

BP Energy Outlook
2019 edition

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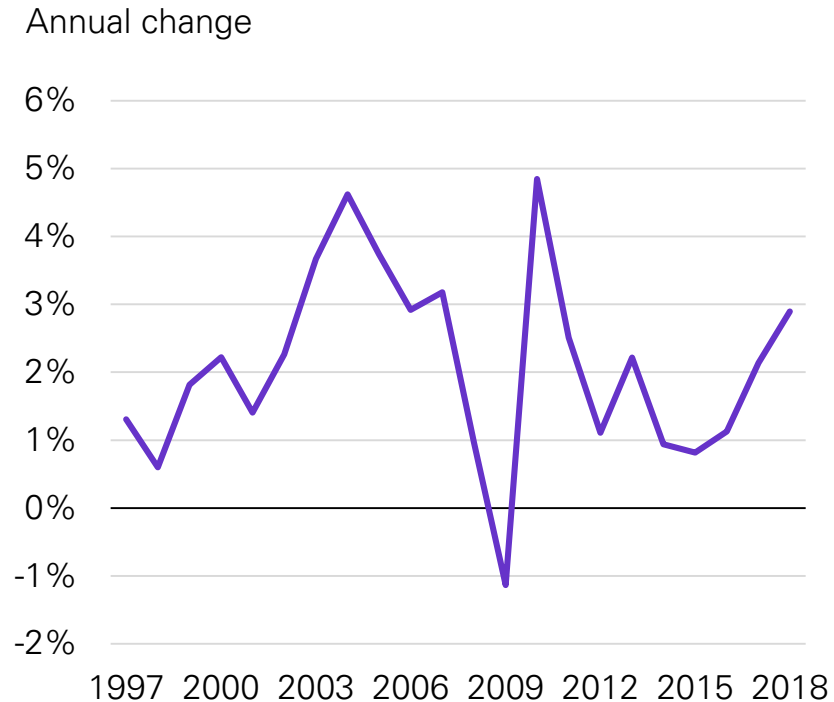


2018: An unsustainable path

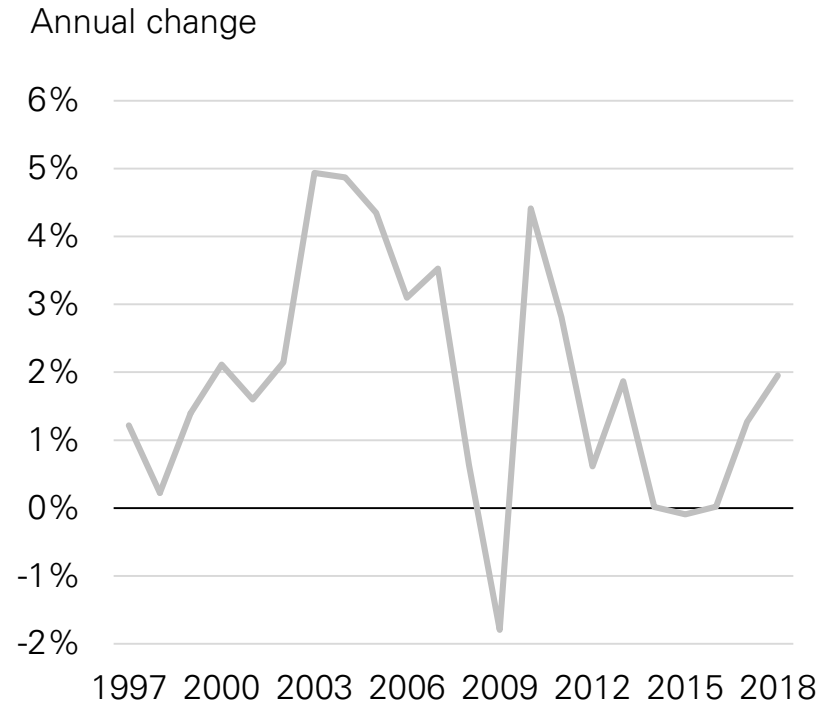
2018: Primary energy, CO₂ emissions grew in tandem and at strongest rate in many years



Primary energy growth



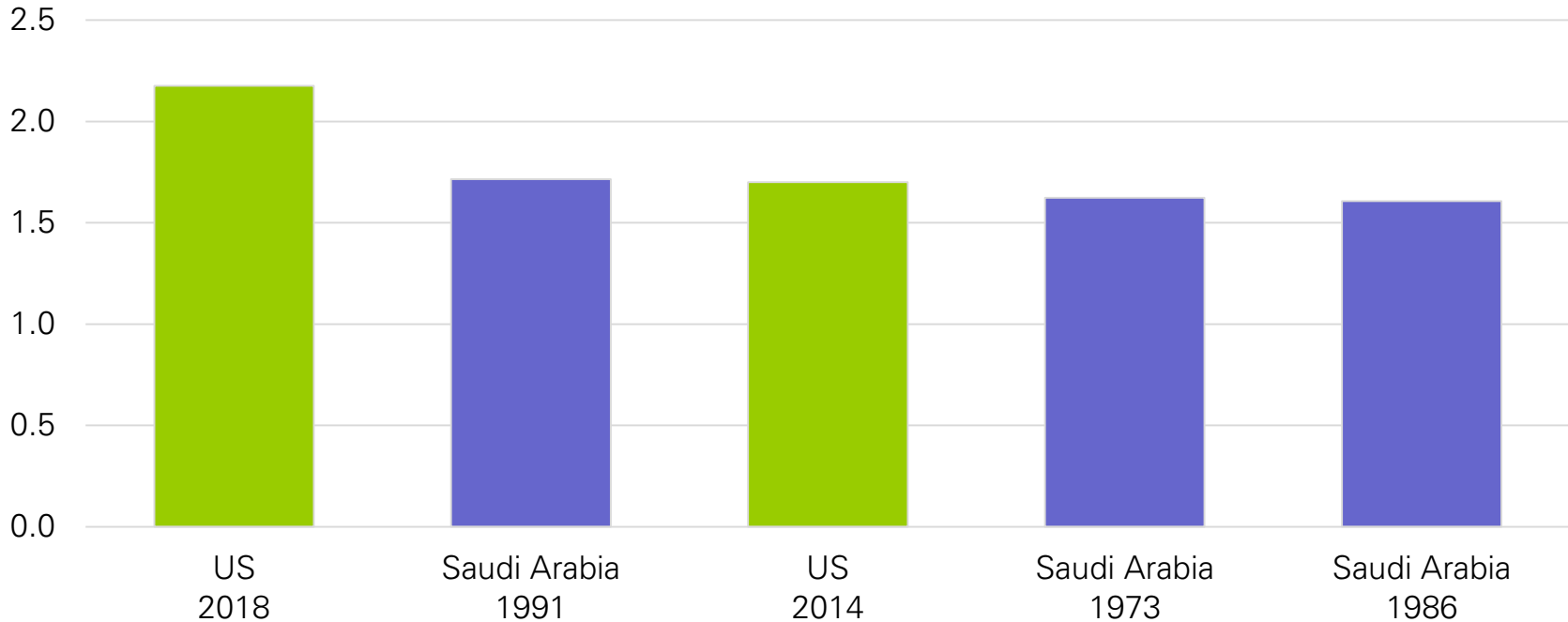
CO₂ emissions from energy use





In 2018 the US set a record for the largest annual increase in oil production ...

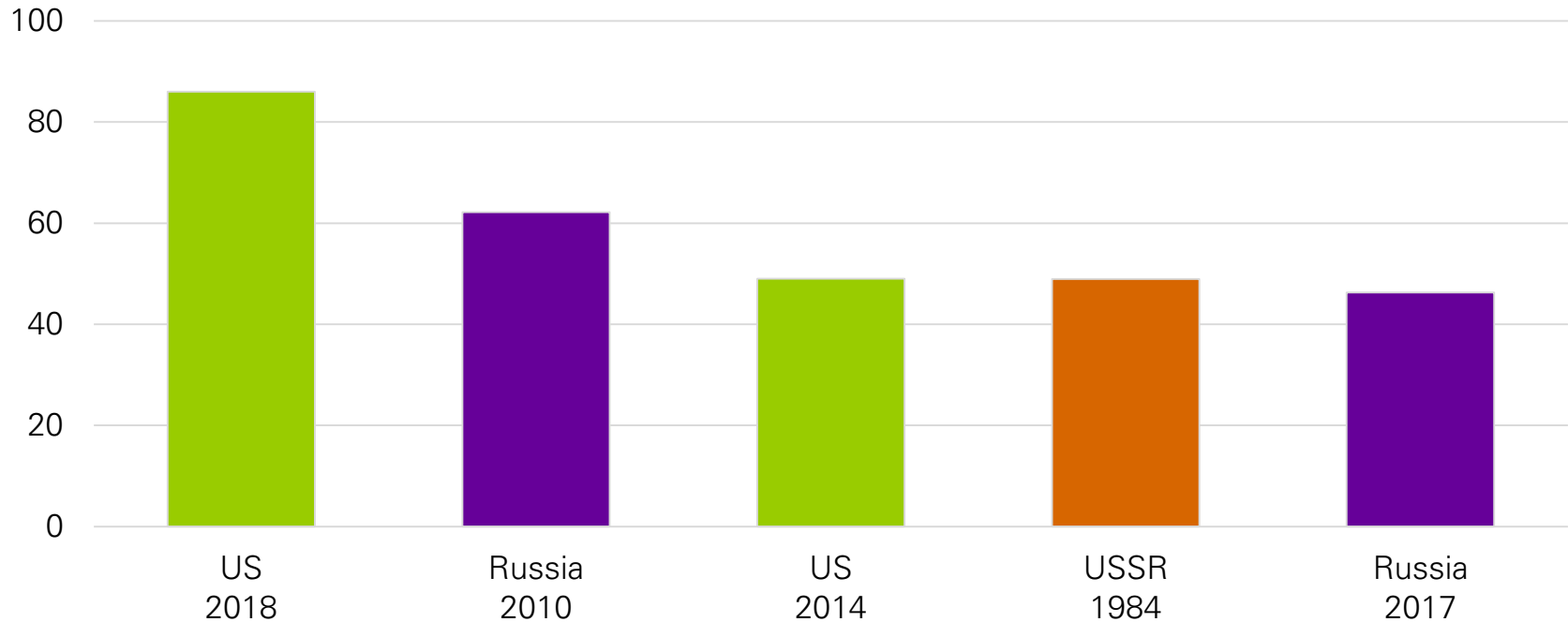
Annual growth, Mb/d



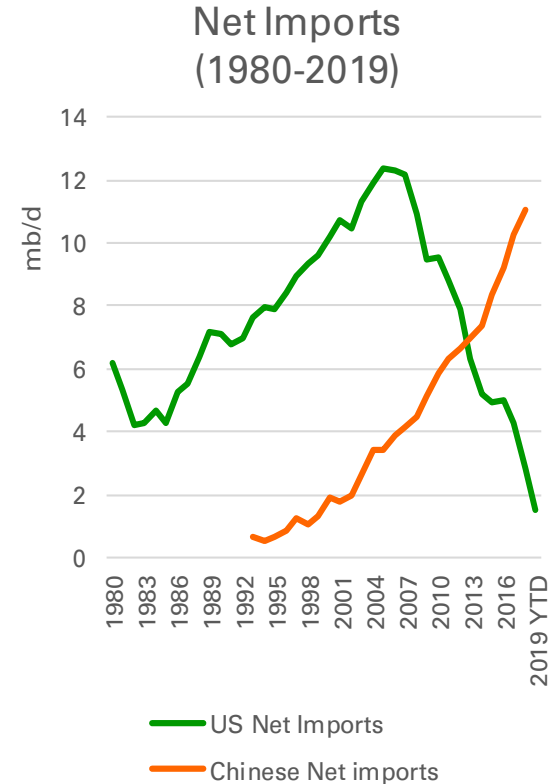
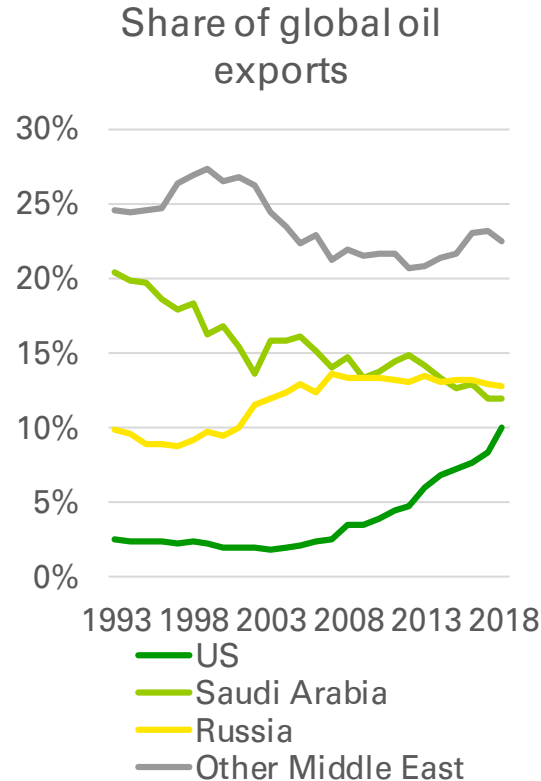
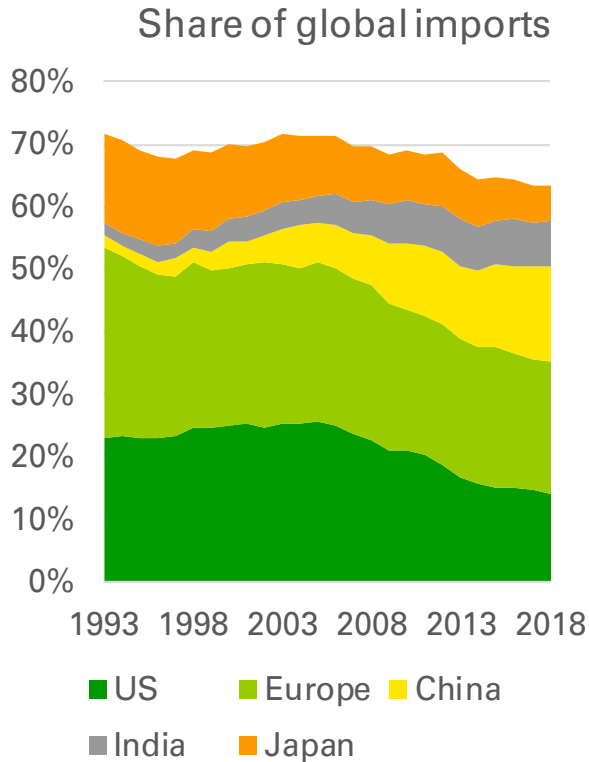
And the largest growth in gas supply by any country and in same year



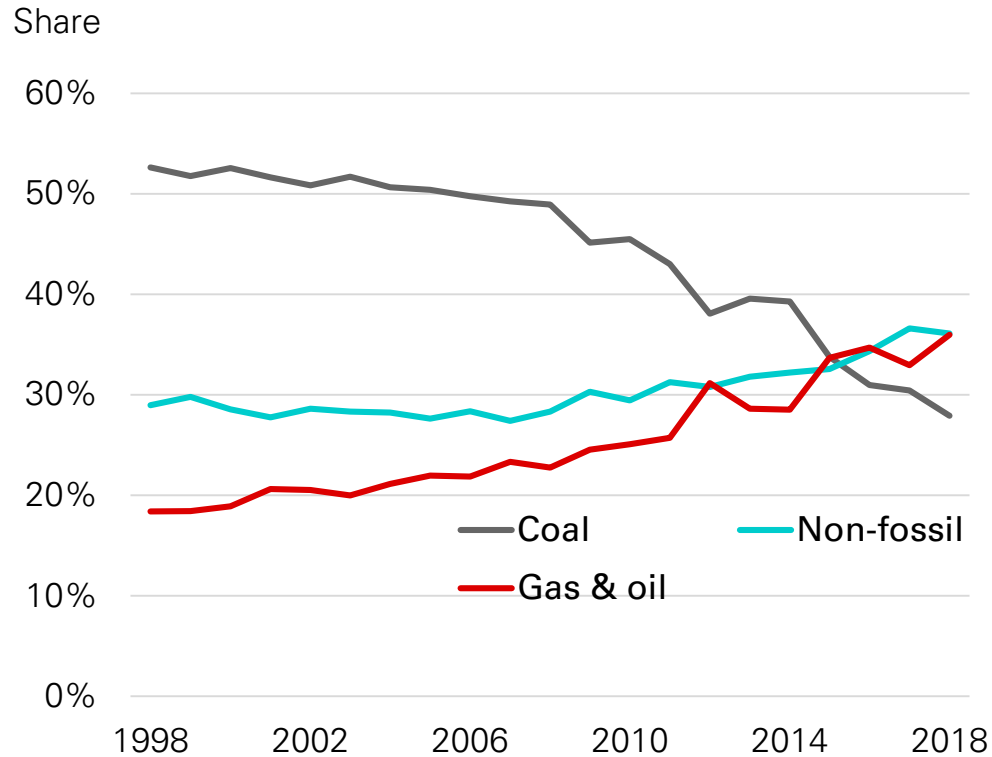
Annual growth, bcm



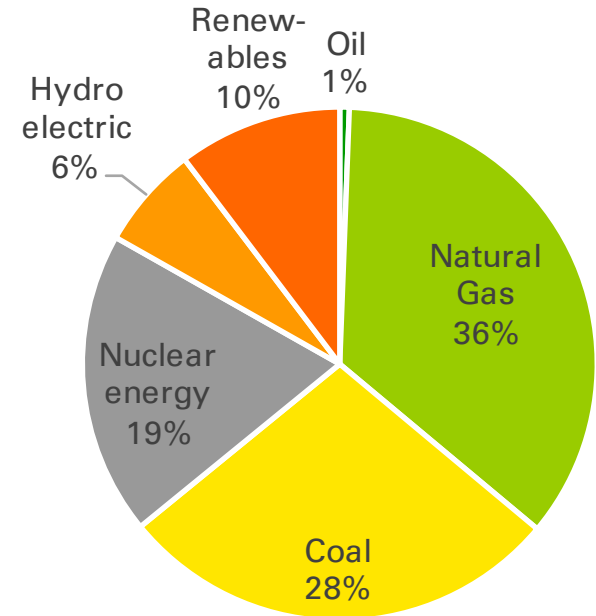
The US has drastically reduced net imports. Yet it still imported 10 mb/d in 2018



In the US, renewables penetration has helped ...

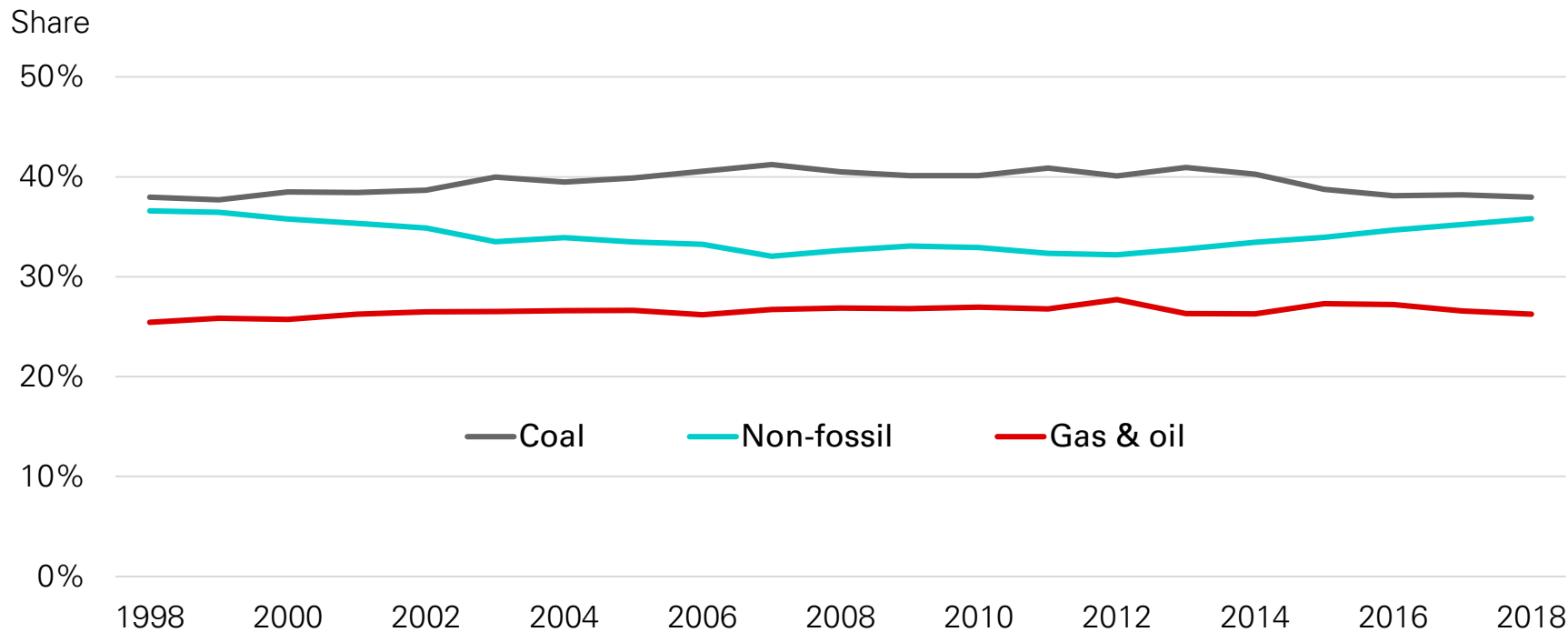


2018: US Power Mix

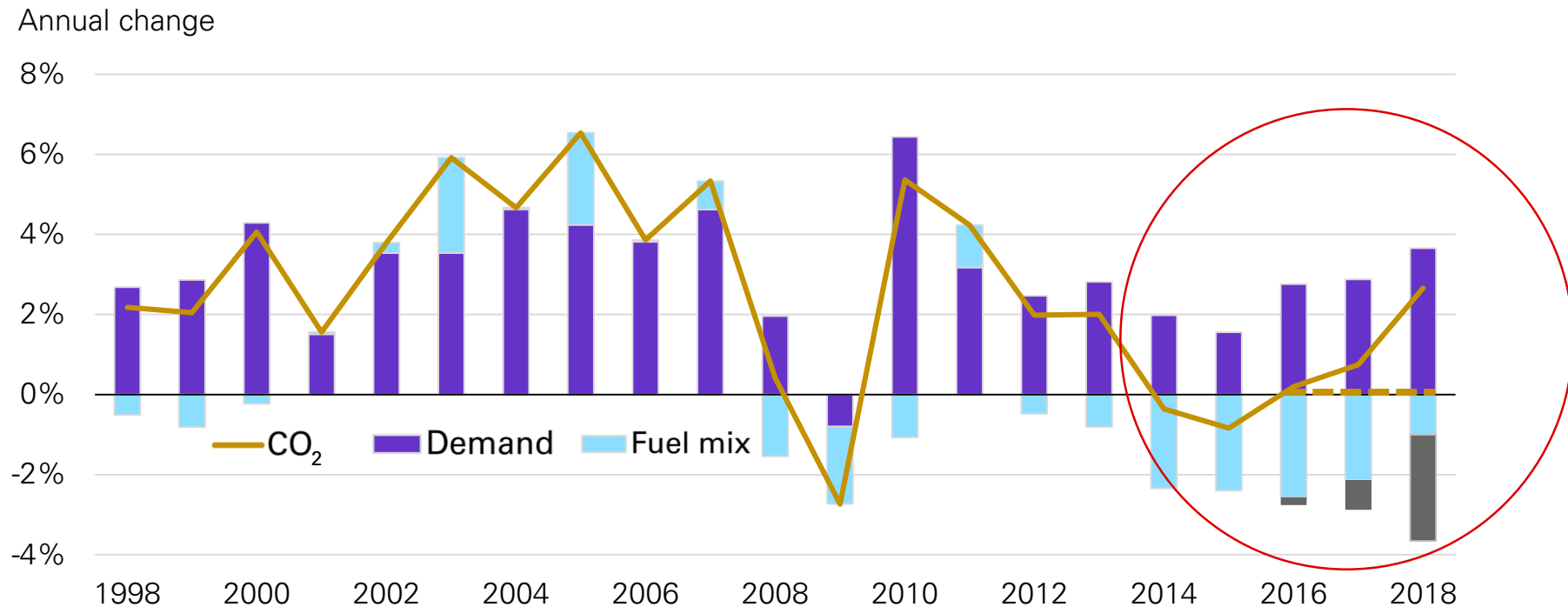




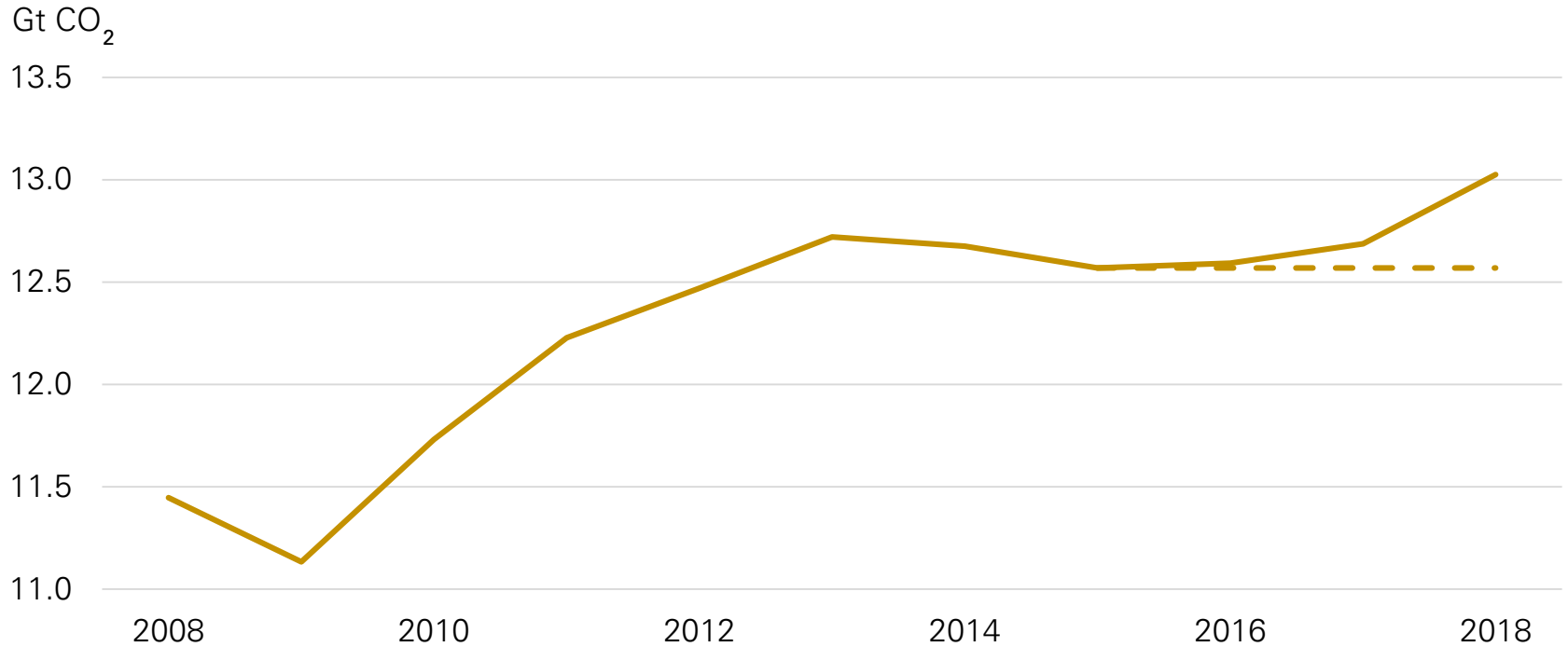
... But on a global basis, the fuel mix remains largely the same as it was two decades ago



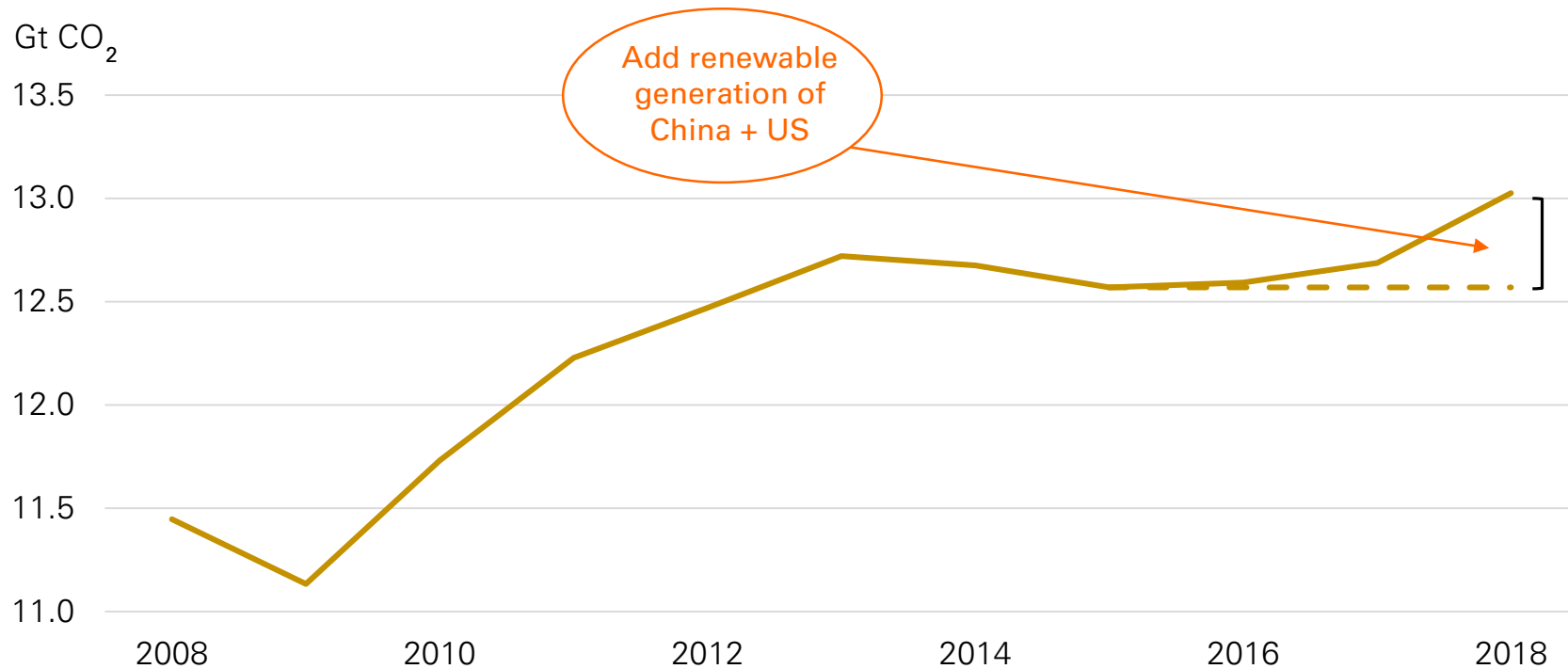
What would it take to keep emissions levels flat?



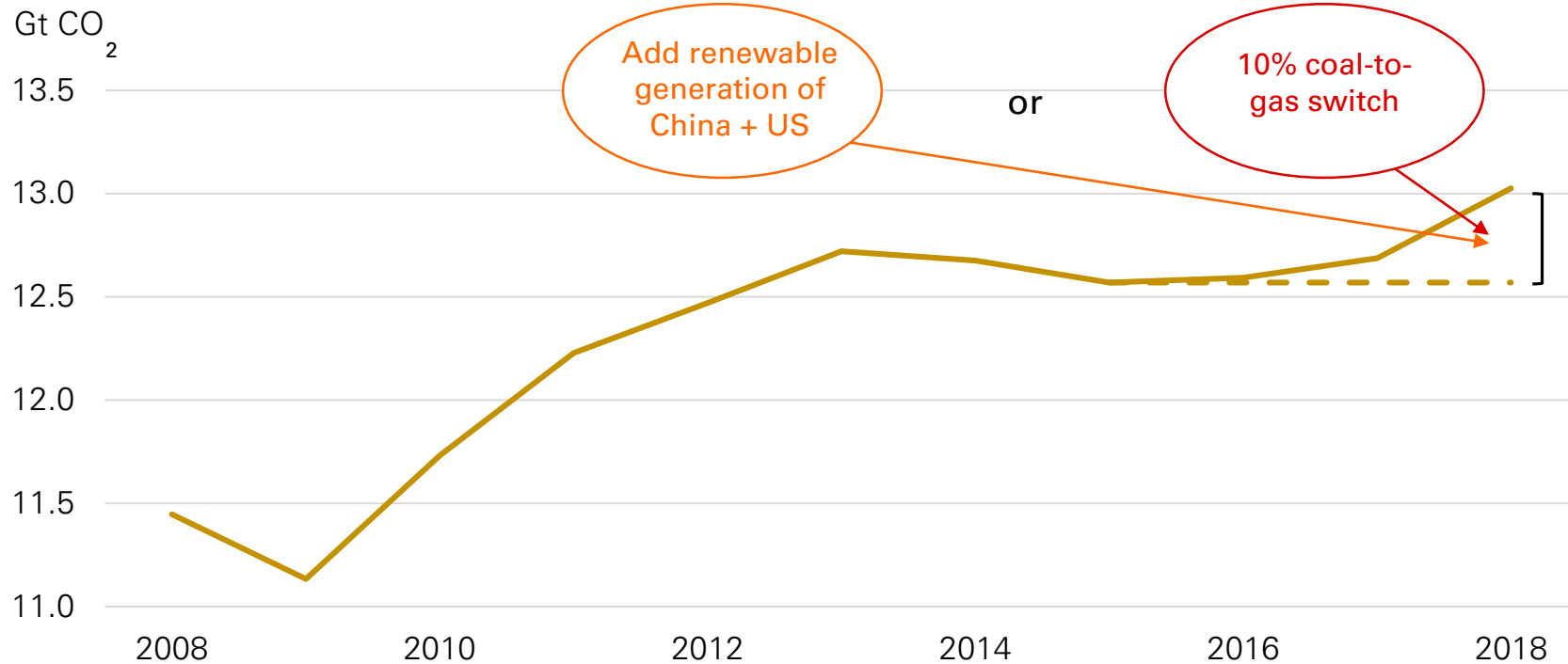
Carbon emissions from power sector



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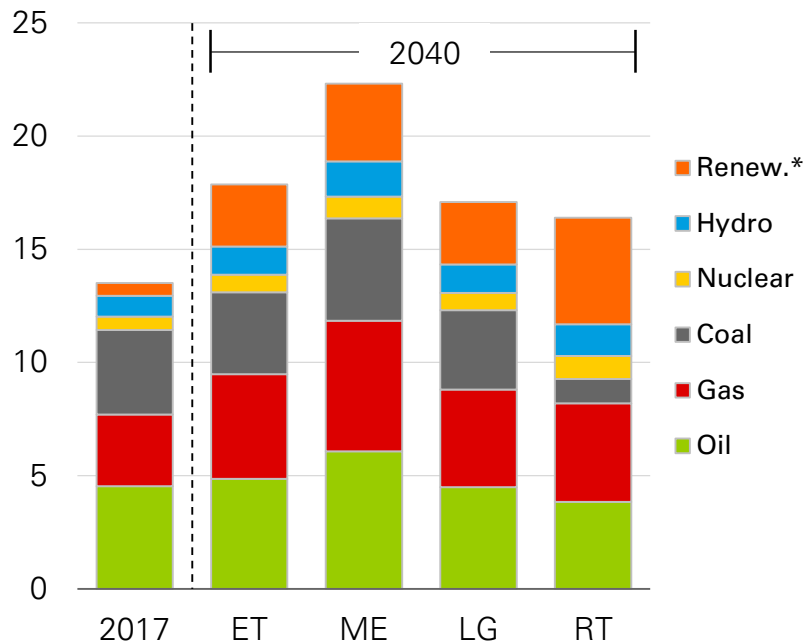


Energy Outlook

Energy Outlook scenarios

Primary energy consumption by fuel

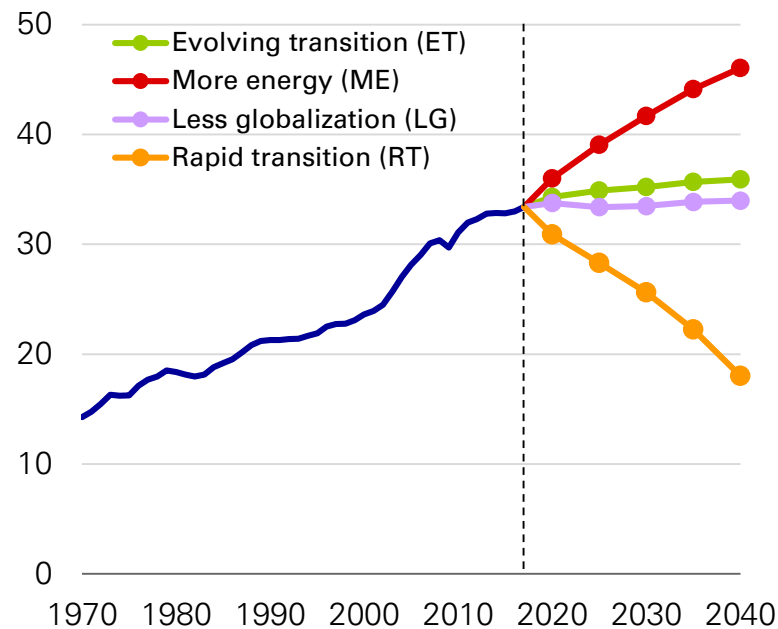
Billion toe



*Renewables includes wind, solar, geothermal, biomass and biofuels

CO₂ emissions

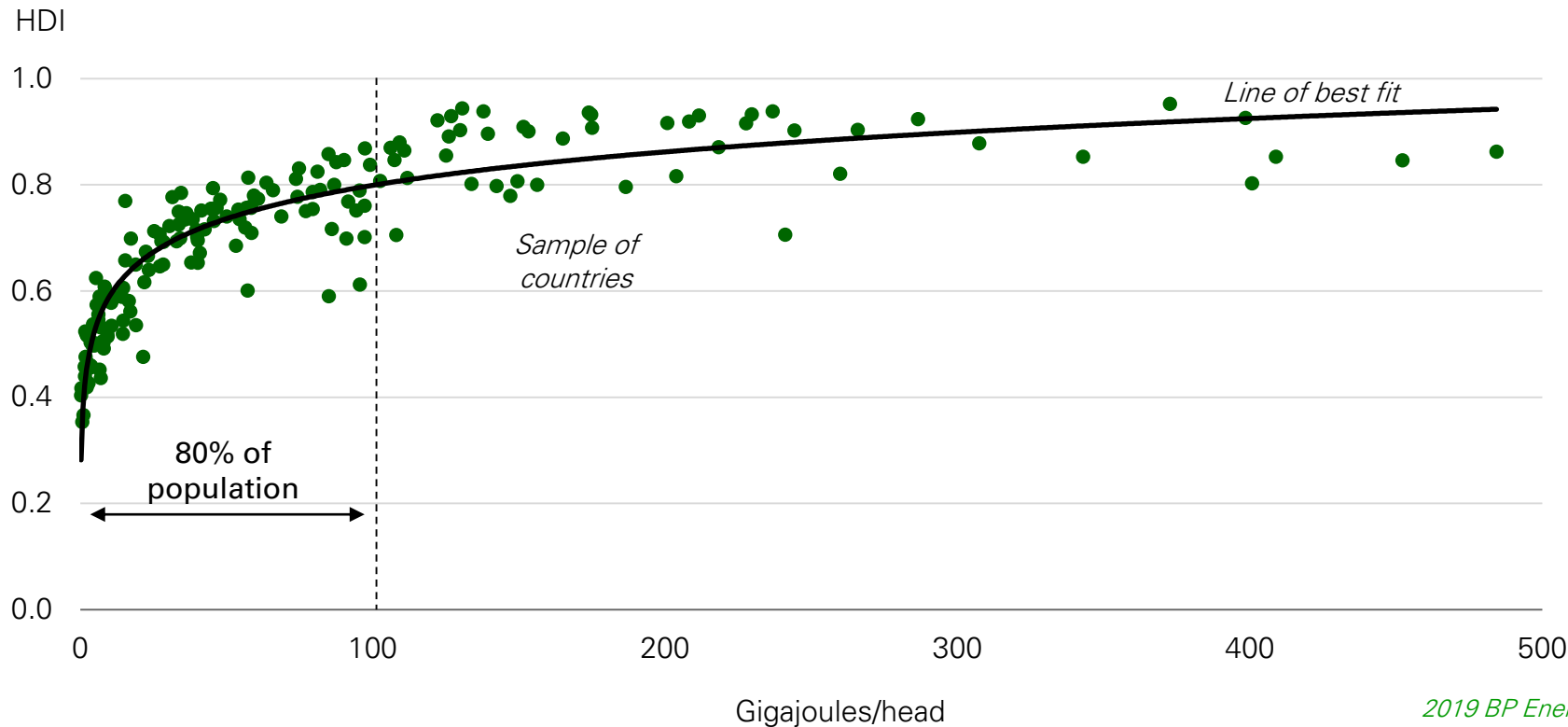
Gt of CO₂





Human development and energy consumption

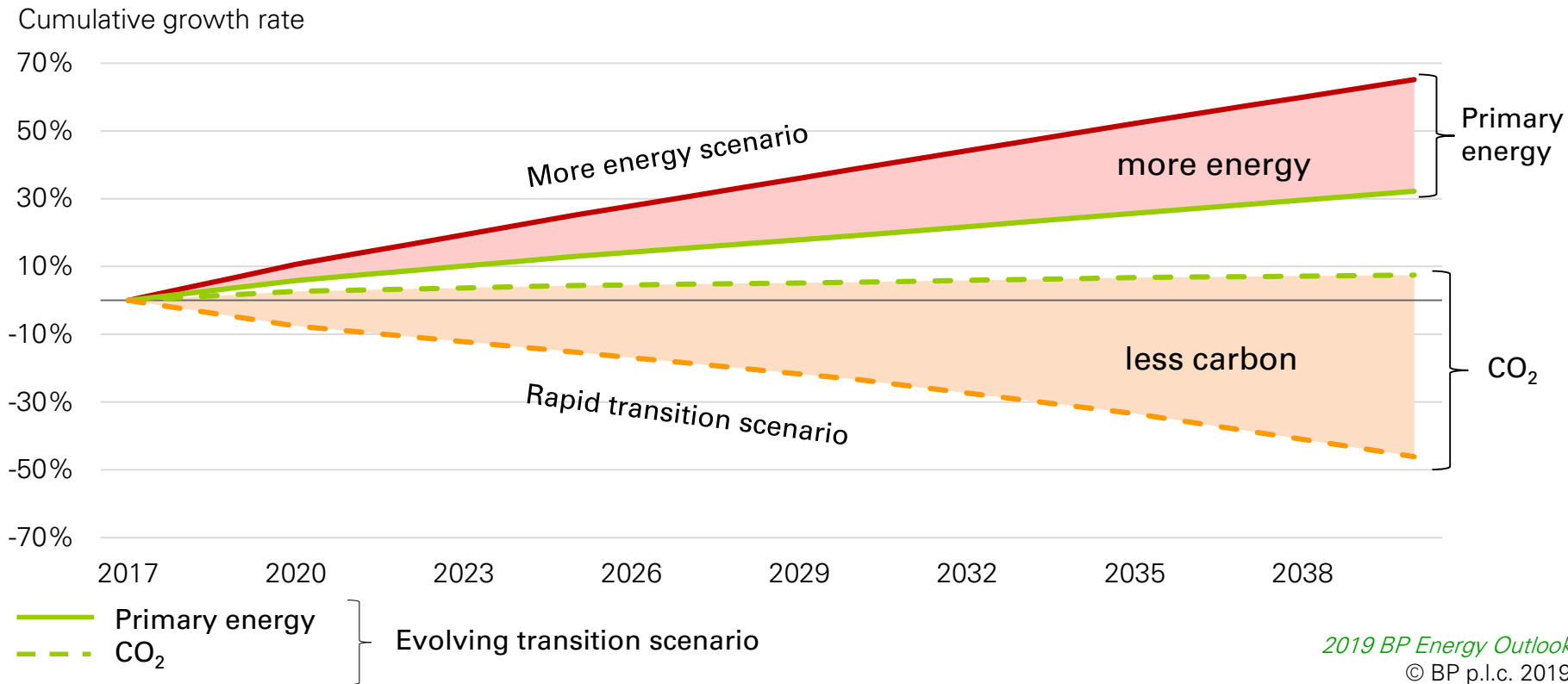
UN Human Development Index and energy consumption, 2017



The Dual Challenge: Supply more energy but with less carbon



Primary energy demand and carbon emissions

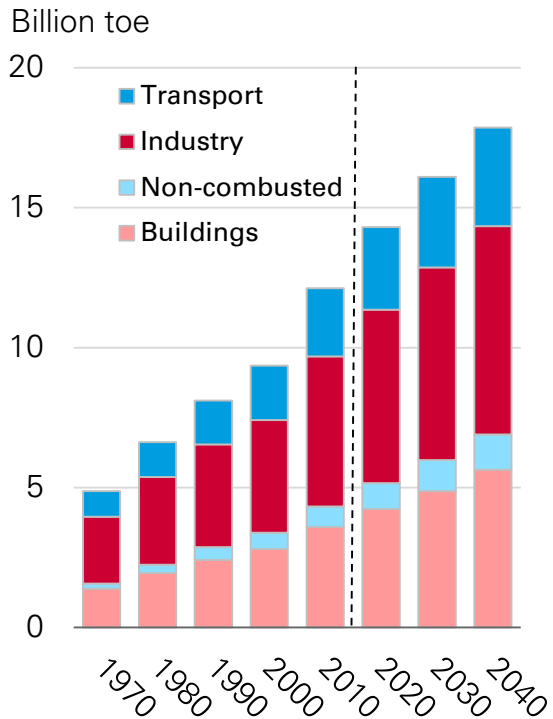




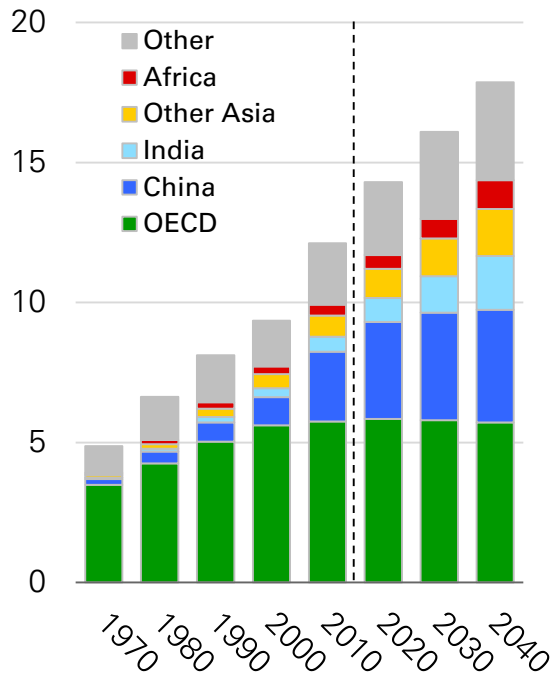
Three windows on the energy transition

Primary energy demand

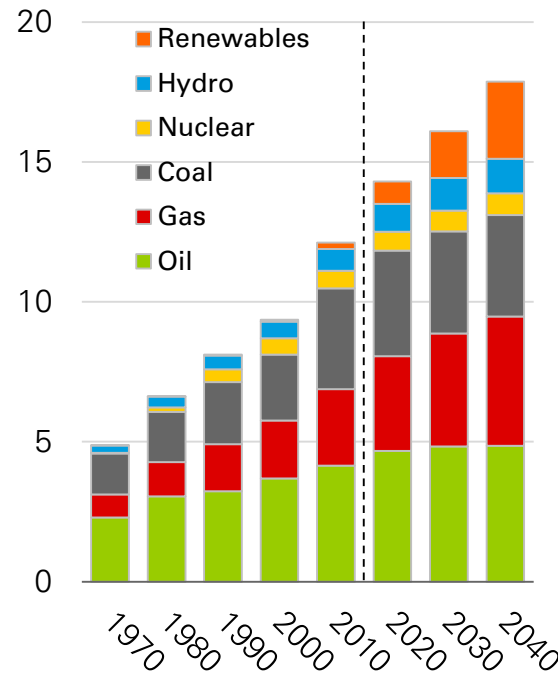
End-use sector



Region



Fuel

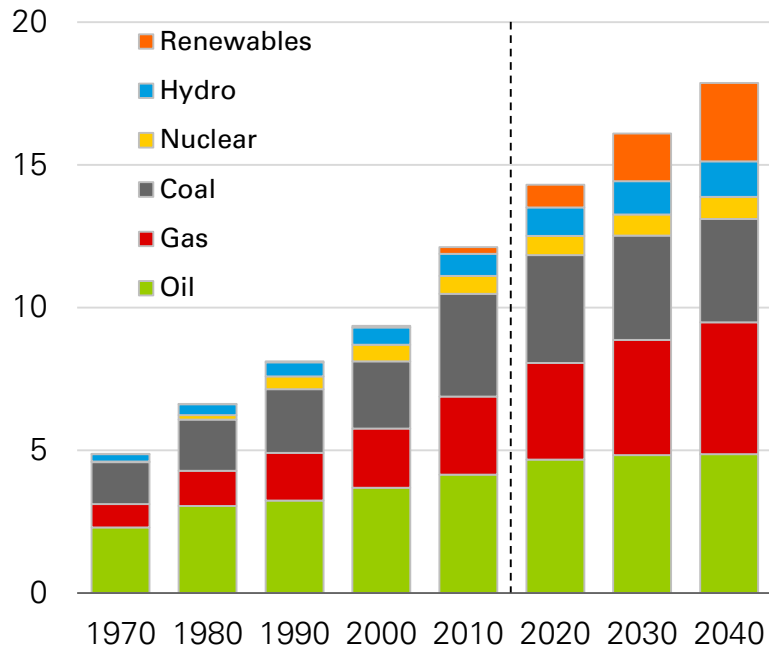


Global energy by fuel type: Gas keeps constant share, renewables grow quickly

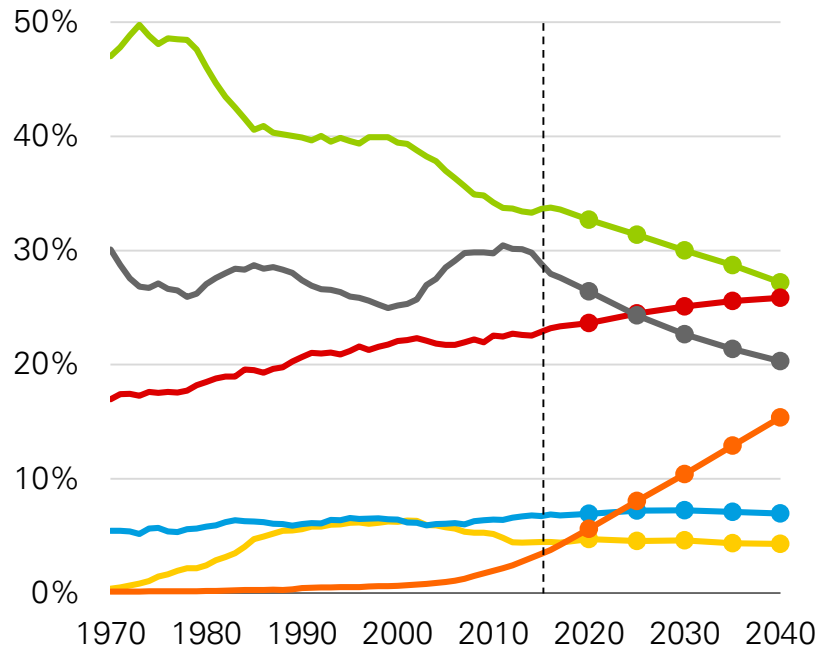


Primary energy consumption by fuel

Billion toe



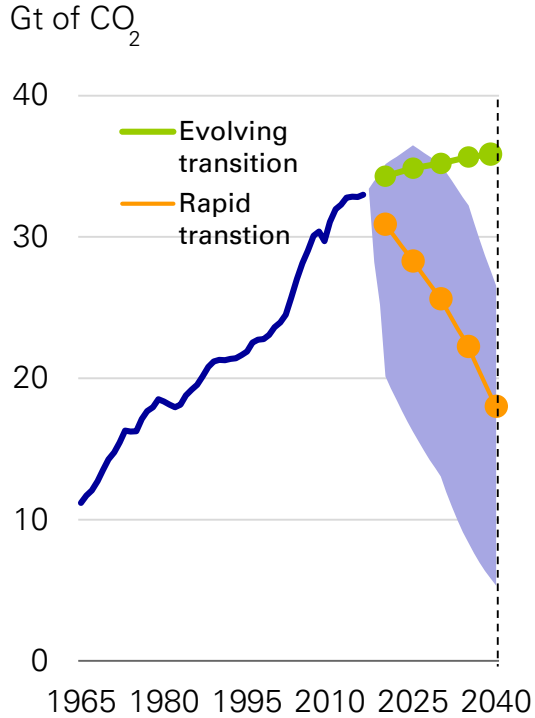
Shares of primary energy



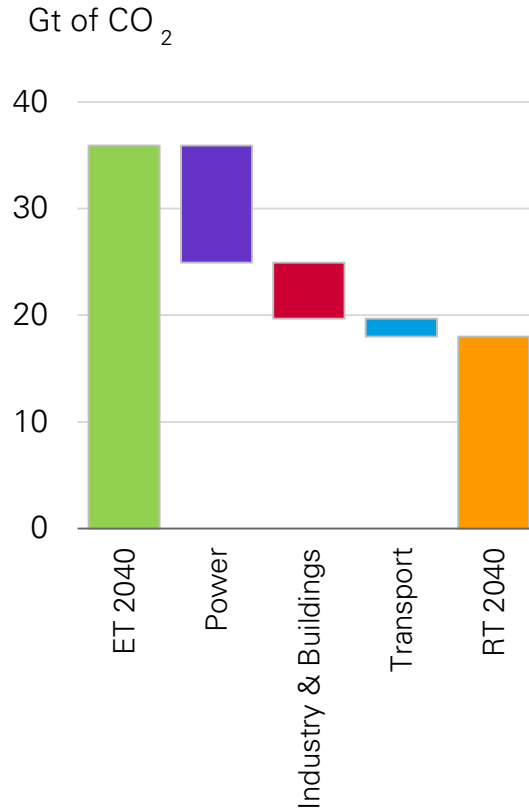
45% reduction in CO₂ emissions needed in Rapid Transition



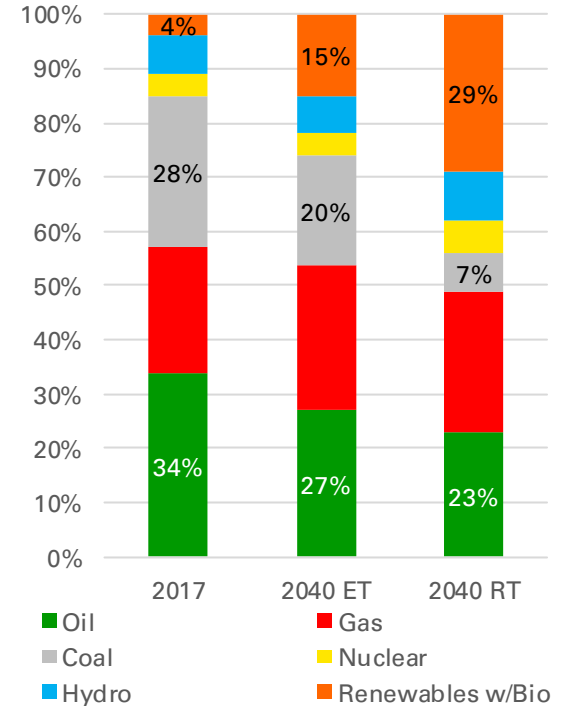
45% reduction in CO₂ emissions



ET vs RT in 2040: Transport shoulders a small share of needed abatement



Fuel Shares - RT vs ET





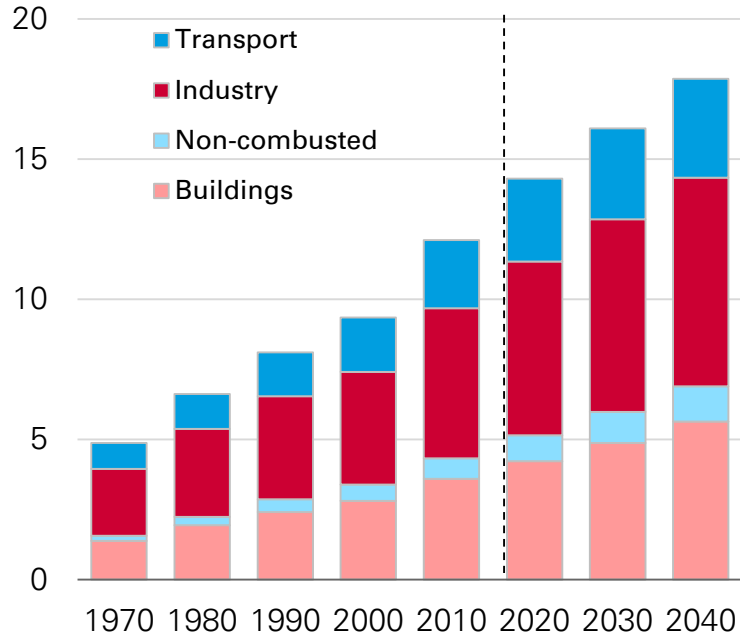
Energy Outlook: Oil and Transport Fuels



Transport is a fifth of primary energy consumption

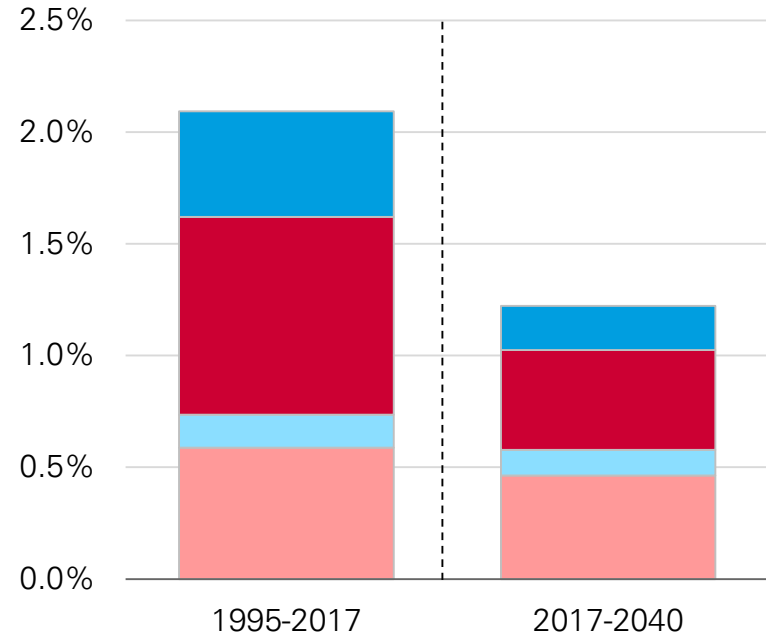
Primary energy consumption by end-use sector

Billion toe



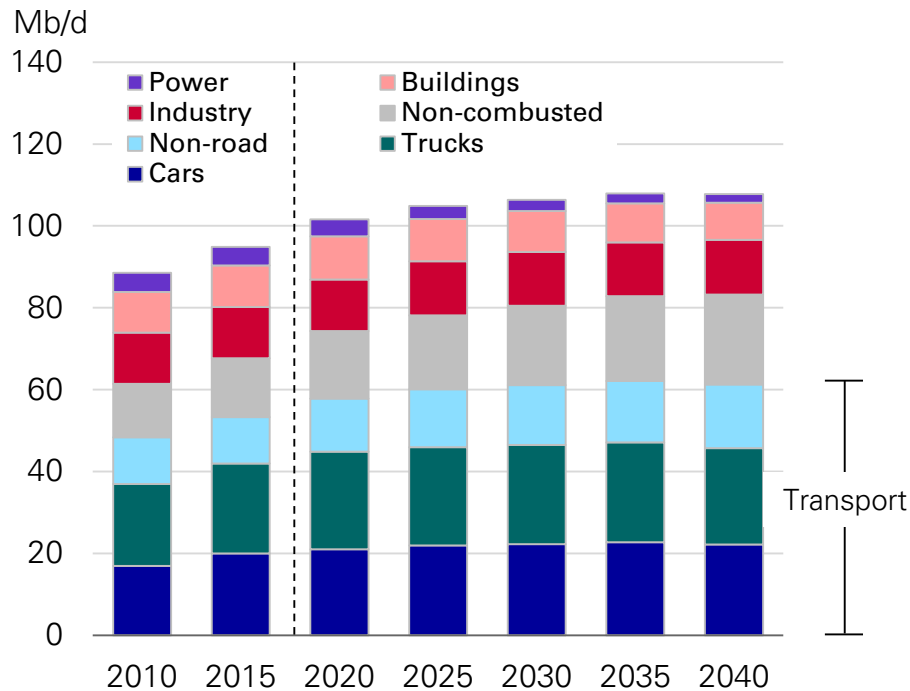
Annual demand growth and sector contributions

% per annum

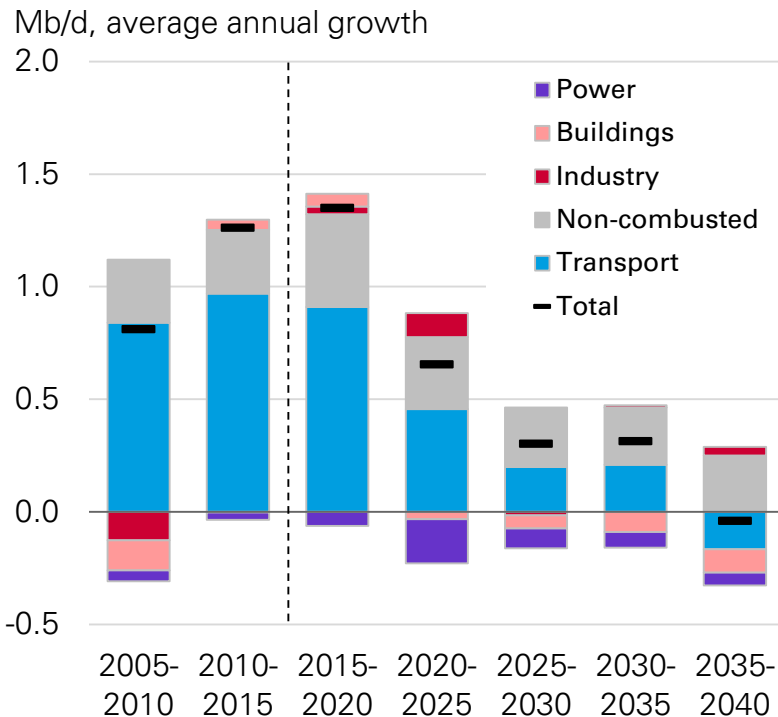


Demand for oil and other liquid fuels

Liquids demand



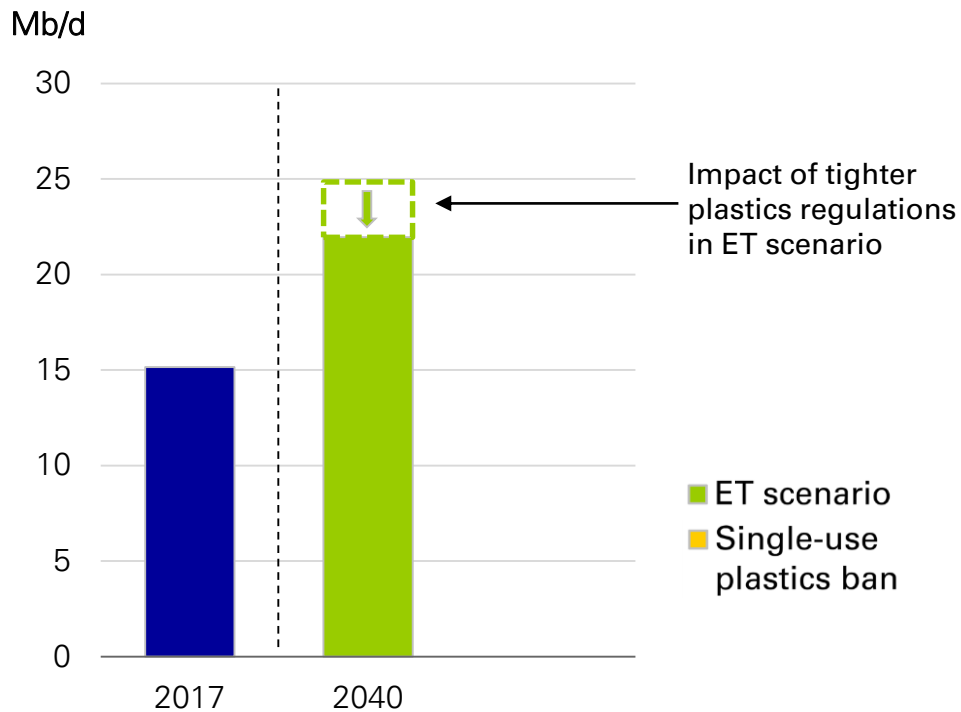
Liquids demand growth



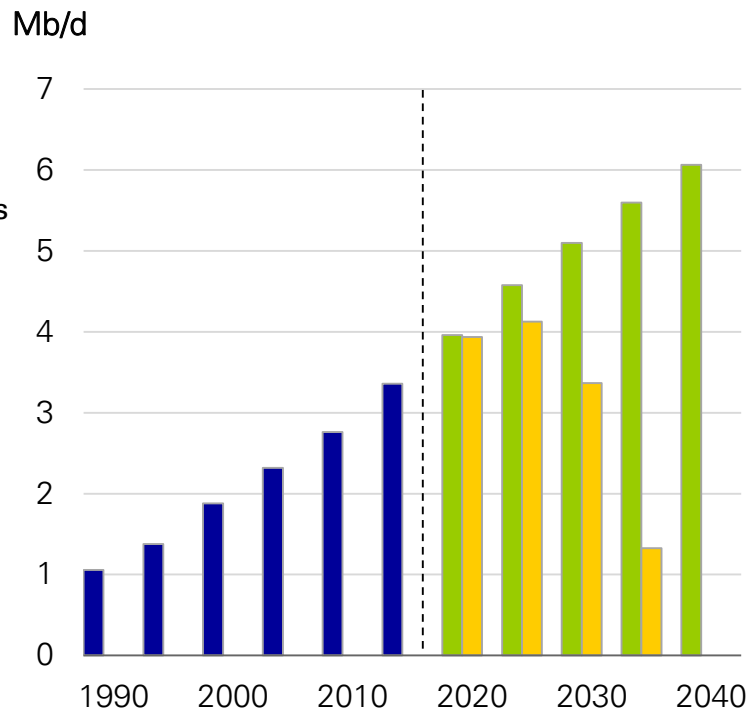
Demand for liquid fuels and plastics



Demand for non-combusted liquid fuels



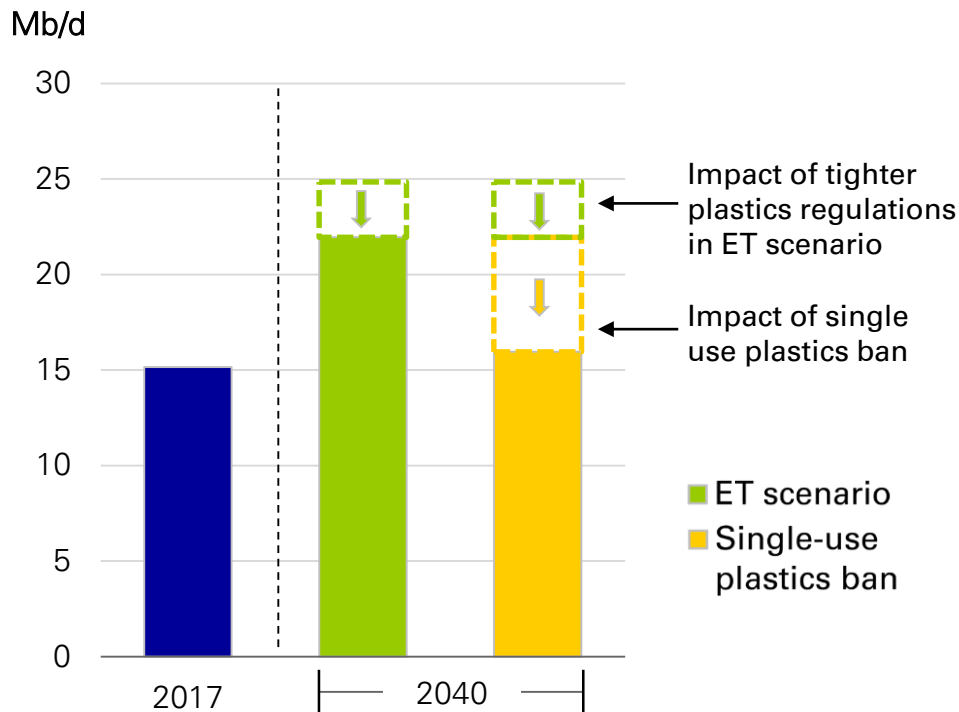
Liquid feedstocks for single-use plastics



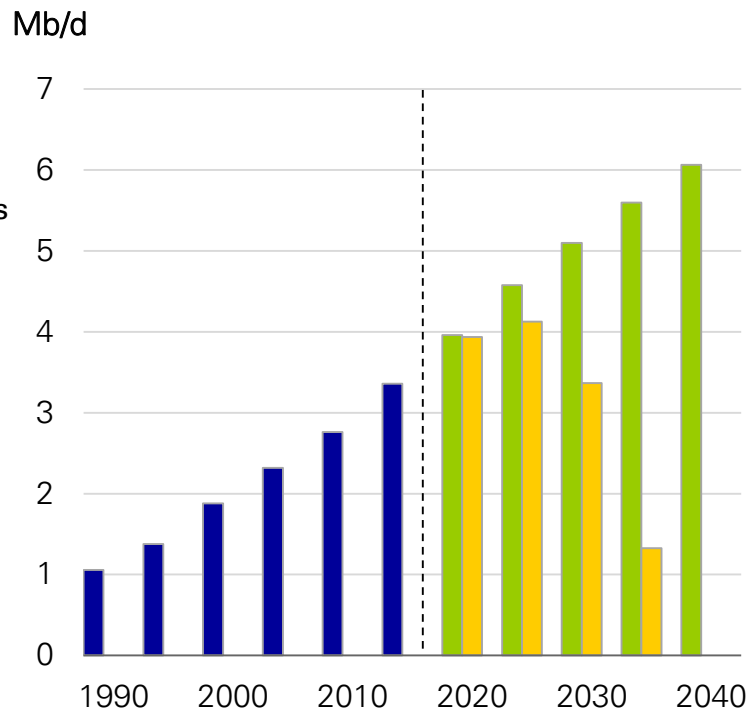
Demand for liquid fuels and plastics



Demand for non-combusted liquid fuels

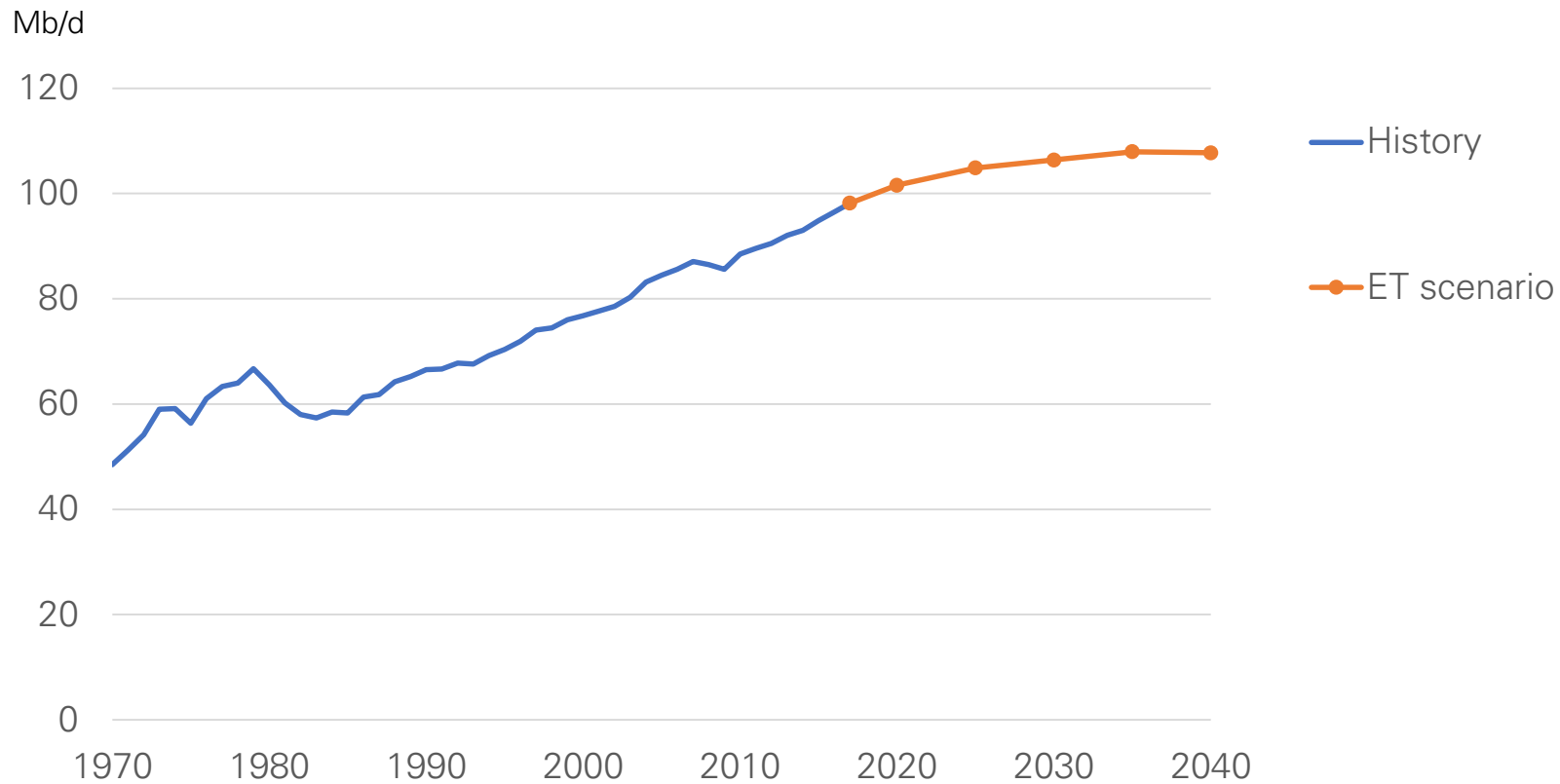


Liquid feedstocks for single-use plastics



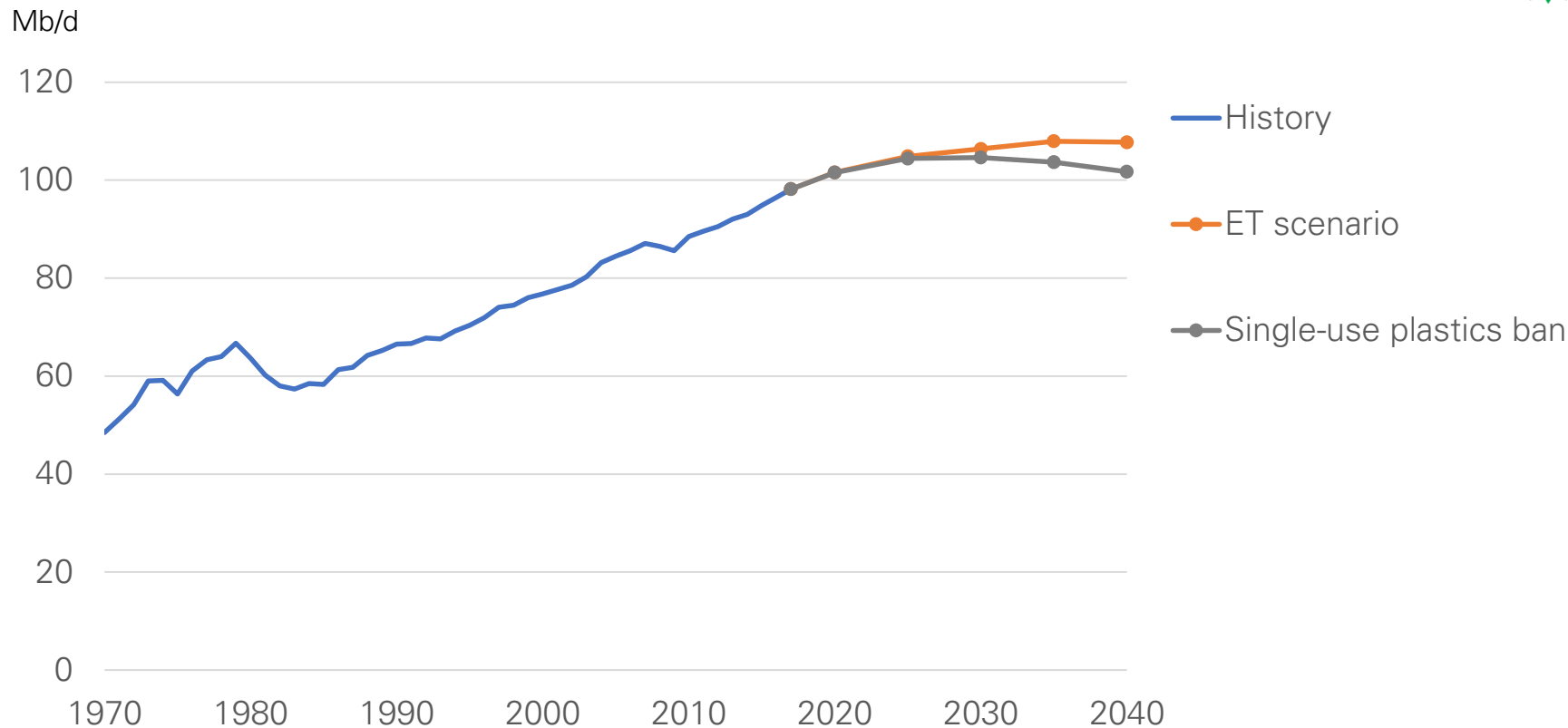


Oil demand by scenario



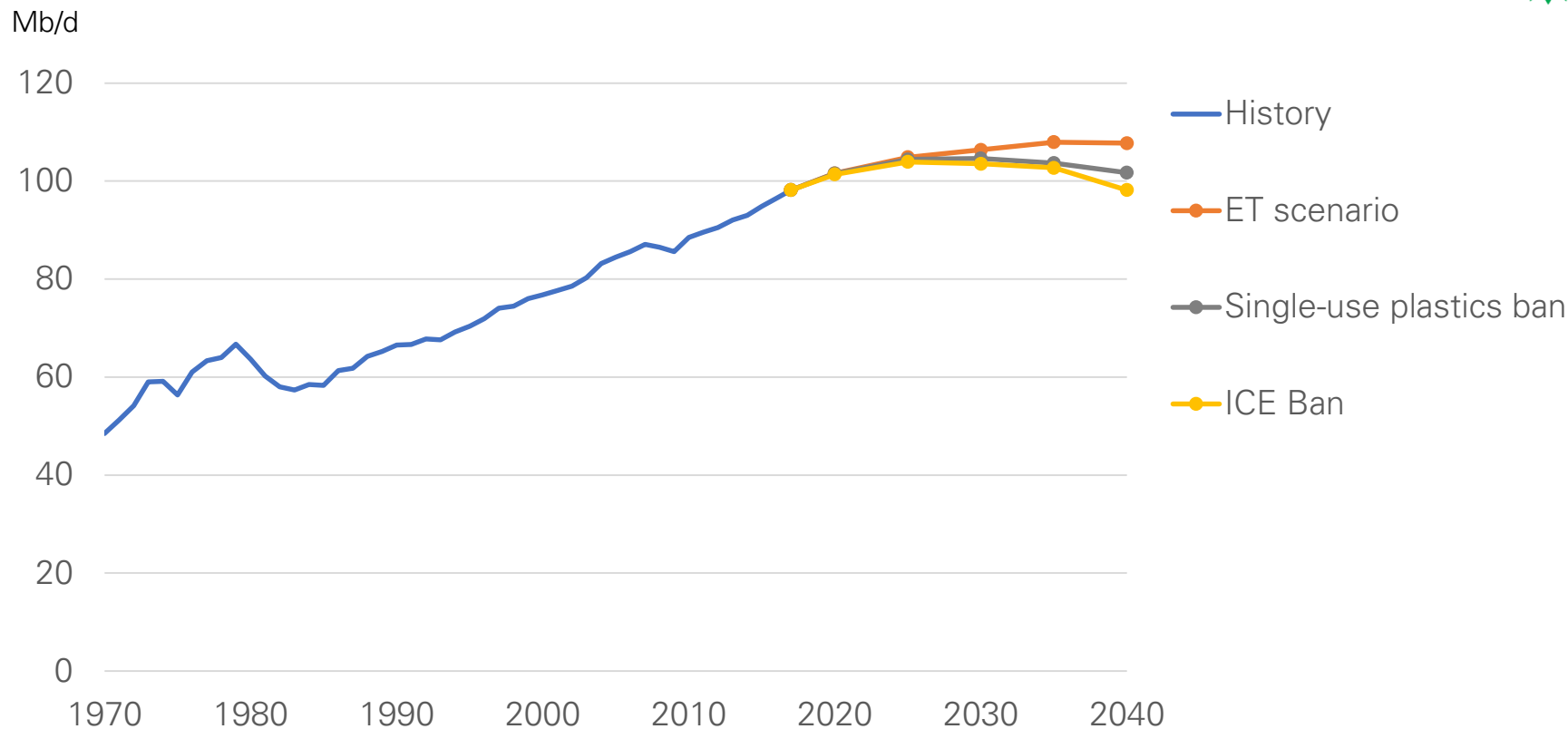


Oil demand by scenario



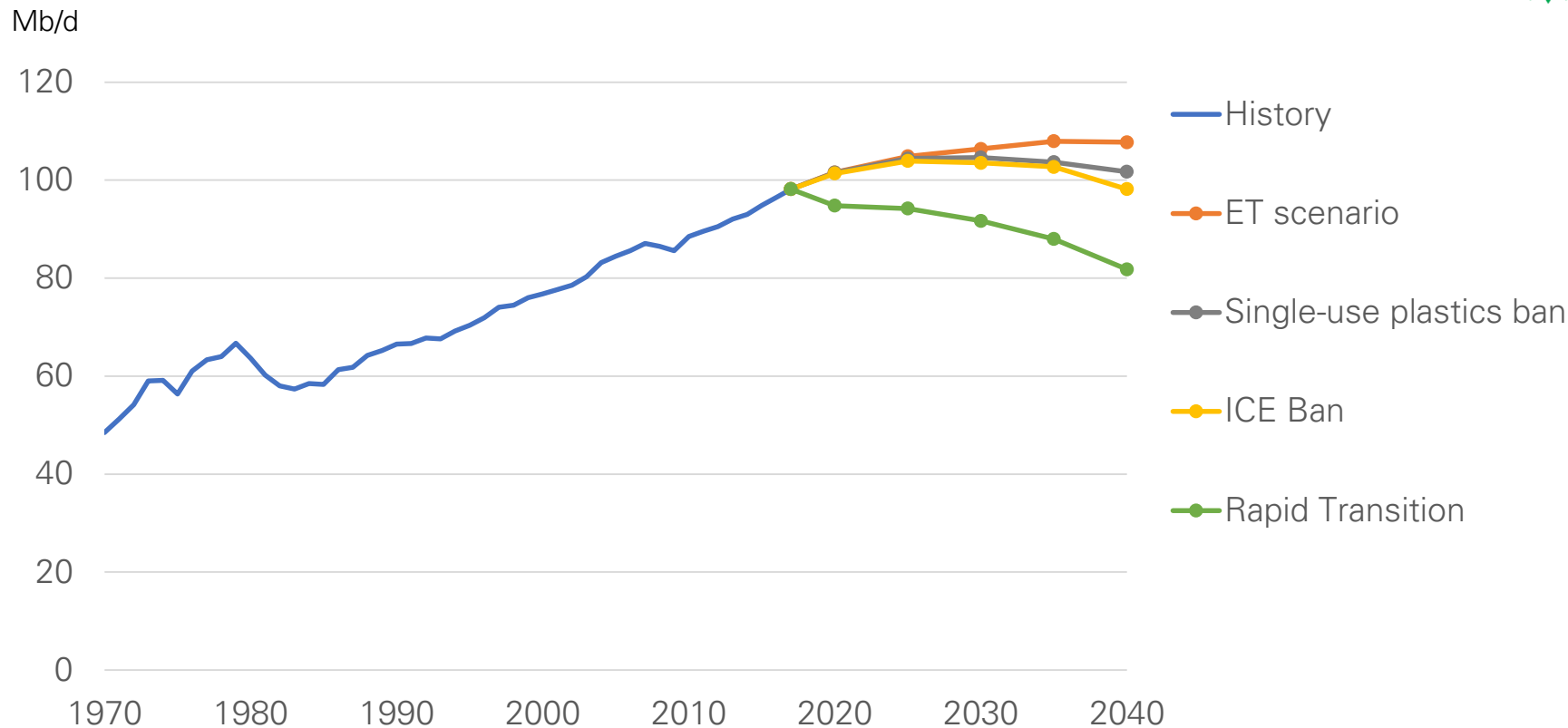


Oil demand by scenario



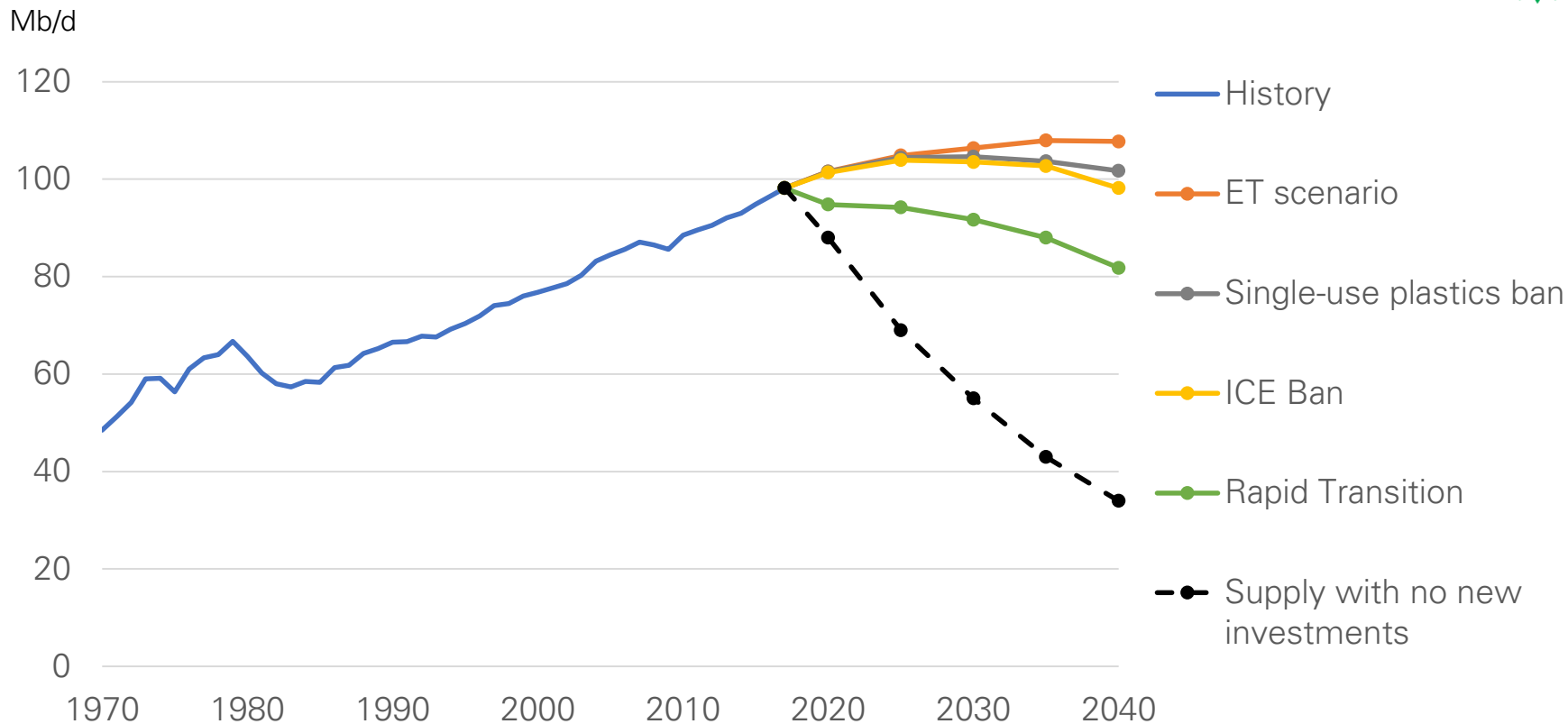


Oil demand by scenario

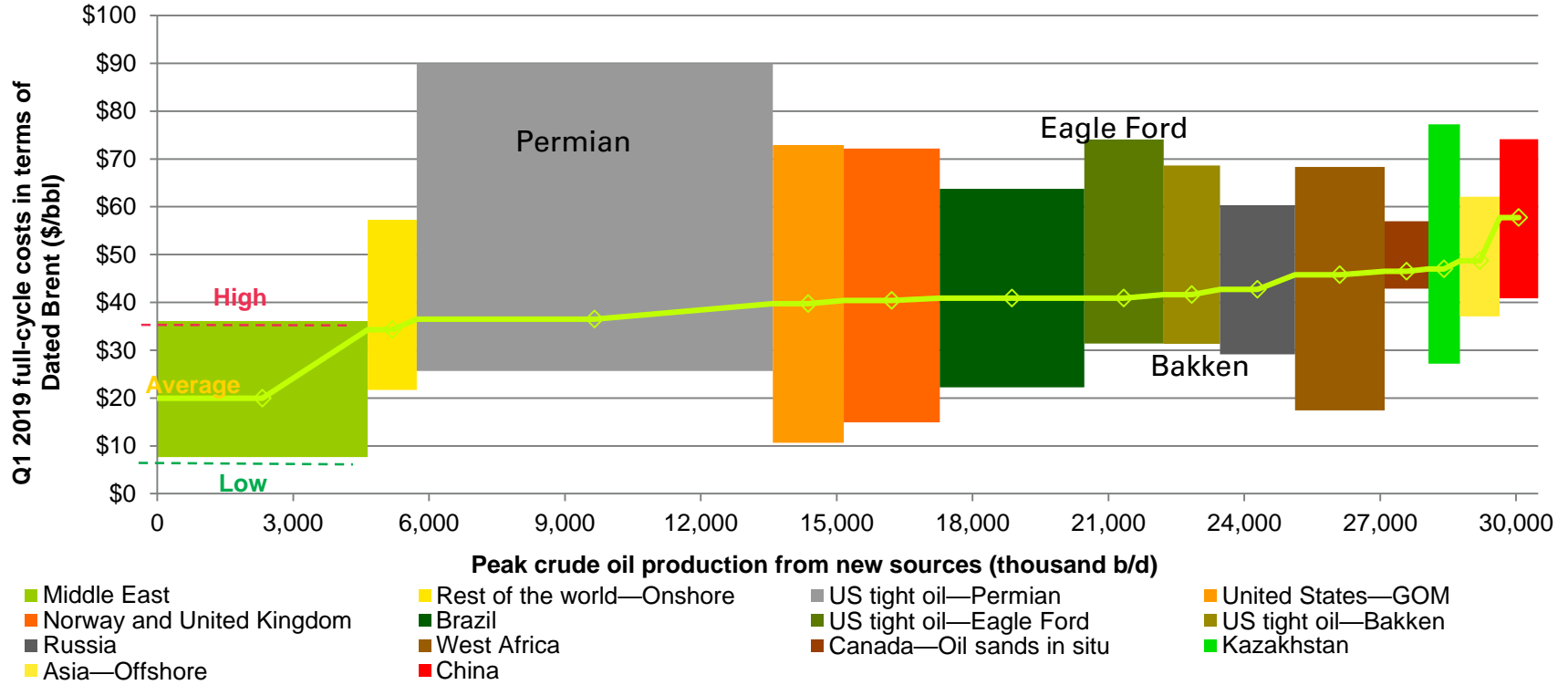




Oil demand – what a rapid transition might look like



If 25 Mb/d of new production has a full cycle breakeven below \$50 Brent ...

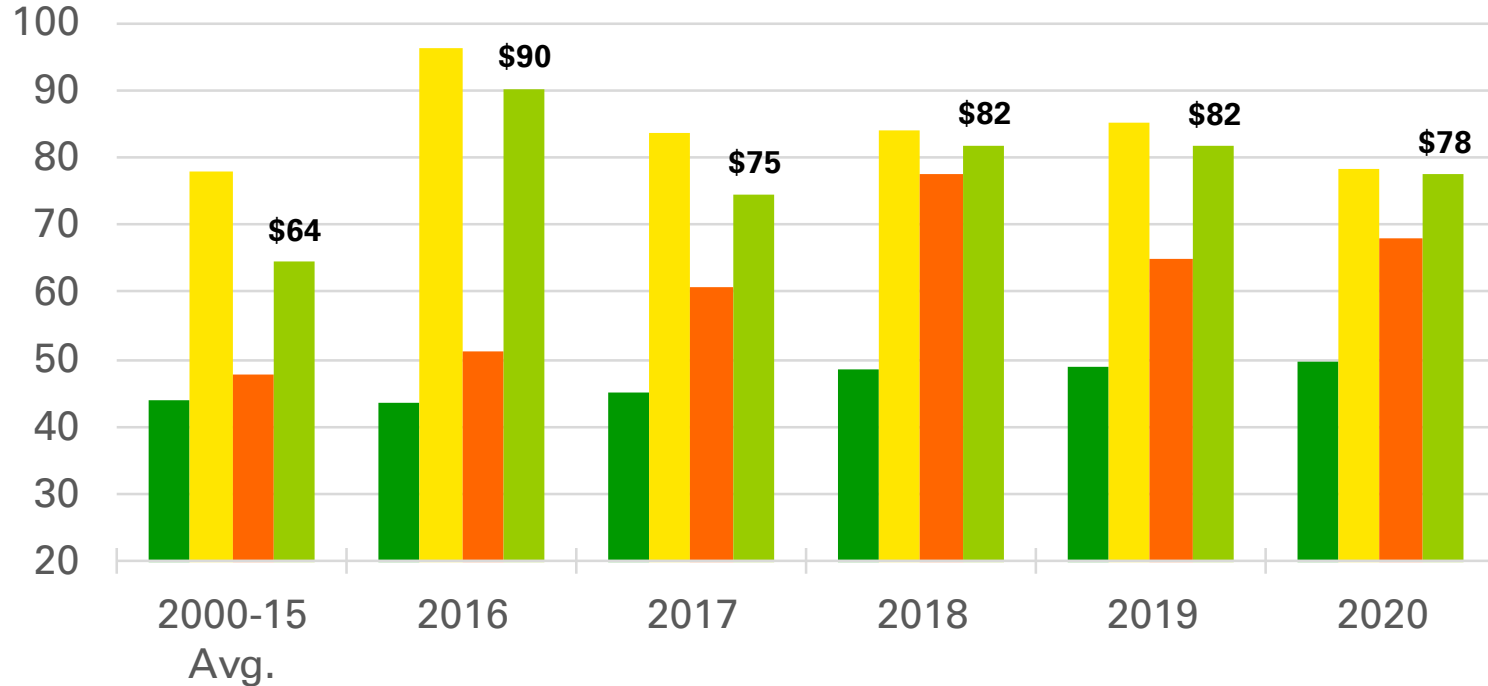


Note: GOM = Gulf of Mexico.
Source: IHS Markit



...what will this mean for MENA exporters?

Fiscal Breakeven Oil Prices (\$/b)



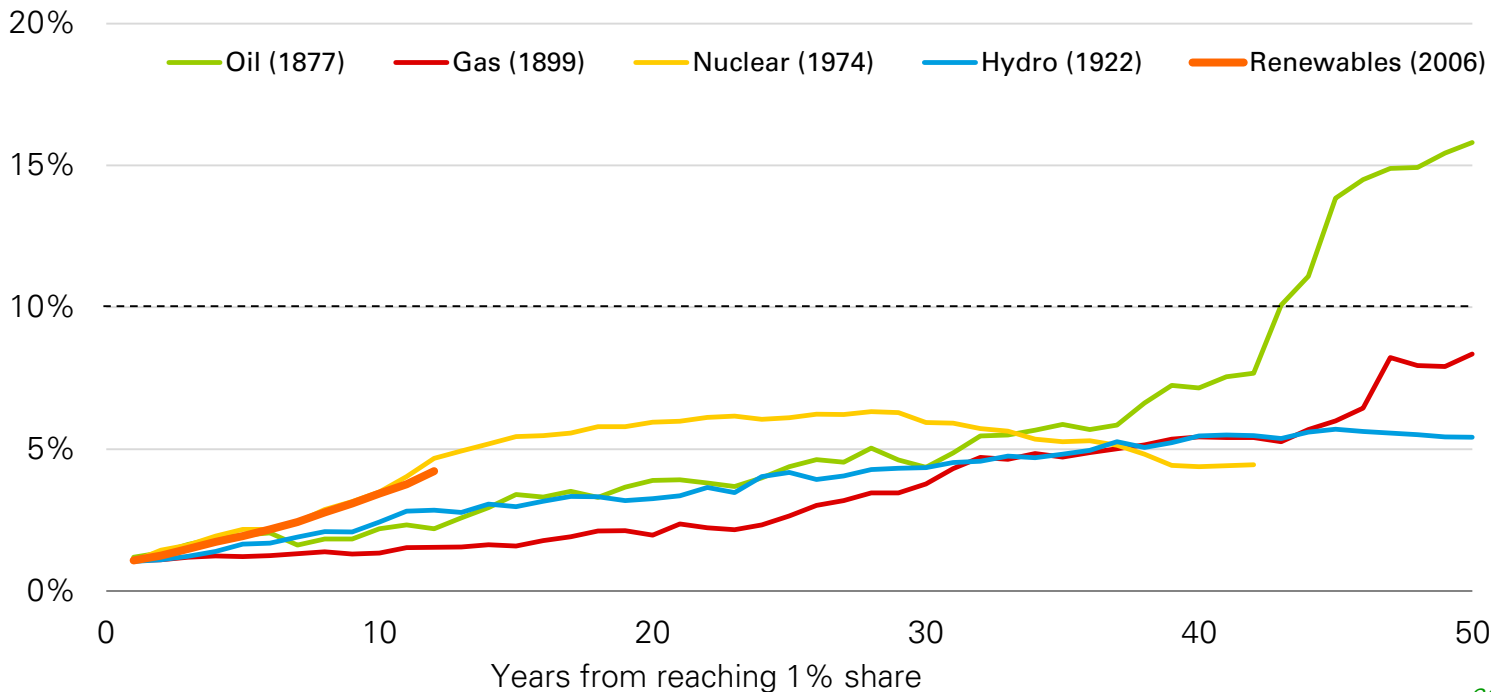
■ Kuwait ■ Saudi Arabia ■ United Arab Emirates ■ MENA Oil Exporter Average

It took natural gas fifty years to reach just 8% of global energy



Speed of penetration of new fuels in global energy system

Share of world energy

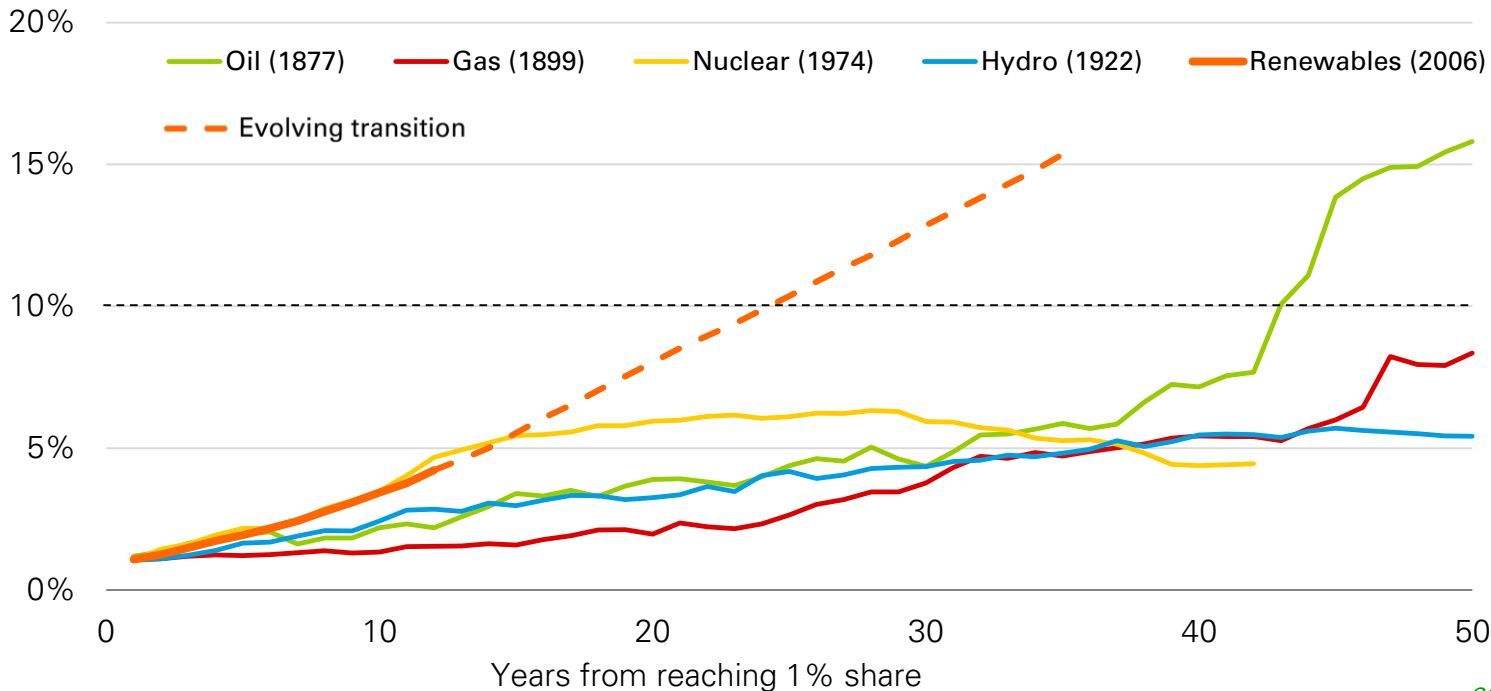




We expect renewables to reach more than 15% in ET

Speed of penetration of new fuels in global energy system

Share of world energy

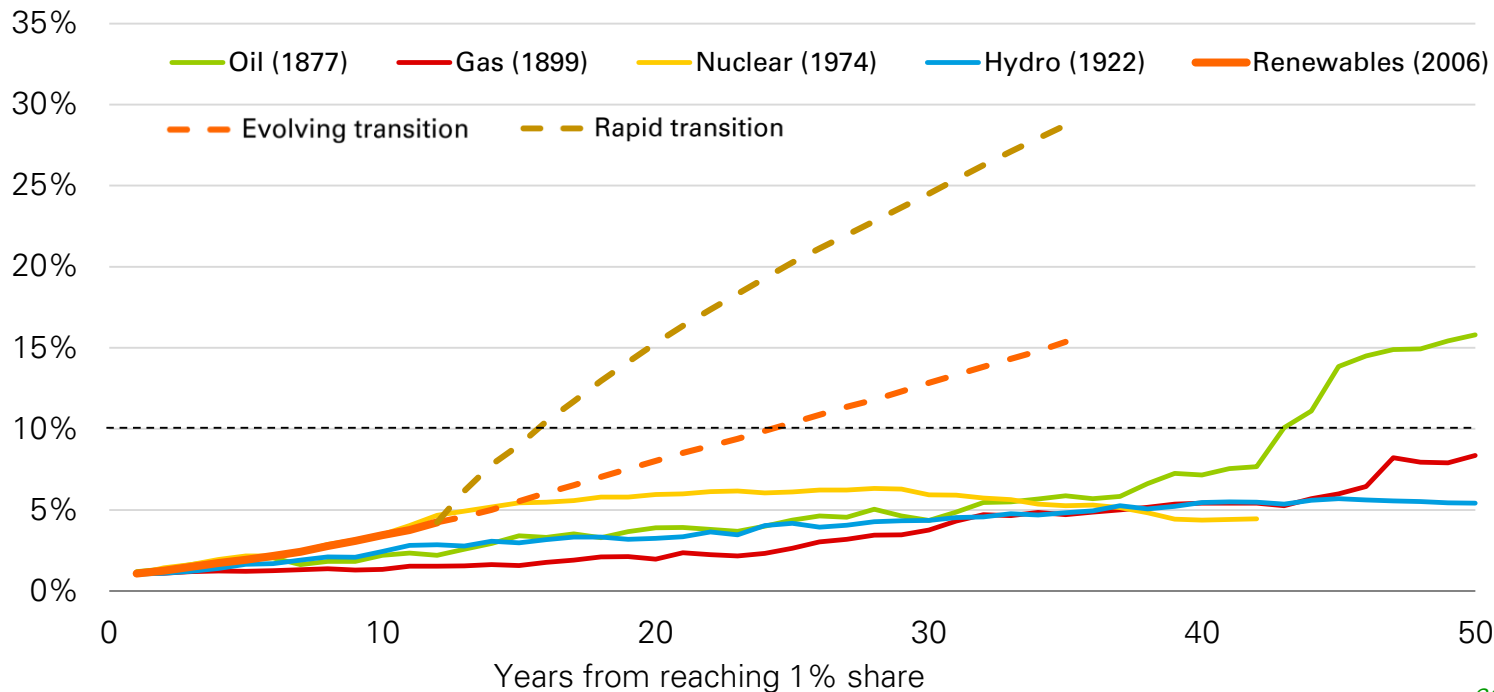




And almost a 30% share in 35 years in Rapid Transition

Speed of penetration of new fuels in global energy system

Share of world energy





Conclusions

- Weather extremes could create a vicious cycle and the data for 2018 show a path that is inconsistent with Paris.
- Energy system already feeling severe impacts of climate change.
- US oil and gas production had a record year in 2018. Can this output growth be sustained amid calls for capital discipline?
- Long term, oil demand could range from 80 to over 100 mb/d. Increasingly met by products bypassing refining system.
- Prices influenced by speed at which MENA exporters can reform
- Energy transitions are hard but even a rapid transition will require all sources of fuels .

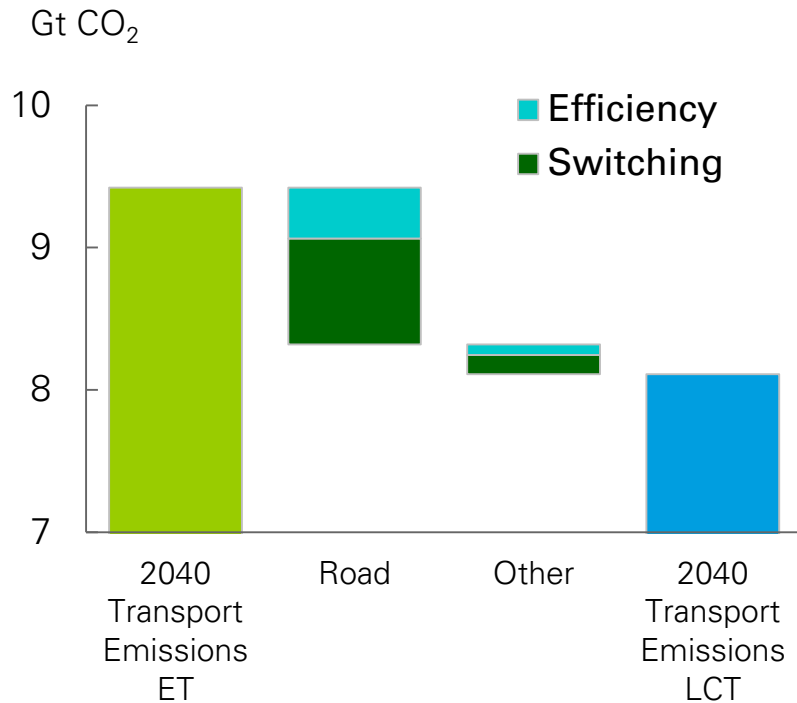


Supplementary Slides

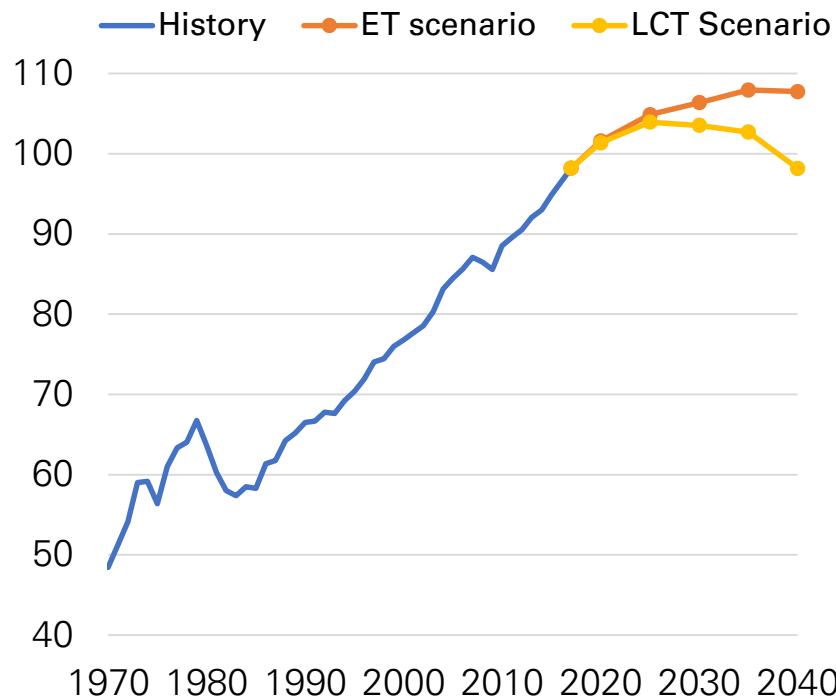
Switching plays key role in shift from ET to RT path



Transport emissions in ET and RT scenarios



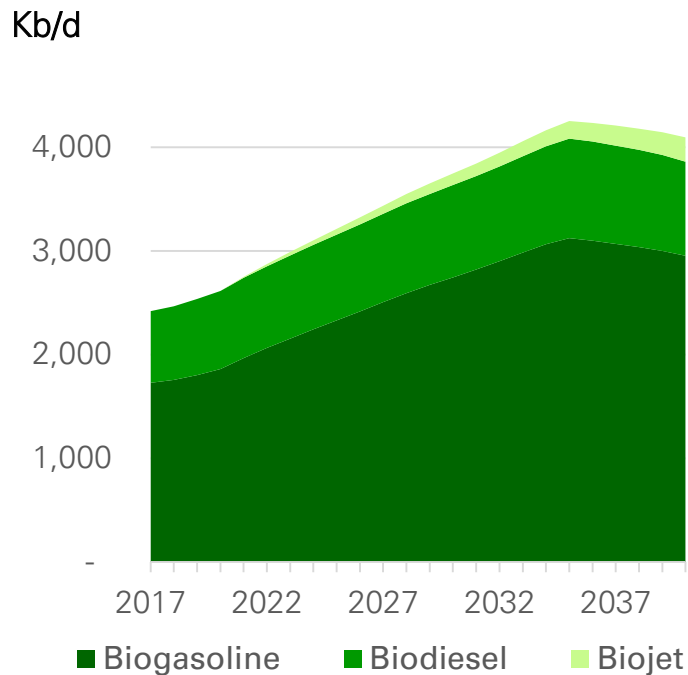
Impact of RT policies on total liquids demand



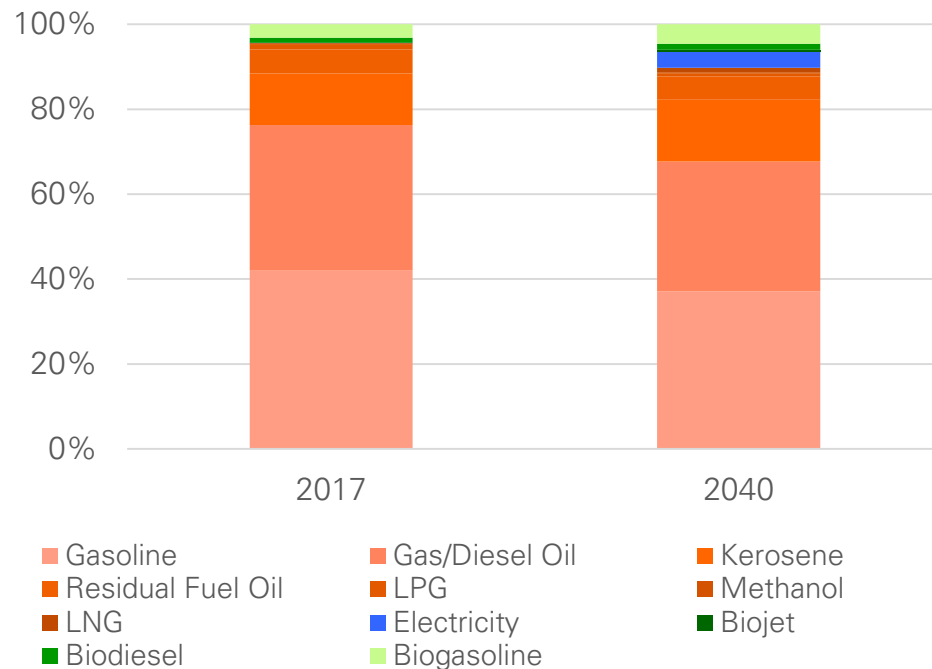
Biofuels in the long term



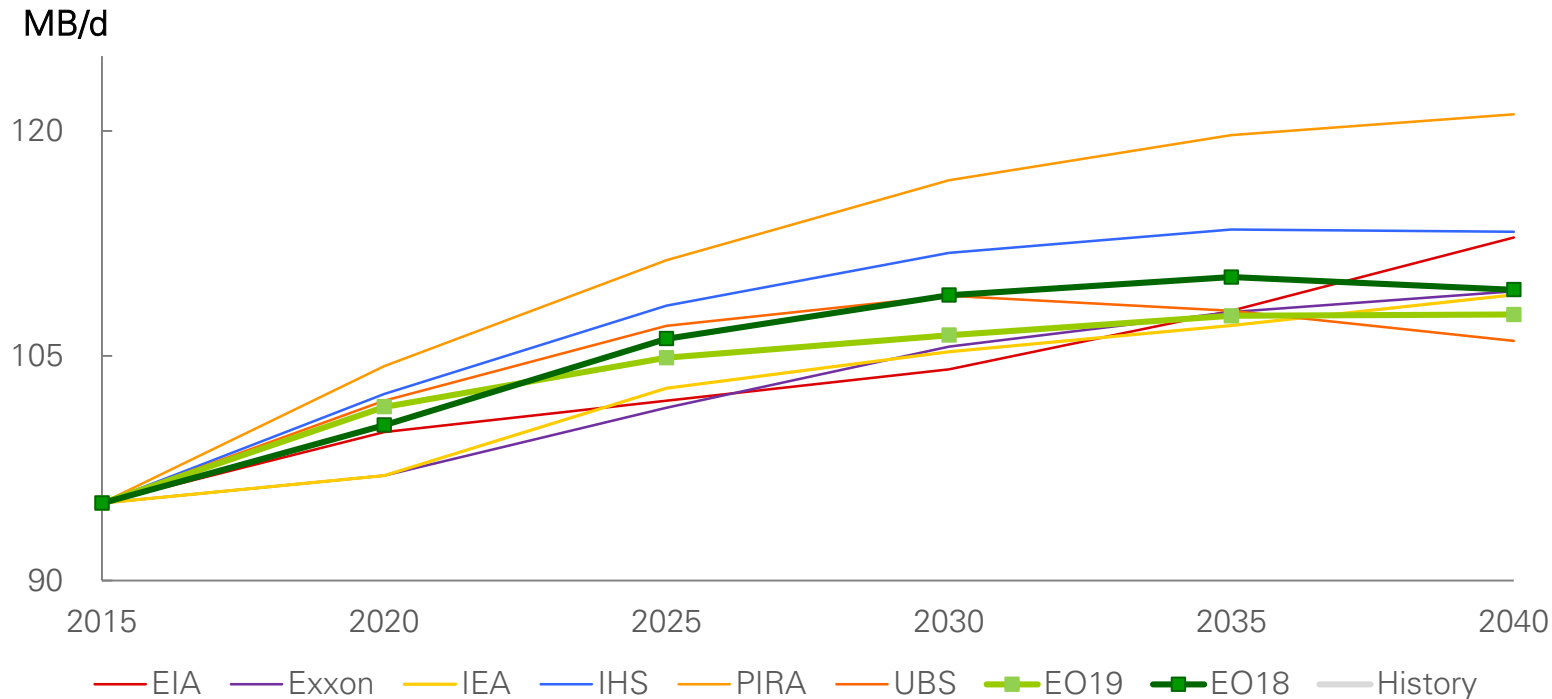
Total biofuels in transport



Share of fuels in transport



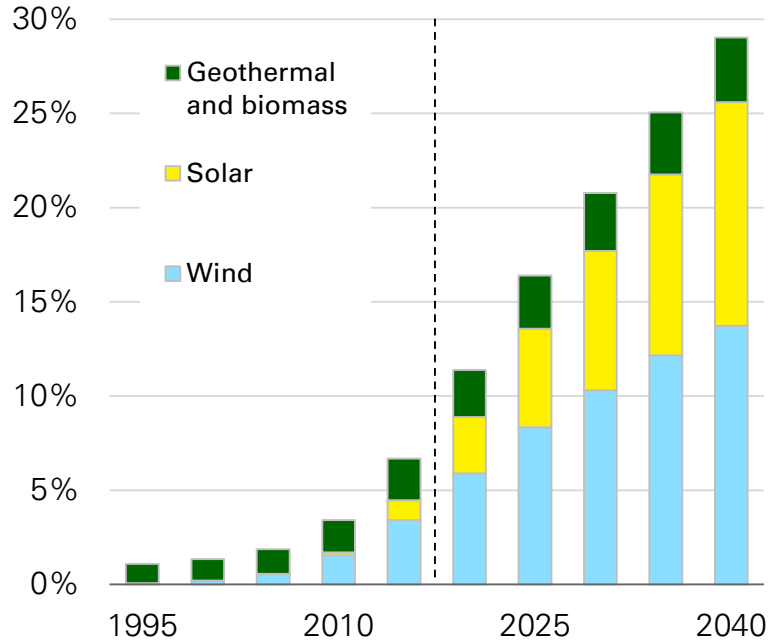
BP Energy Outlook liquids consumption compared to other forecasts



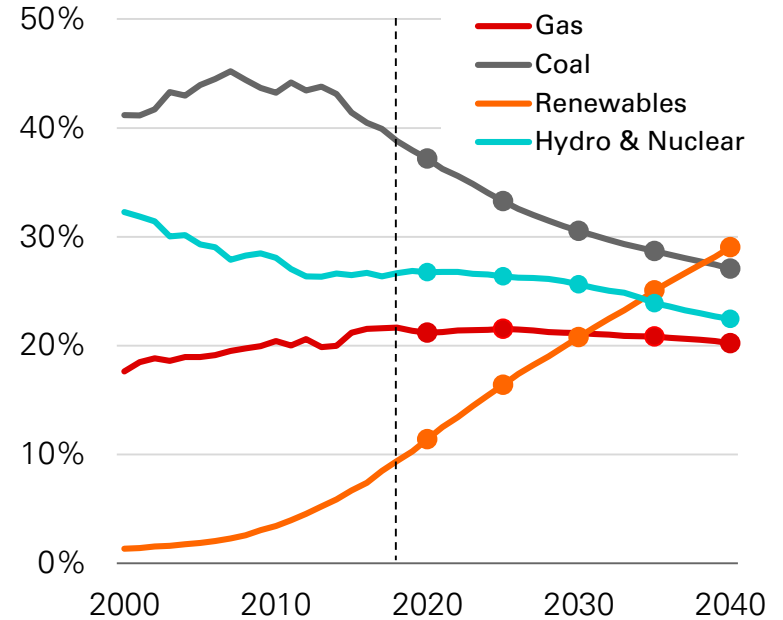
Renewable energy

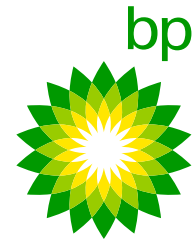


Renewables share of power generation



Fuel shares in power





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