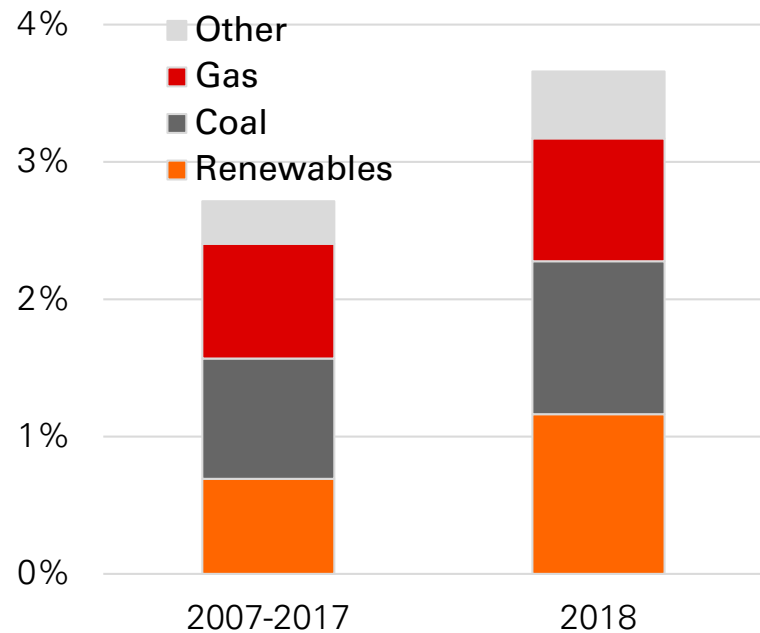
Contributions by region

Annual change

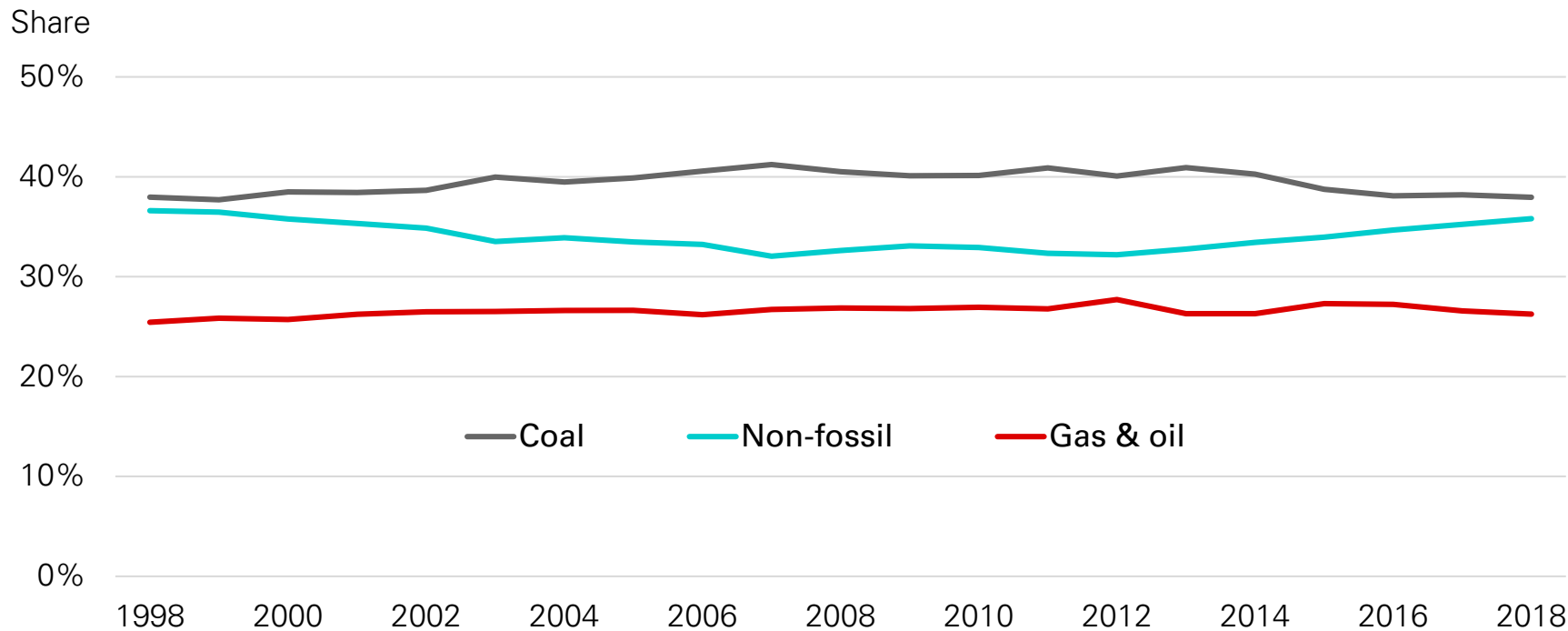


Contributions by fuel

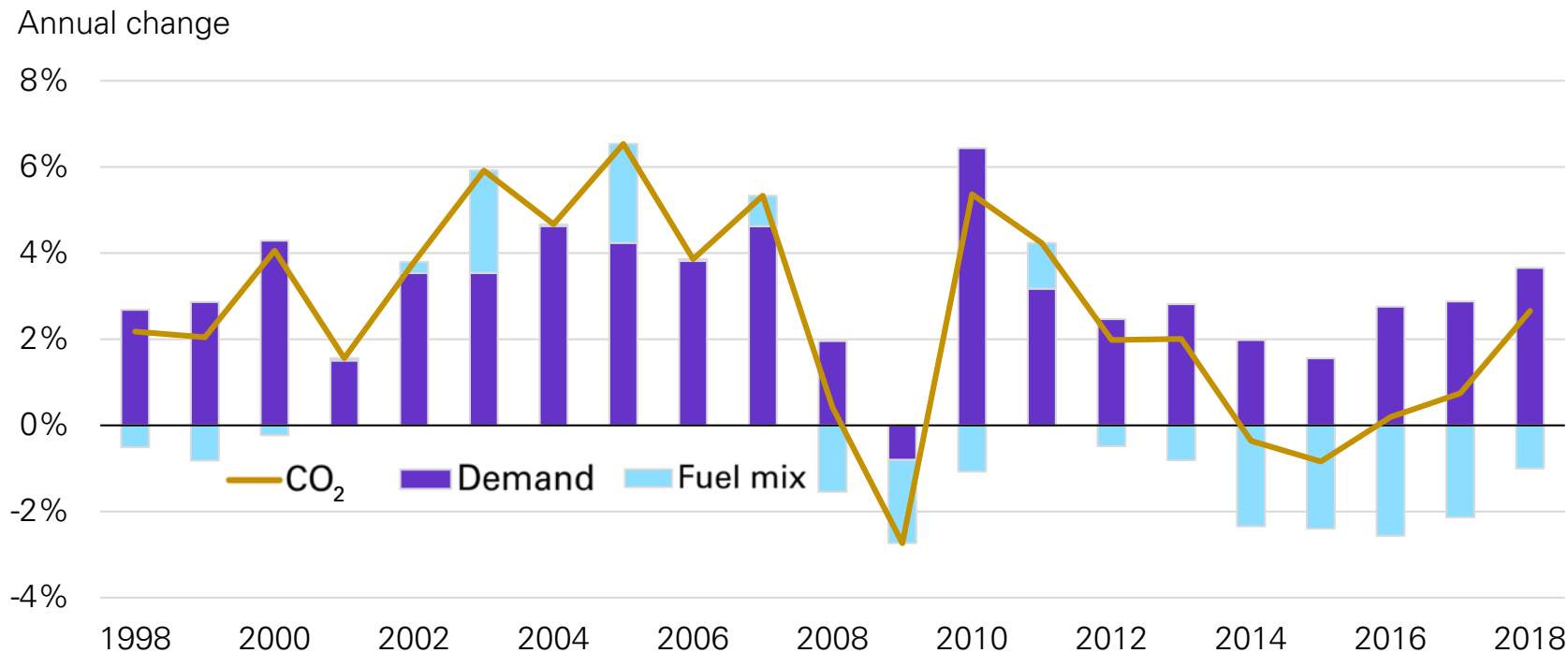
Annual change



Power sector fuel mix



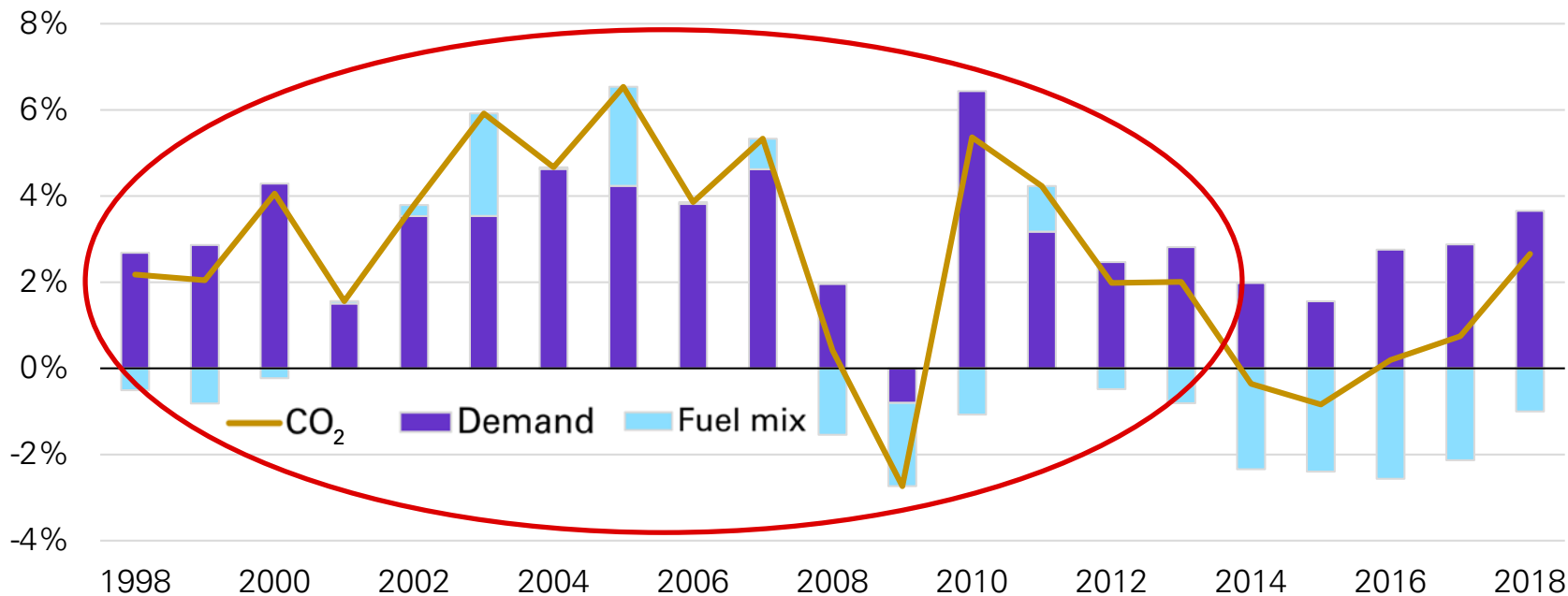
Carbon emissions from global power sector



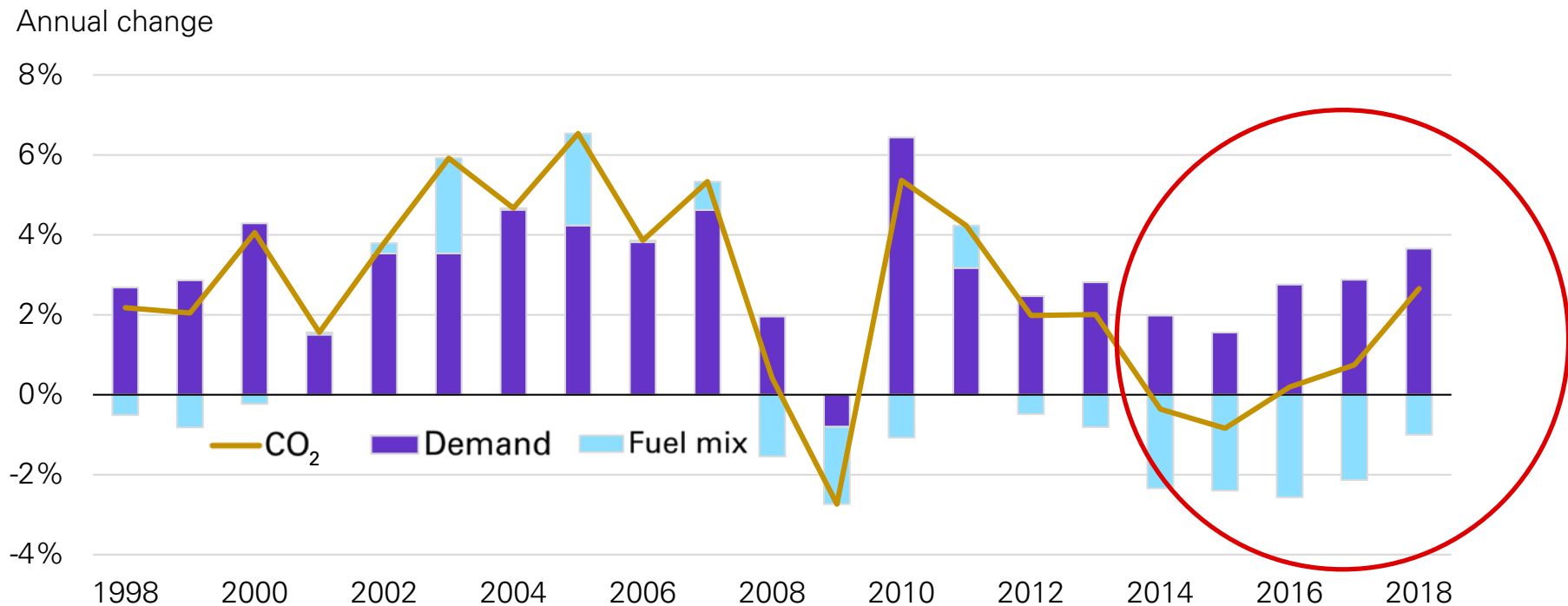
Carbon emissions from global power sector



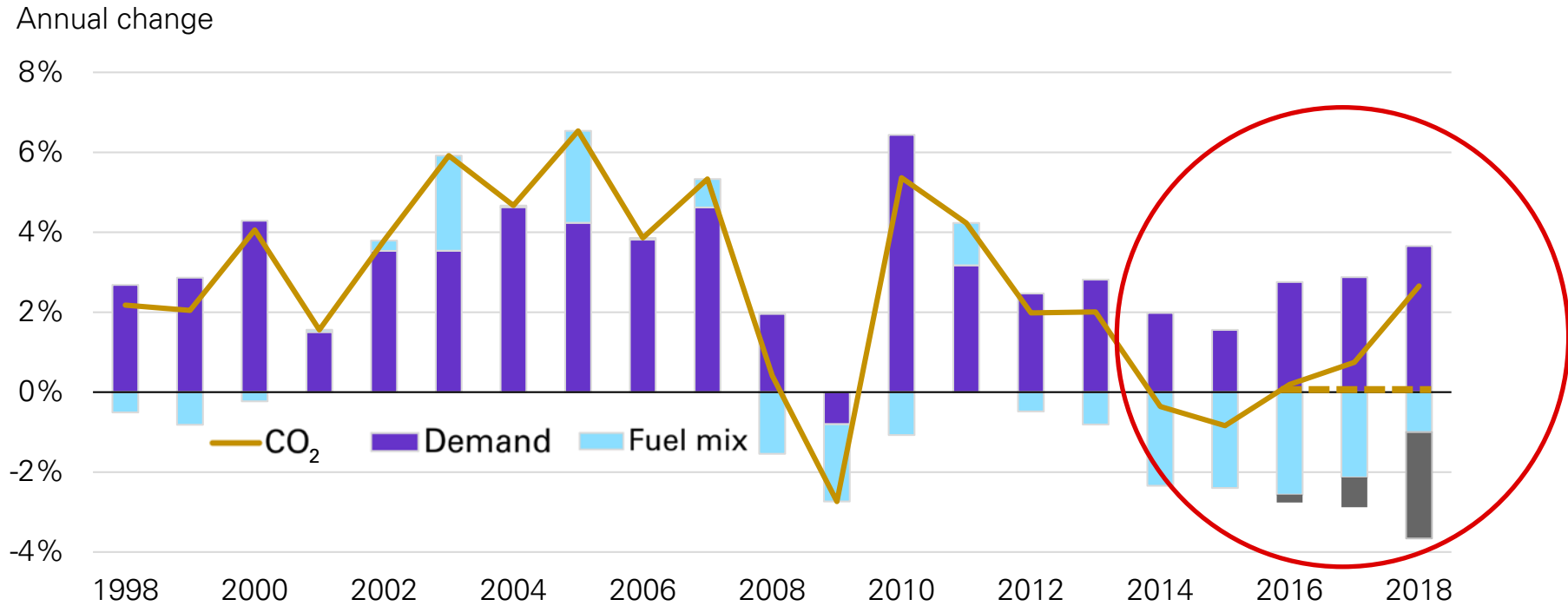
Annual change



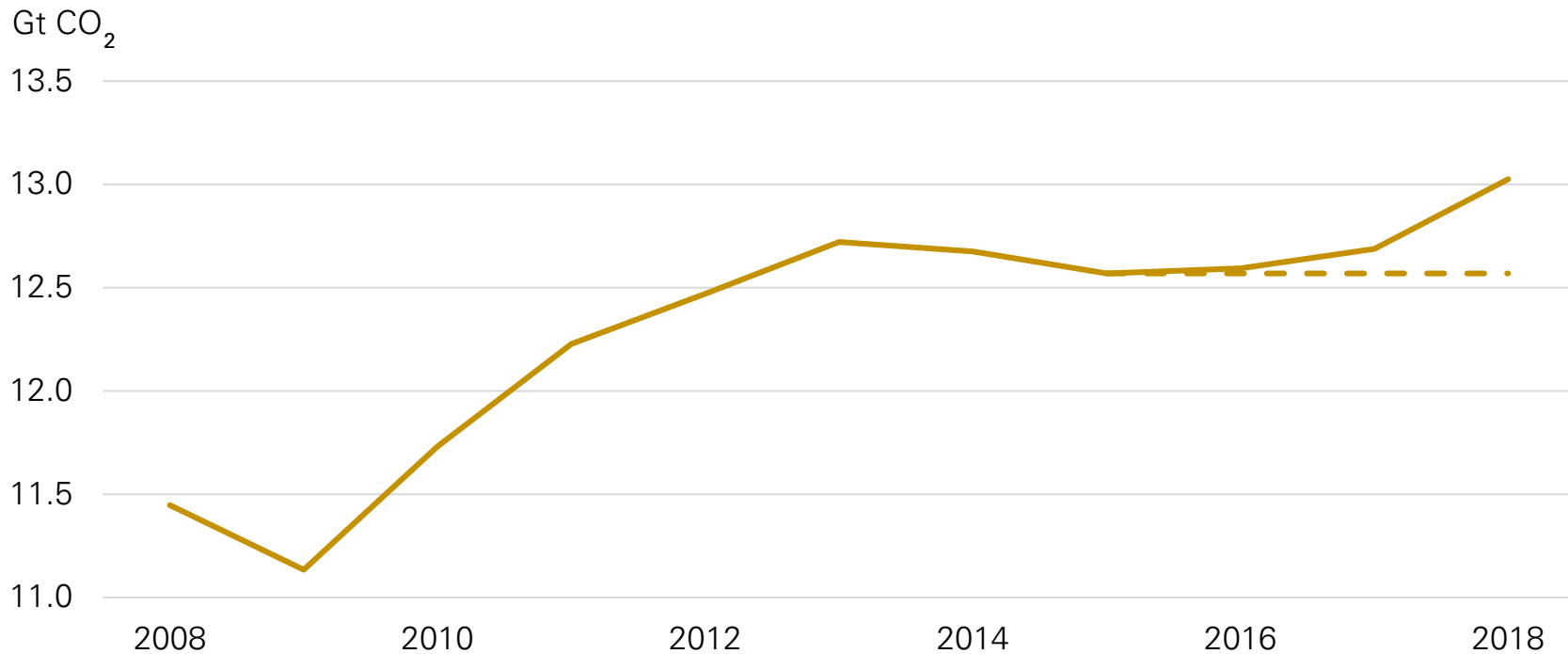
Carbon emissions from global power sector



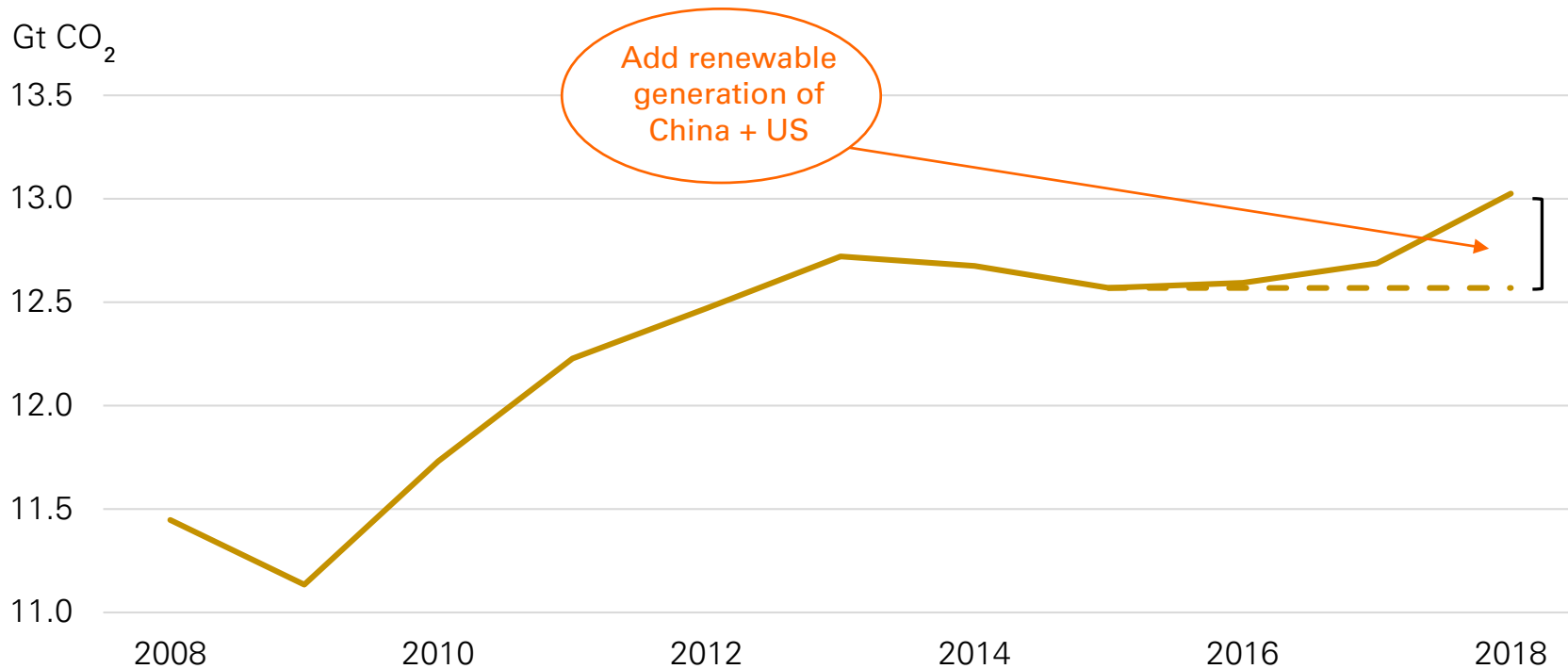
Carbon emissions from global power sector



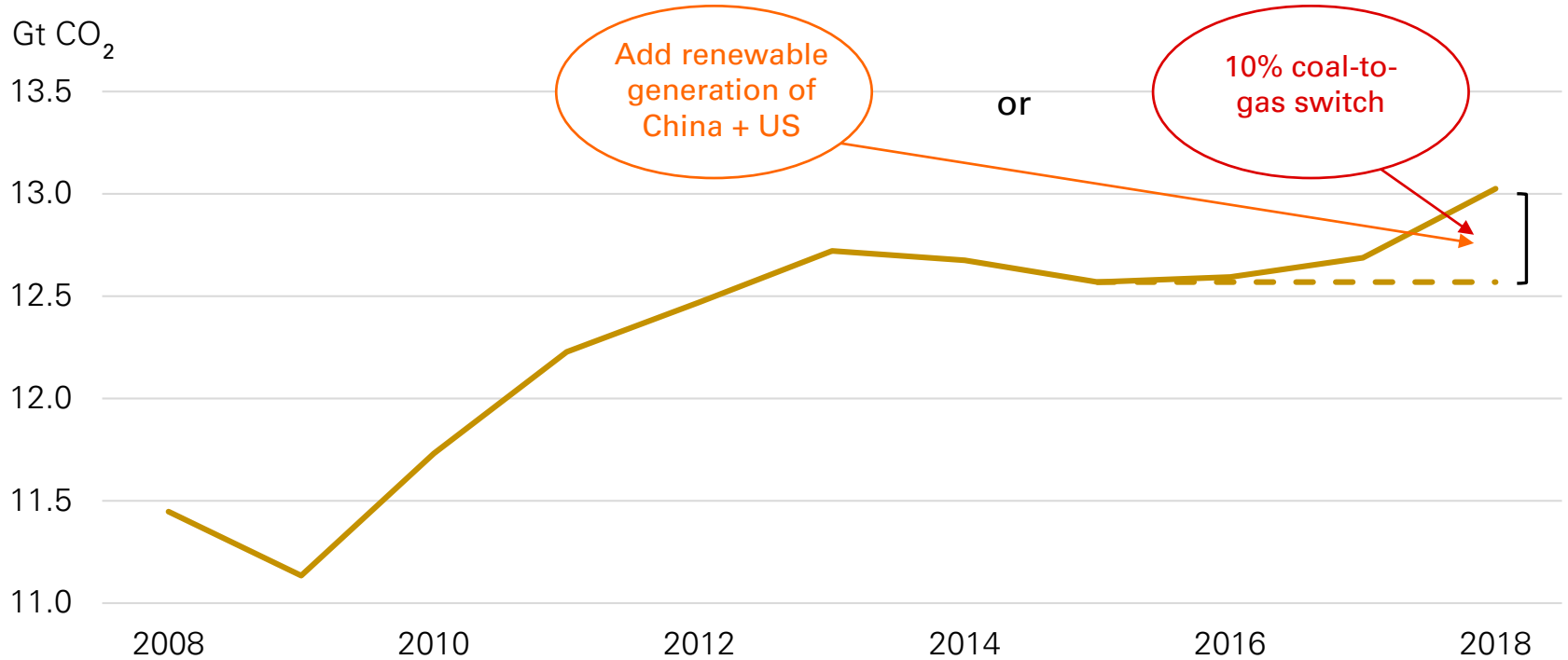
Carbon emissions from global power sector



Carbon emissions from global power sector



Carbon emissions from global power sector



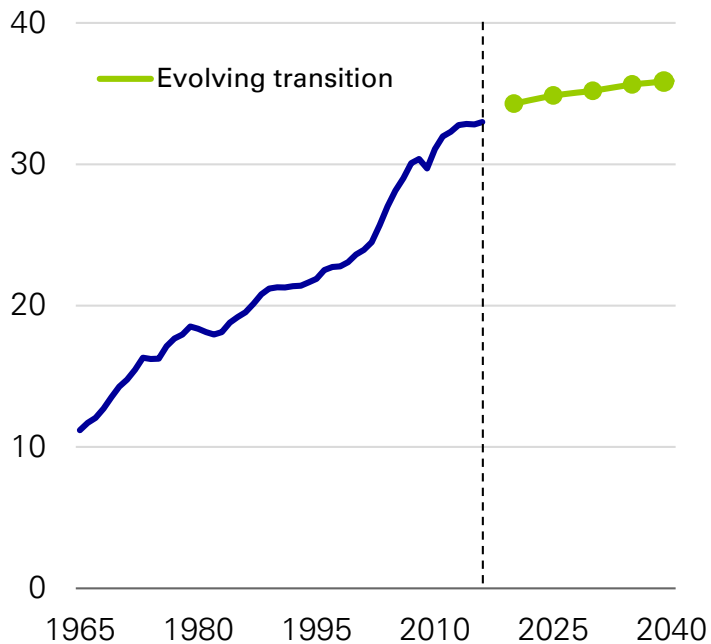


CO₂ emissions: longer-term outlook

CO₂ emissions

CO₂ emissions

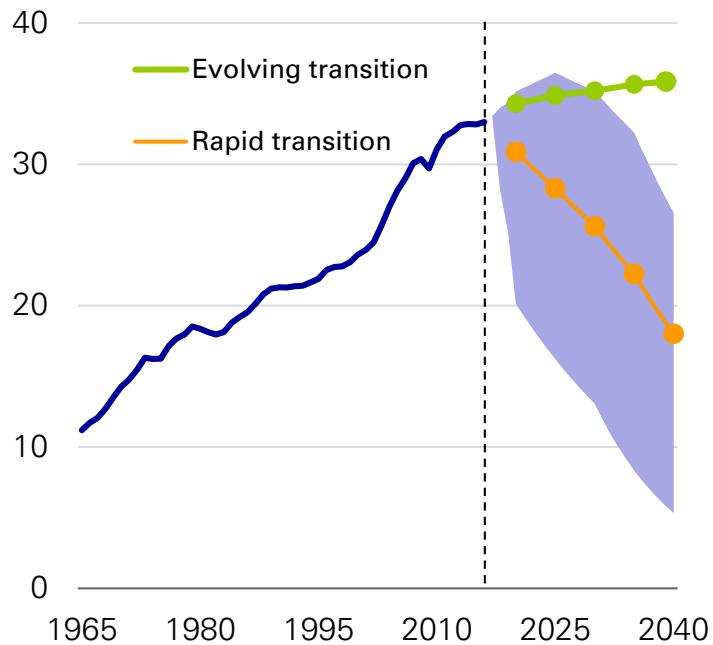
Gt of CO₂



CO₂ emissions

CO₂ emissions

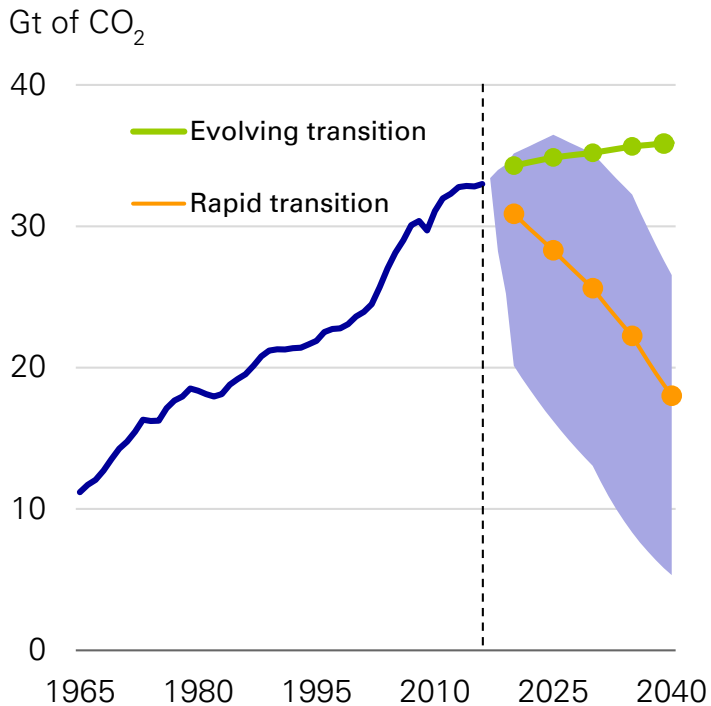
Gt of CO₂



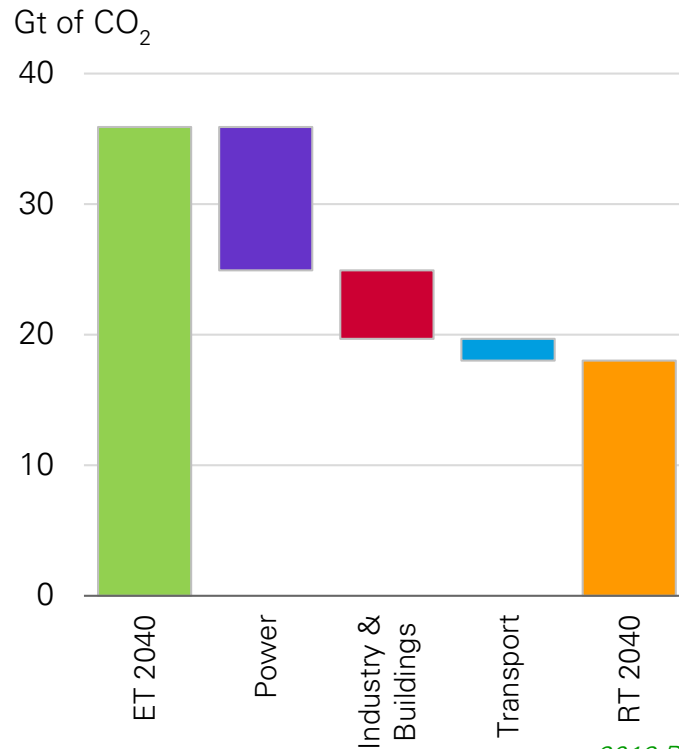


CO₂ emissions

CO₂ emissions

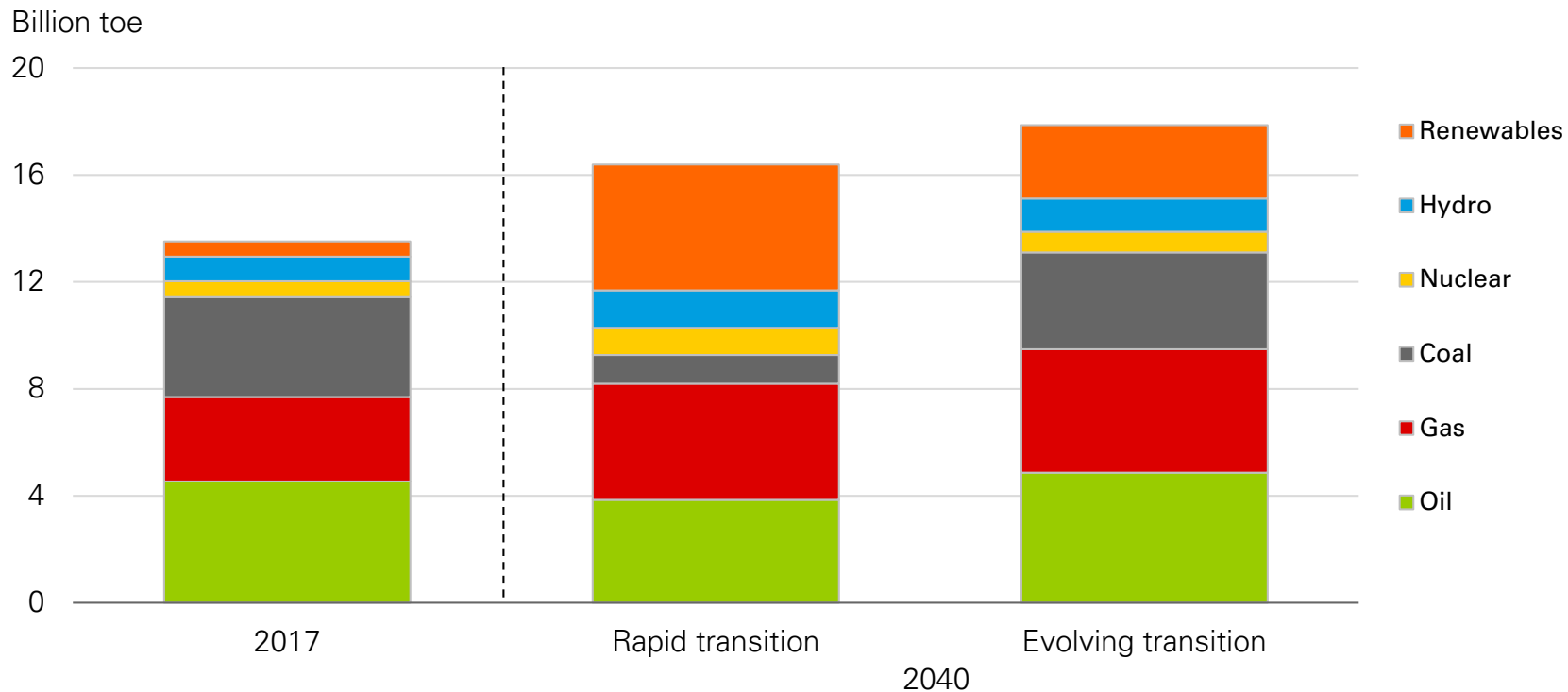


CO₂ in 2040: ET vs RT scenario



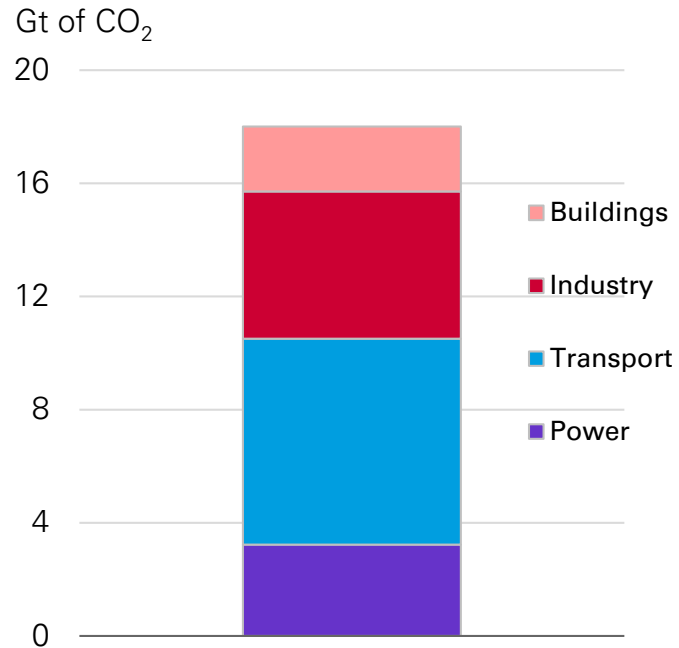
Global energy demand and fuel mix

Primary energy consumption by fuel



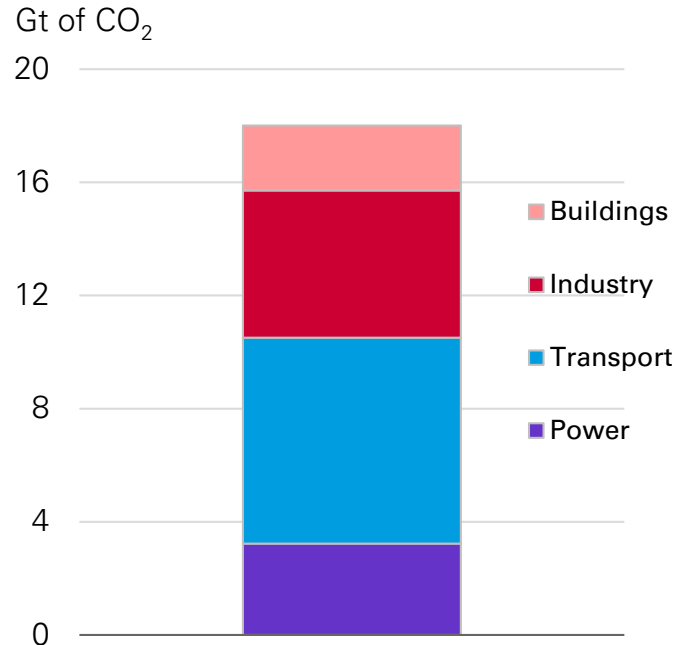
Hard-to-abate carbon emissions

CO₂ emissions in RT scenario in 2040



Hard-to-abate carbon emissions

CO₂ emissions in RT scenario in 2040



Decarbonise power sector

- Renewables
- Gas (and coal) plus CCUS
- Energy storage and demand-side-response

Other low-carbon energy sources and carriers

- Hydrogen
- Bioenergy

Efficiency

- Circular economy
- Process efficiency

Storage and removal of carbon

- CCUS
- Negative emission technologies, eg land carbon, bioenergy with CCS (BECCS)



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