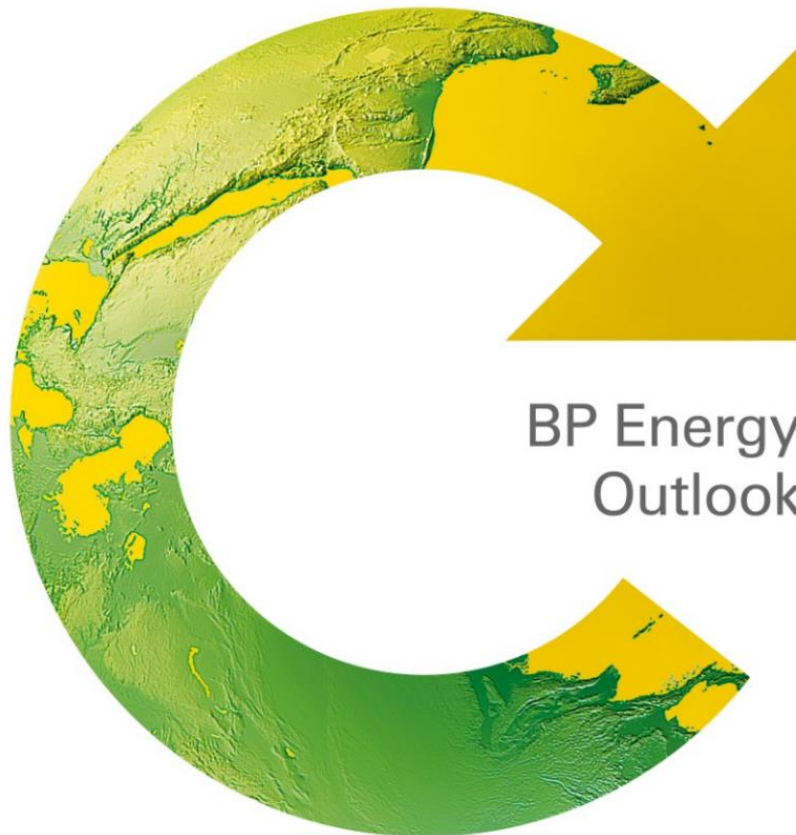


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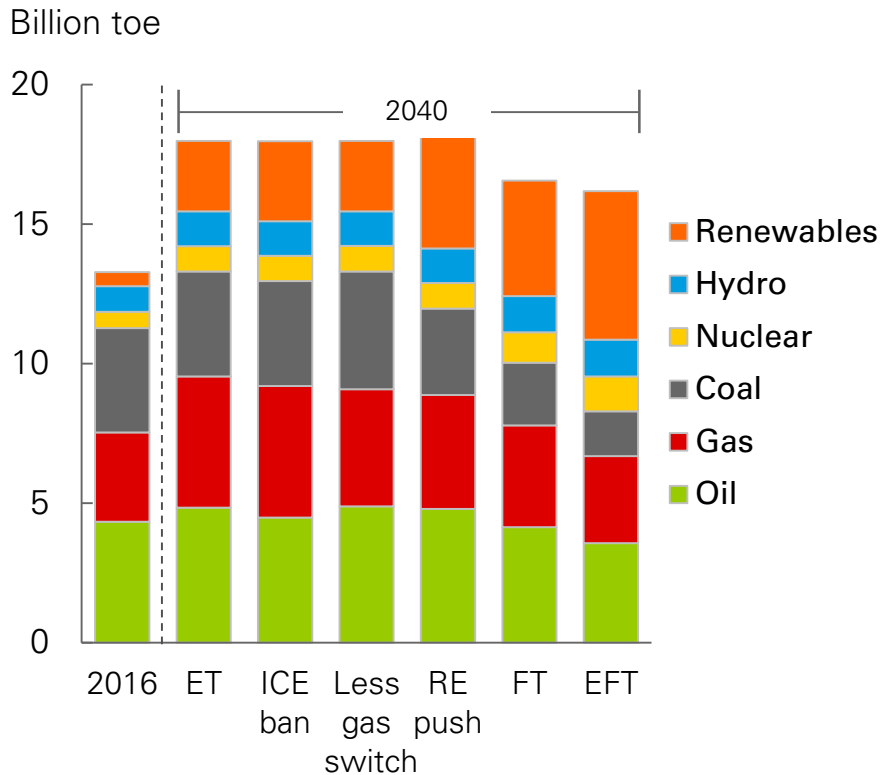
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Spencer Dale
Group chief economist

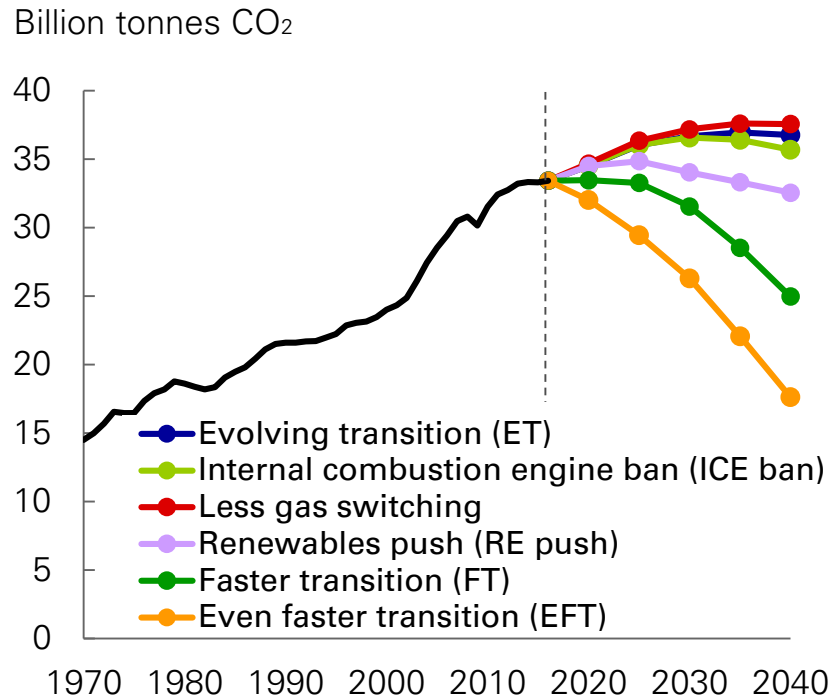
Alternative scenarios



Primary energy consumption by fuel



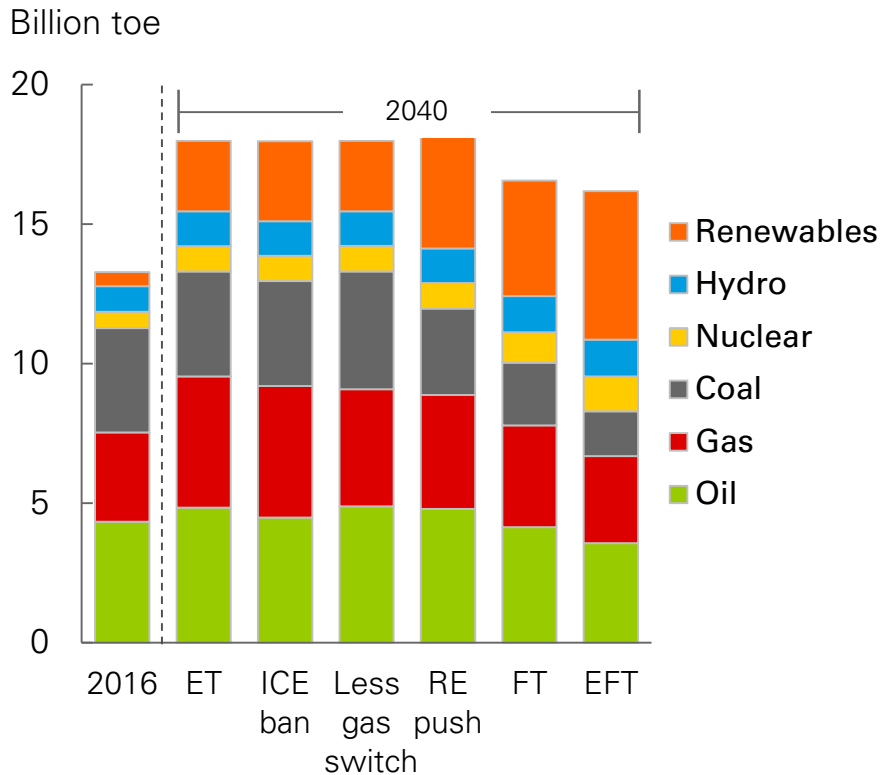
Carbon emissions



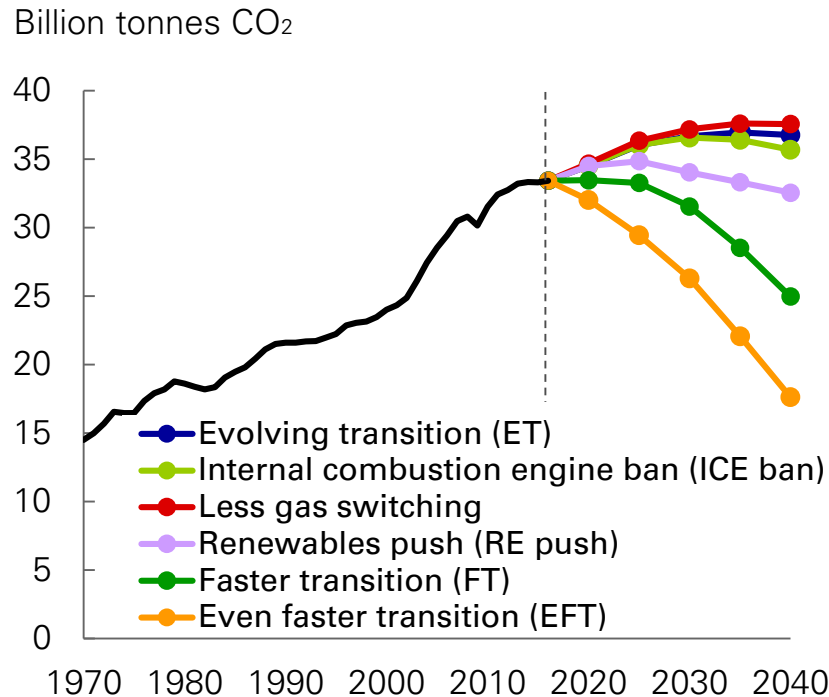
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Primary energy consumption by fuel

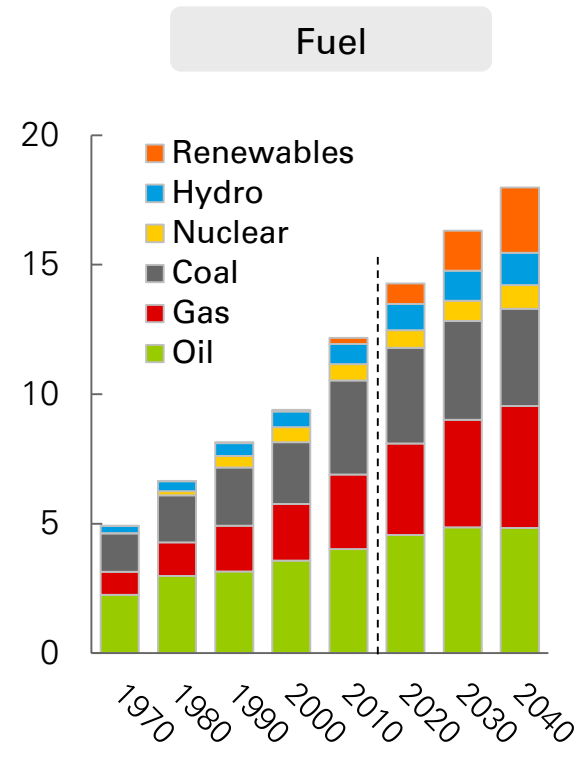
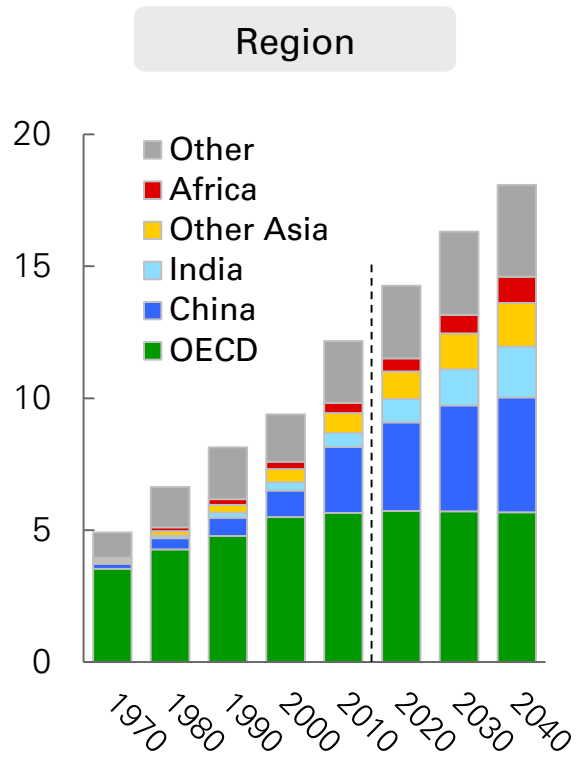
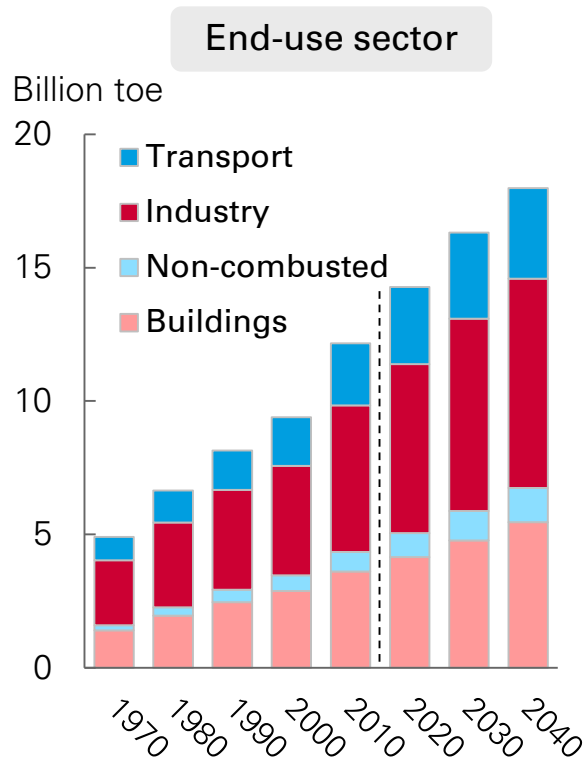


Carbon emissions



Three windows on the energy transition

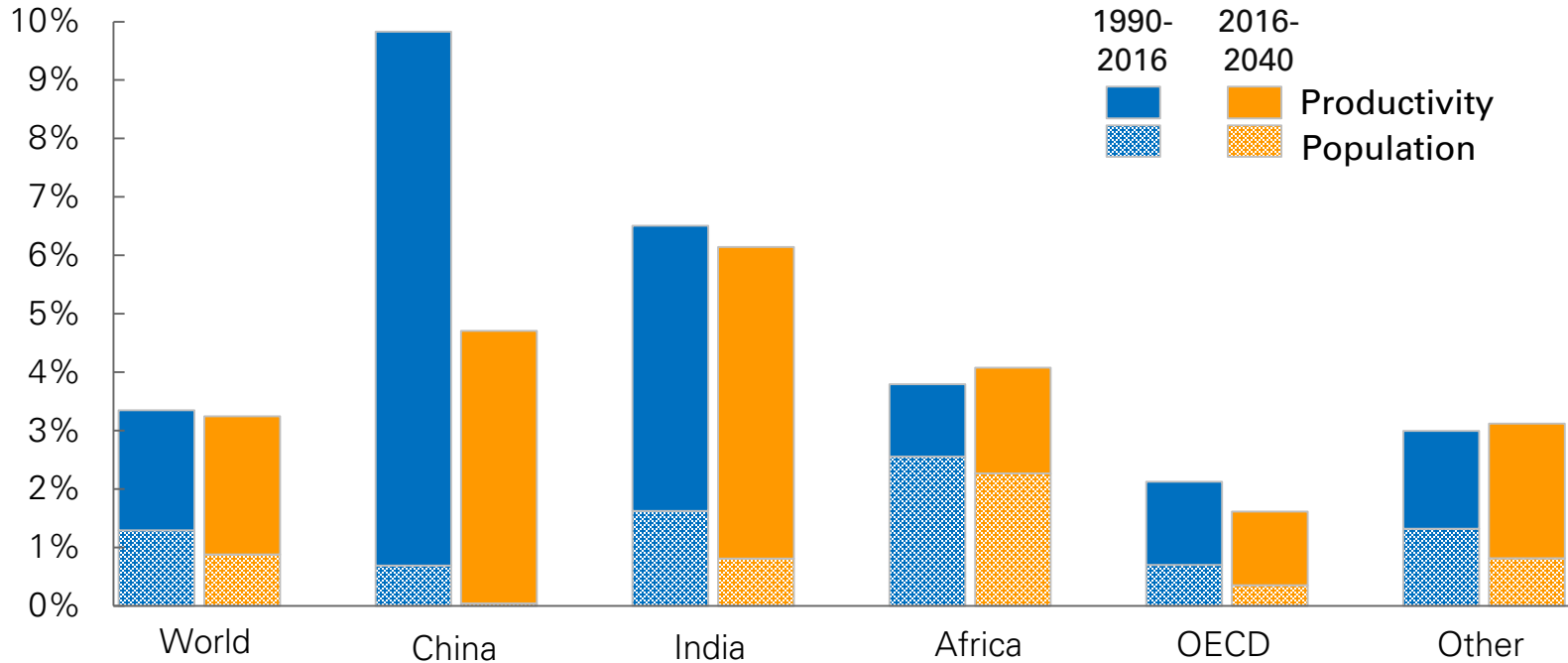
Primary energy demand



Economic backdrop

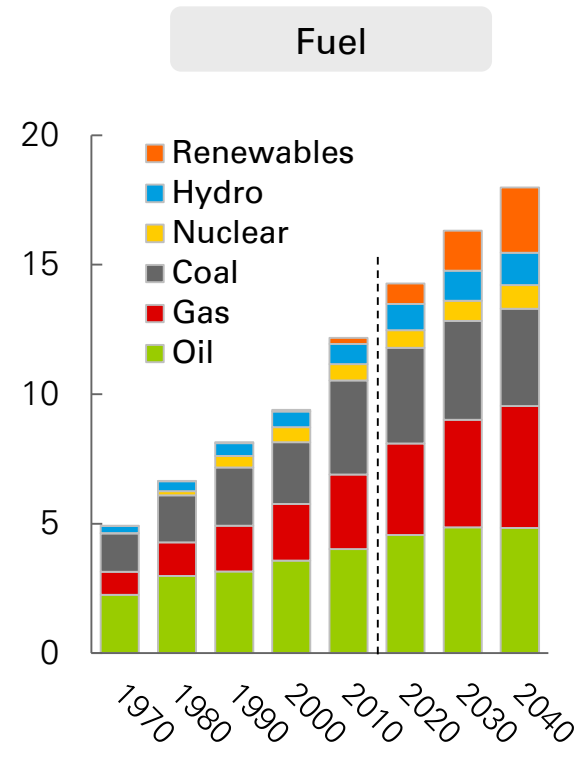
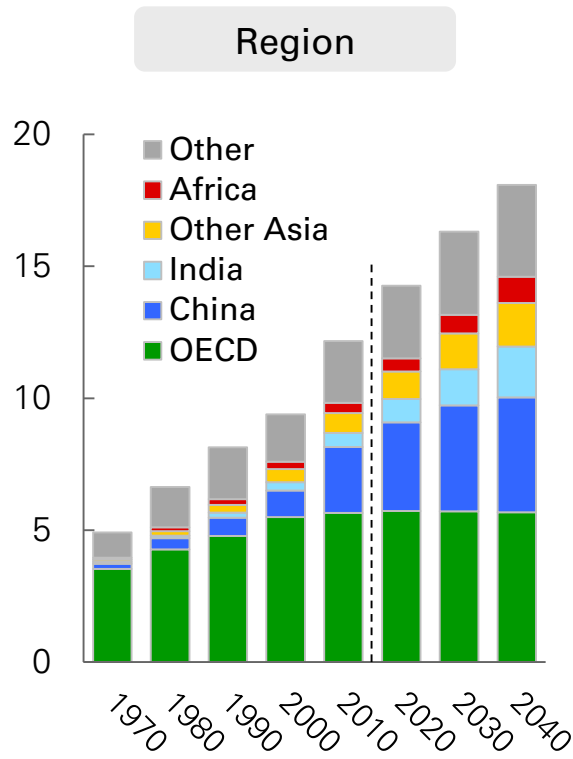
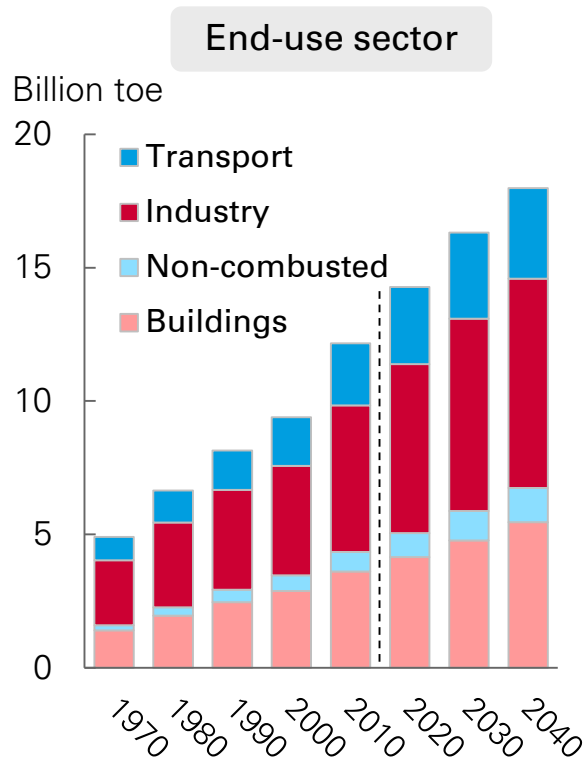
GDP growth by region and factor

% per annum



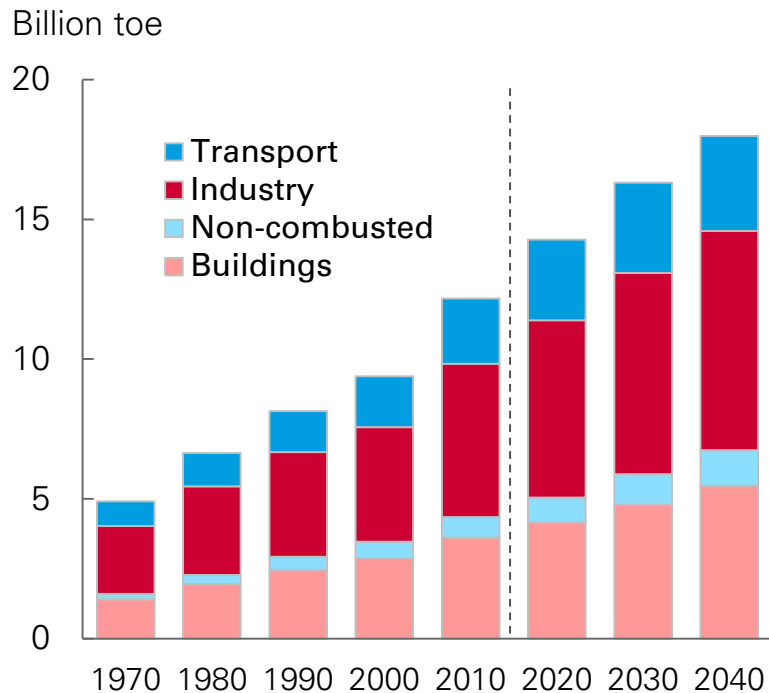
Three windows on the energy transition

Primary energy demand

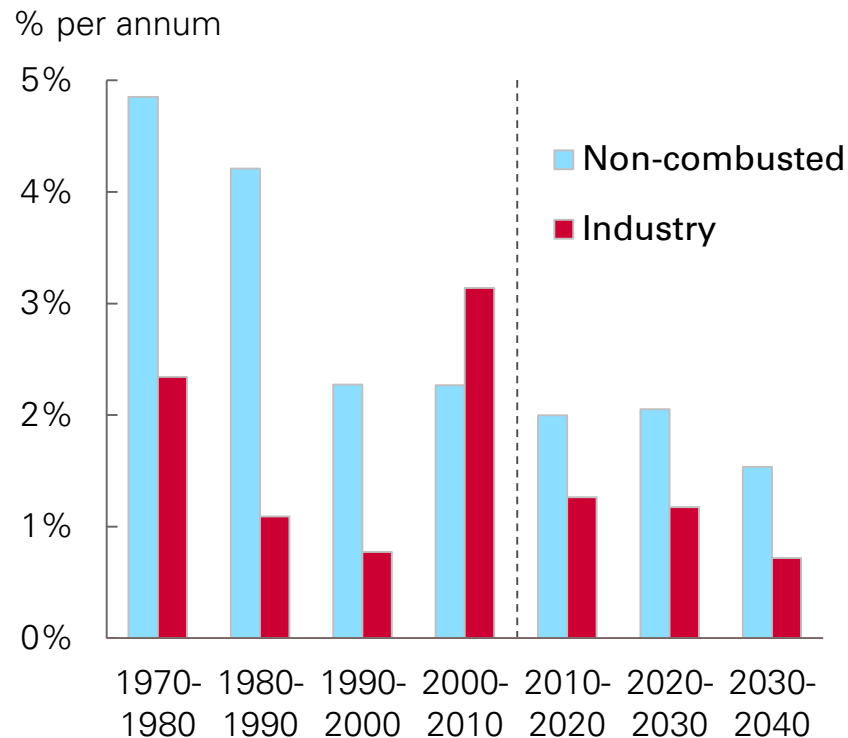


Energy demand by sector

Primary energy consumption by end use sector

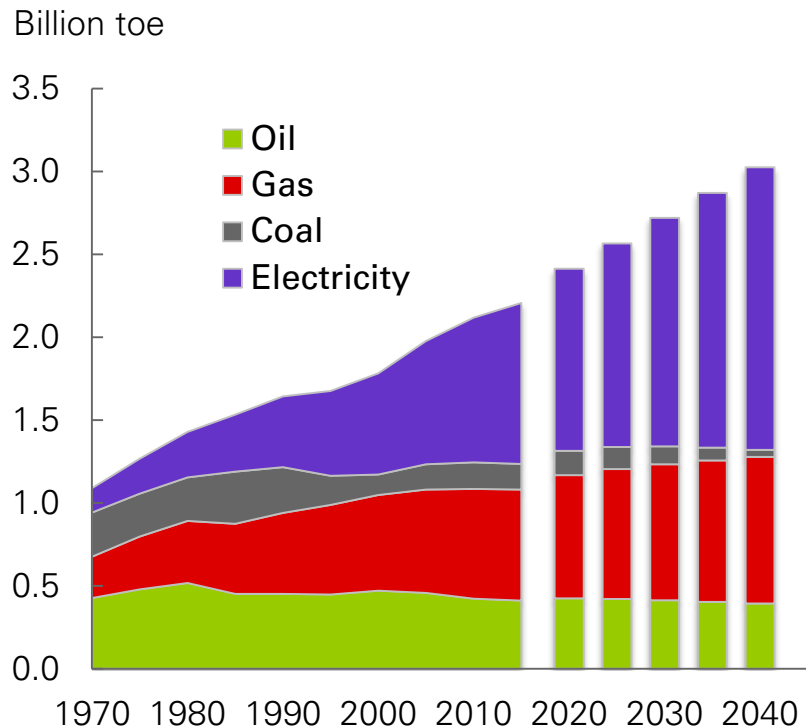


Final energy consumption growth: non-combusted versus industry



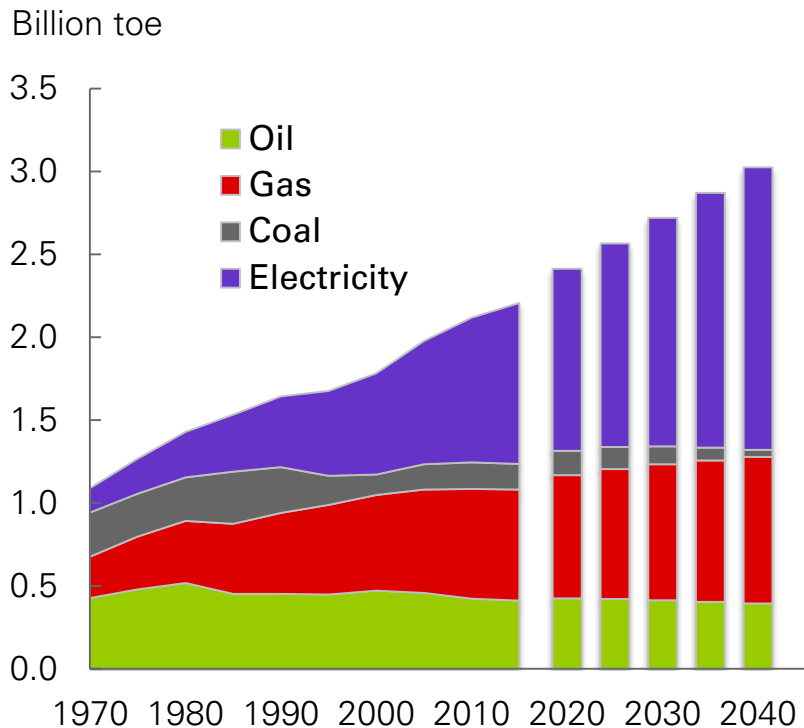
Energy demand in buildings

Final energy consumption in buildings
by fuel type

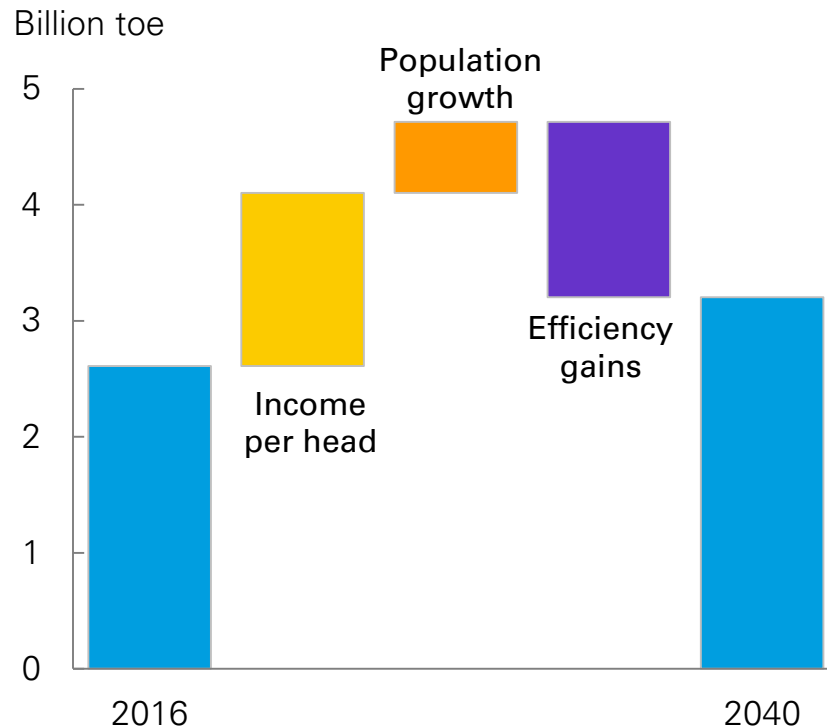


Energy demand in buildings and transport sector

Final energy consumption in buildings by fuel type

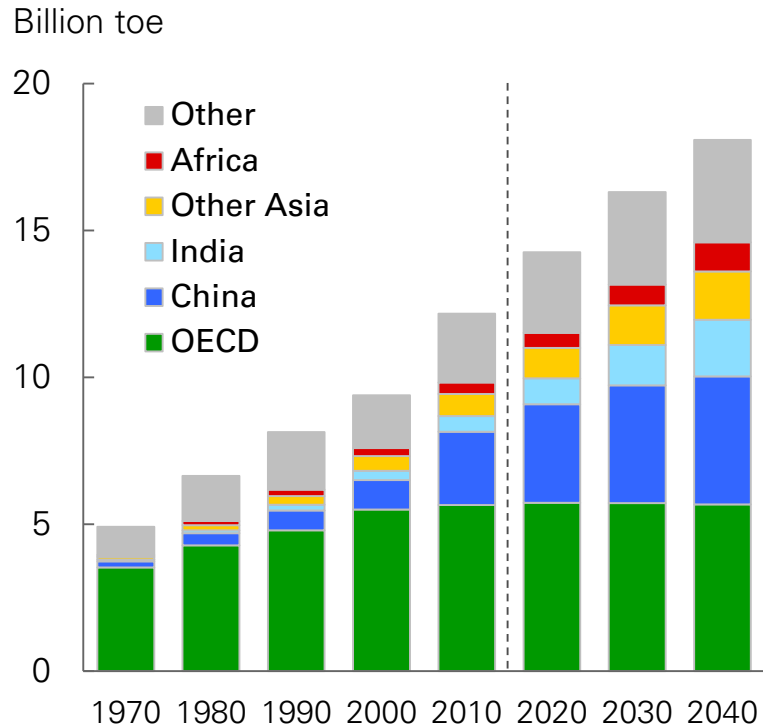


Contributions to transport energy consumption growth

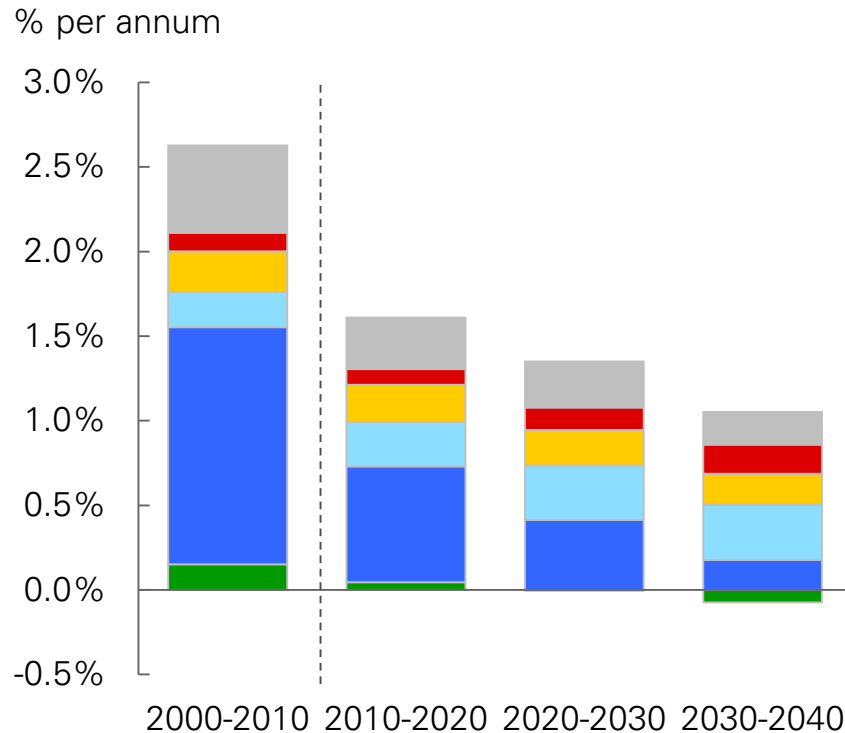


Regional energy demand

Primary energy consumption by region



Primary energy growth and regional contributions

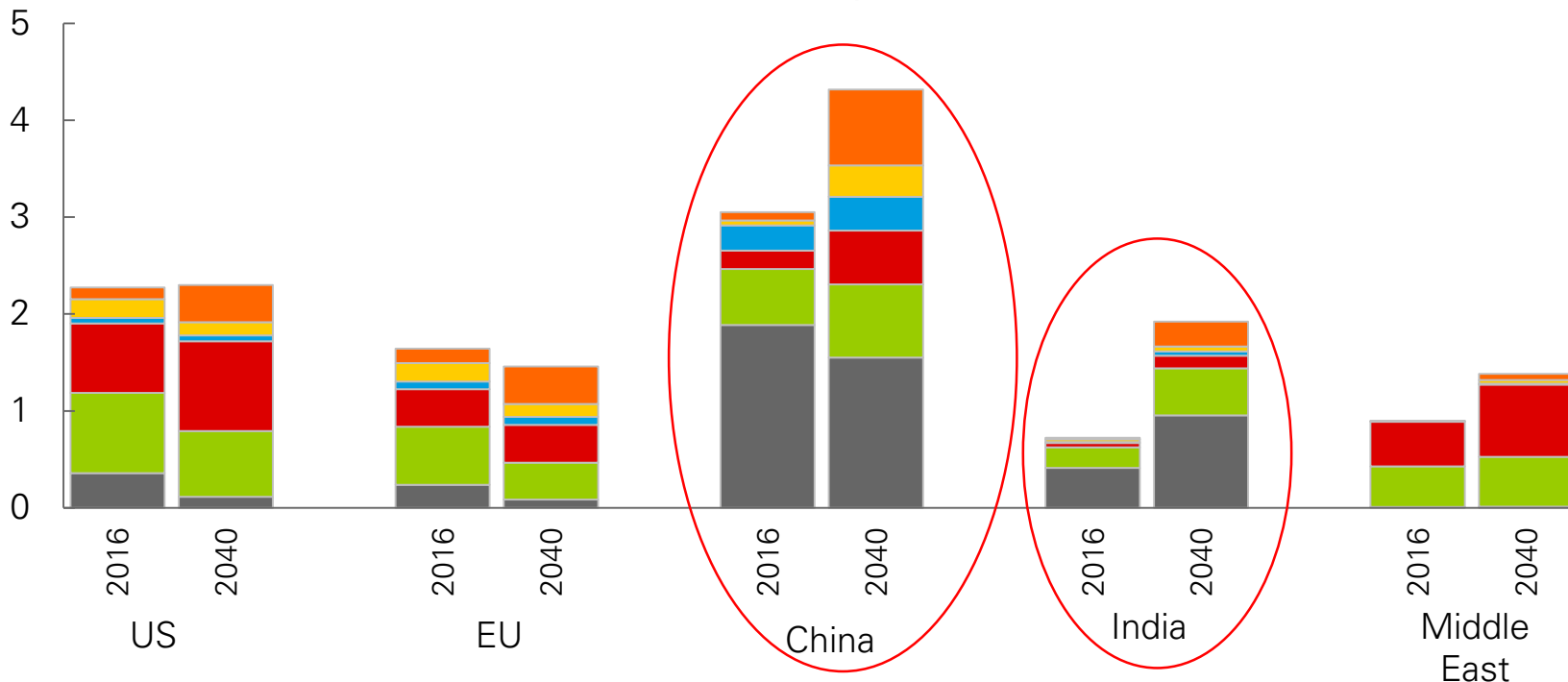


Differences in the fuel mix across regions

Primary energy demand by fuel and region

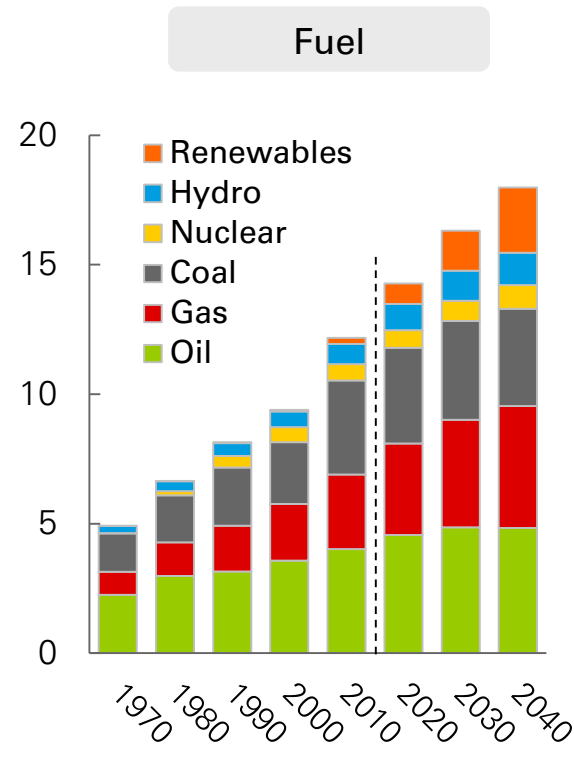
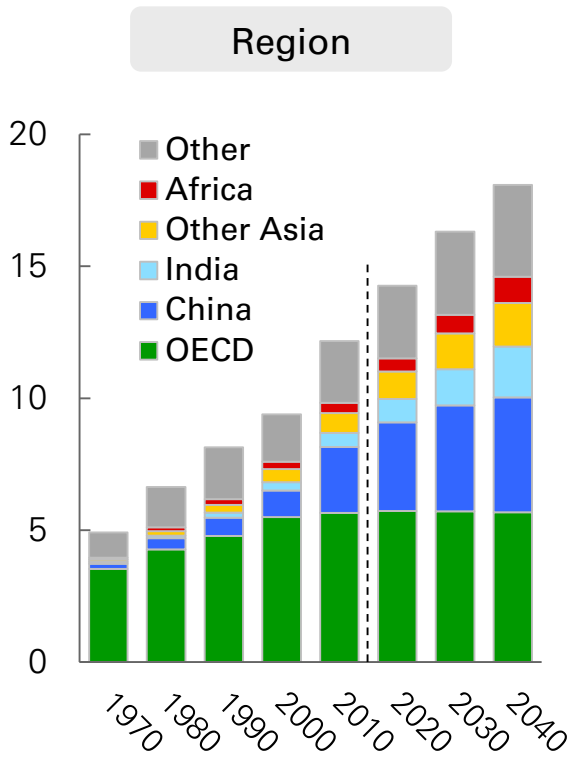
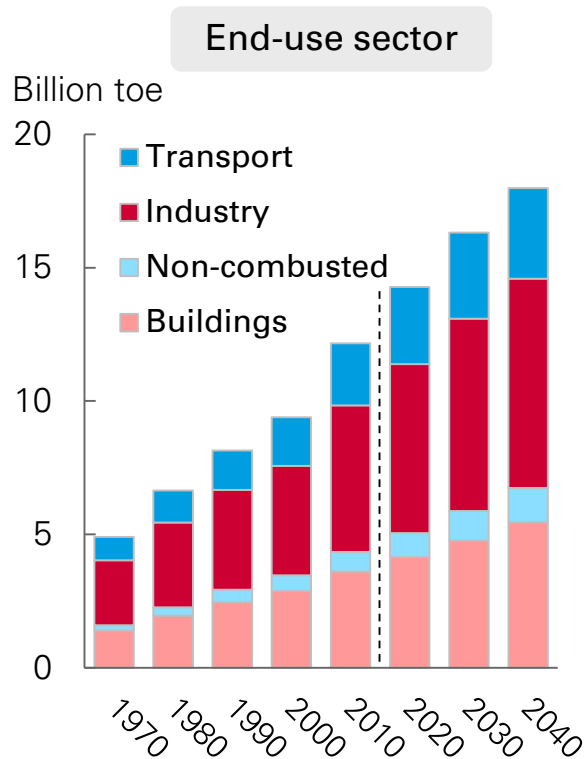
Billion toe

Coal
 Oil
 Gas
 Hydro
 Nuclear
 Renewables



Three windows on the energy transition

Primary energy demand

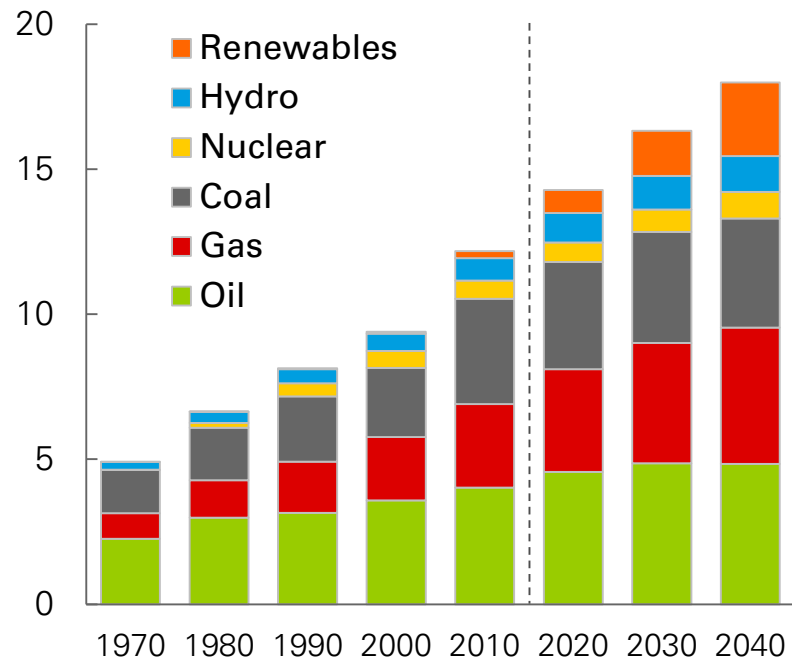


Global energy by fuel

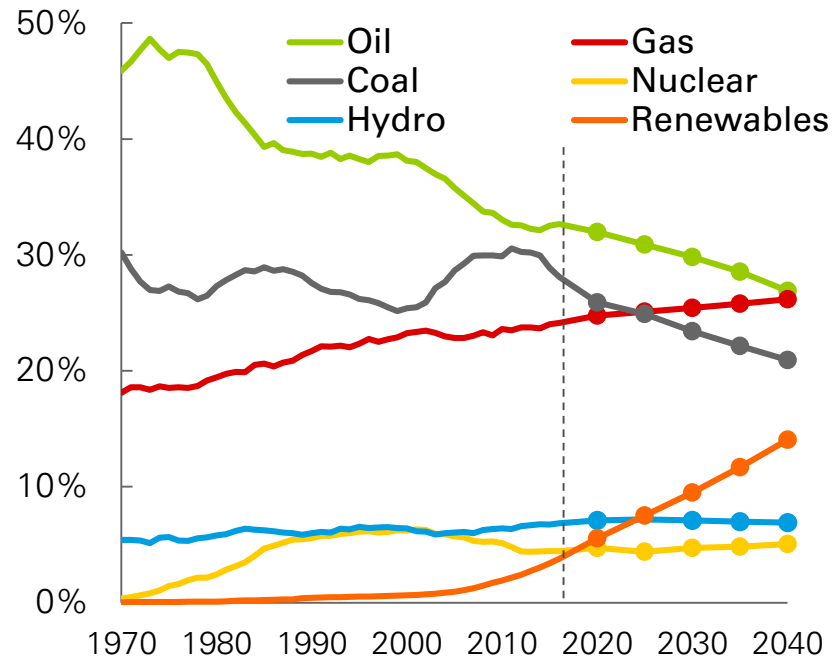


Primary energy consumption by fuel

Billion toe

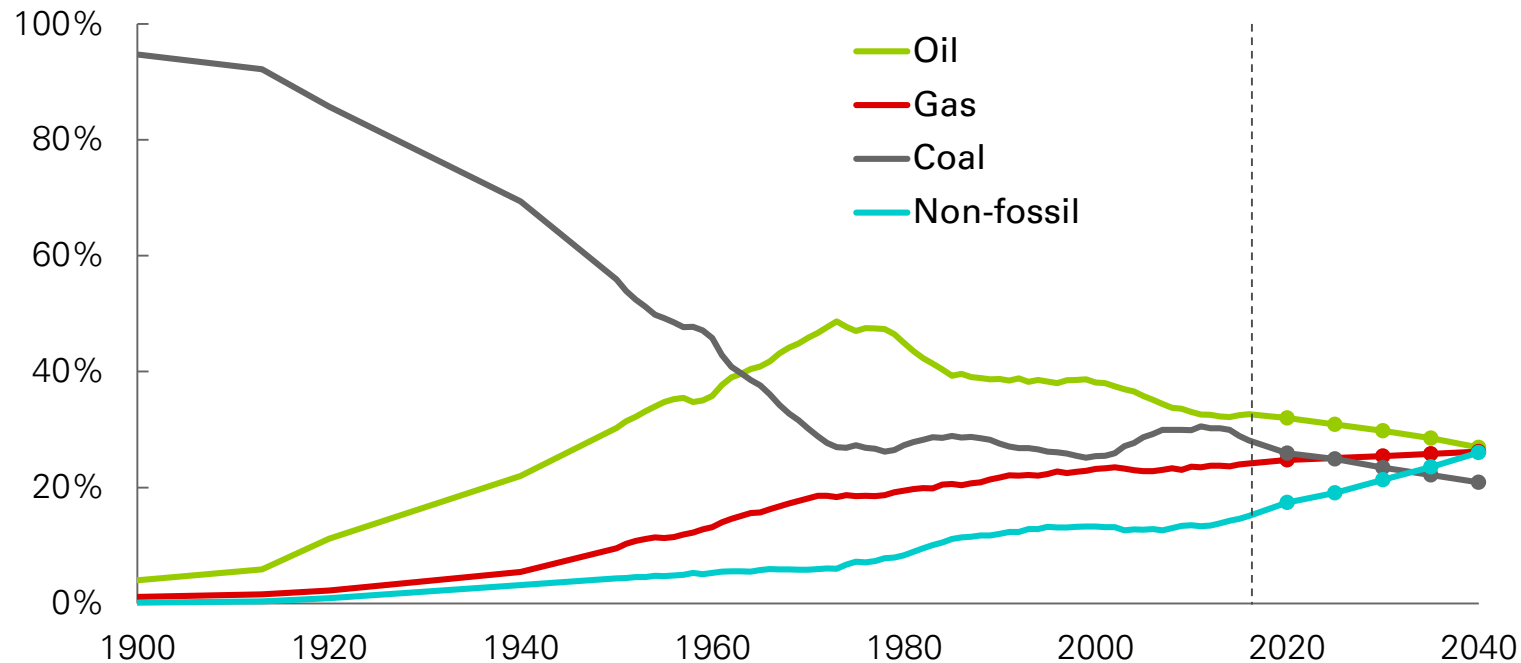


Shares of primary energy



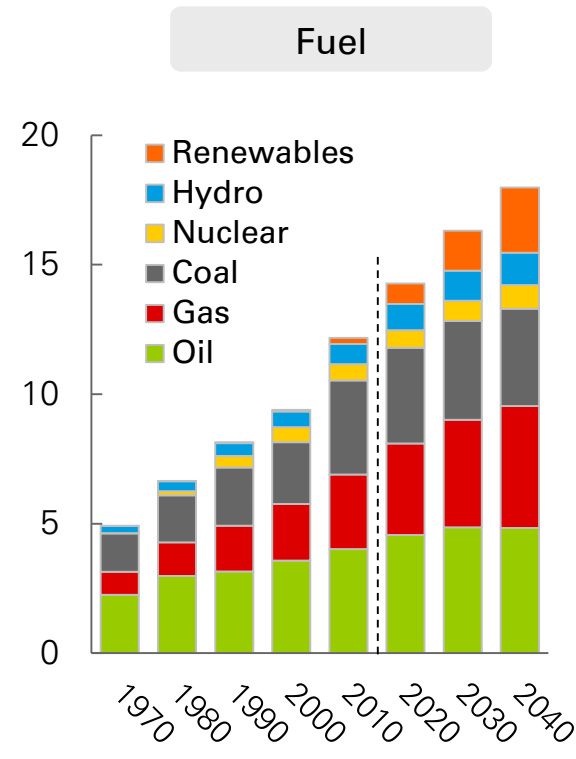
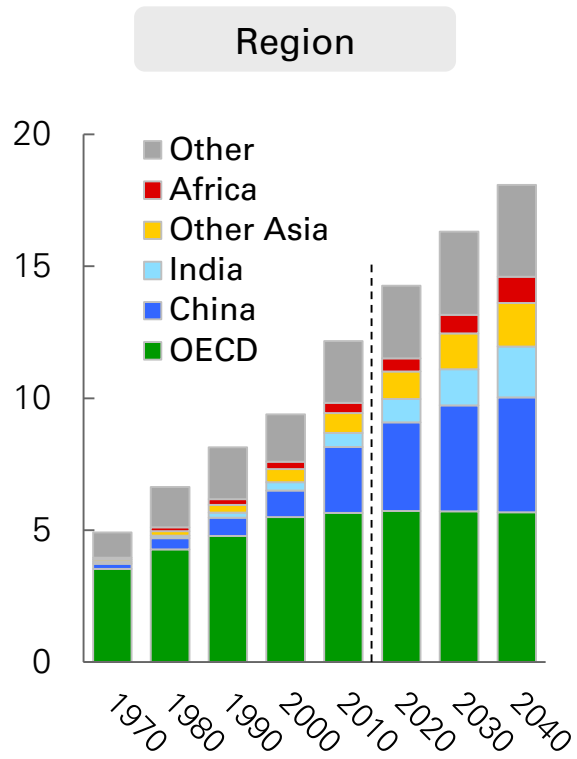
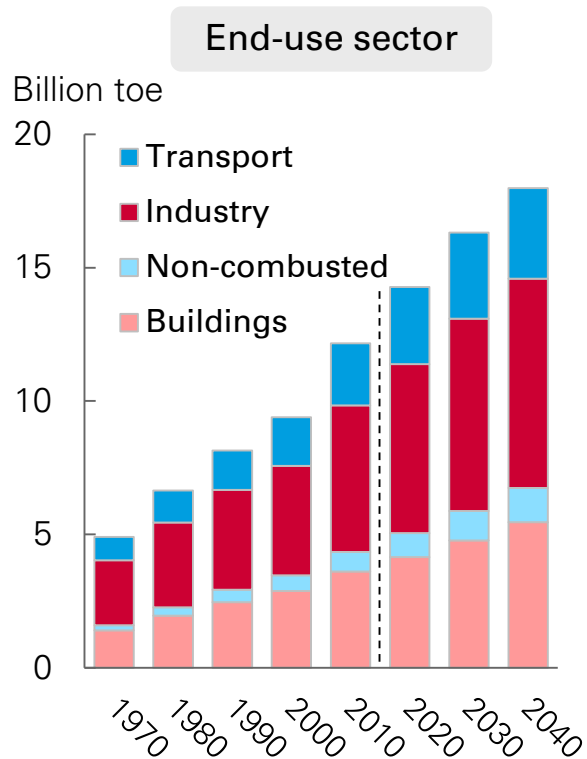
Diversified fuel mix

Shares of primary energy



Three windows on the energy transition

Primary energy demand



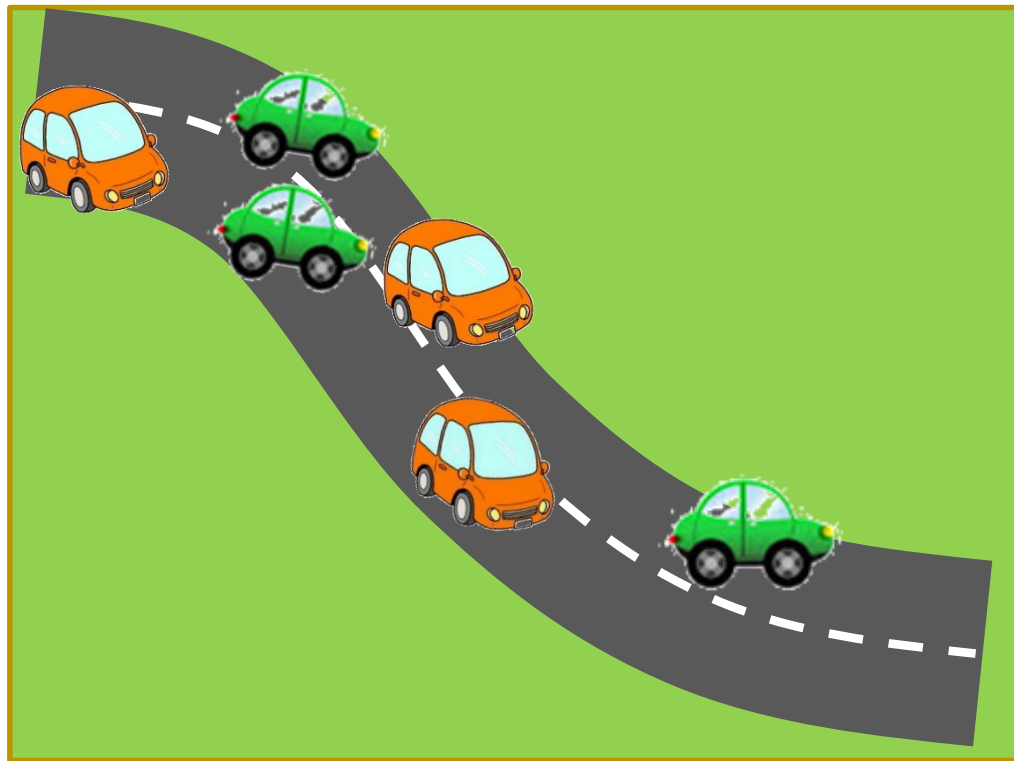
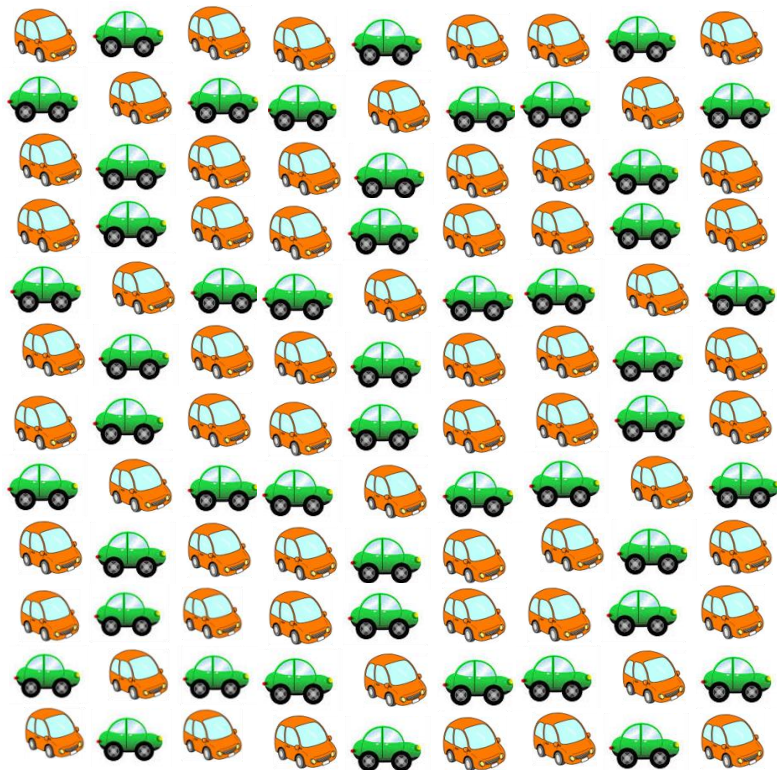
Five key questions

- What have we learnt about electric cars and the mobility revolution?
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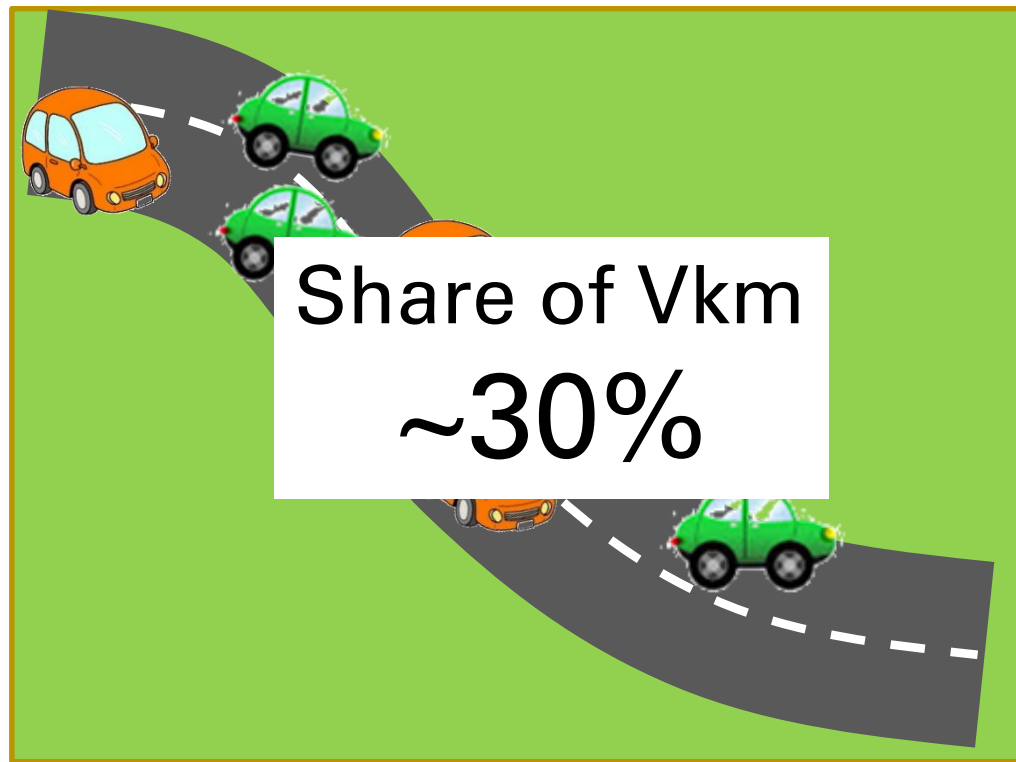
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Penetration of electric cars in 2040



Penetration of electric cars in 2040

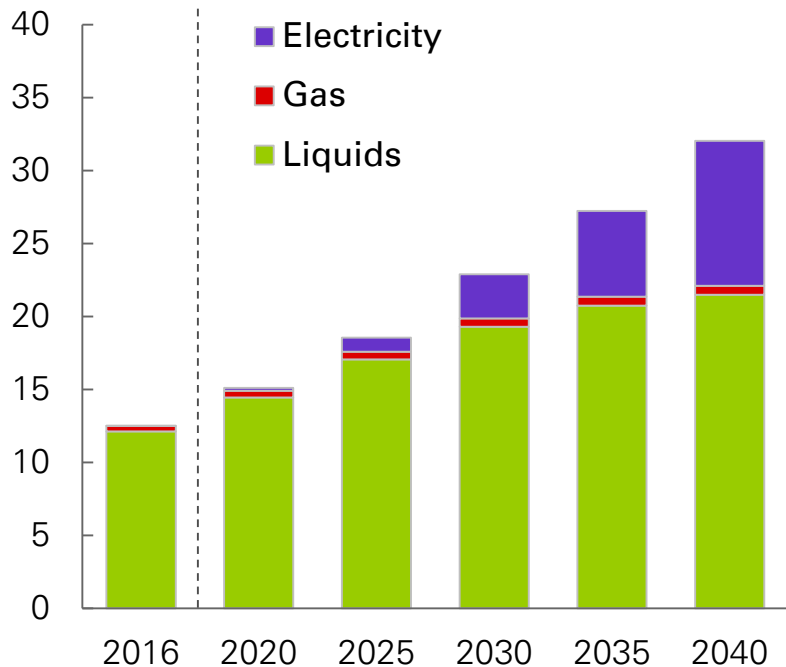




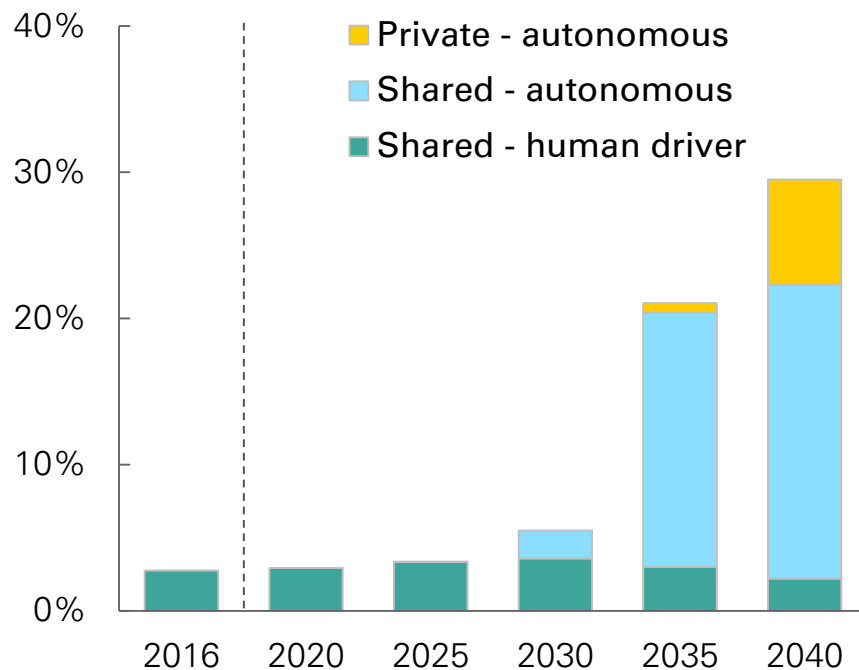
Electric cars, shared mobility and autonomy

Car kilometres by fuel type

Trillion km

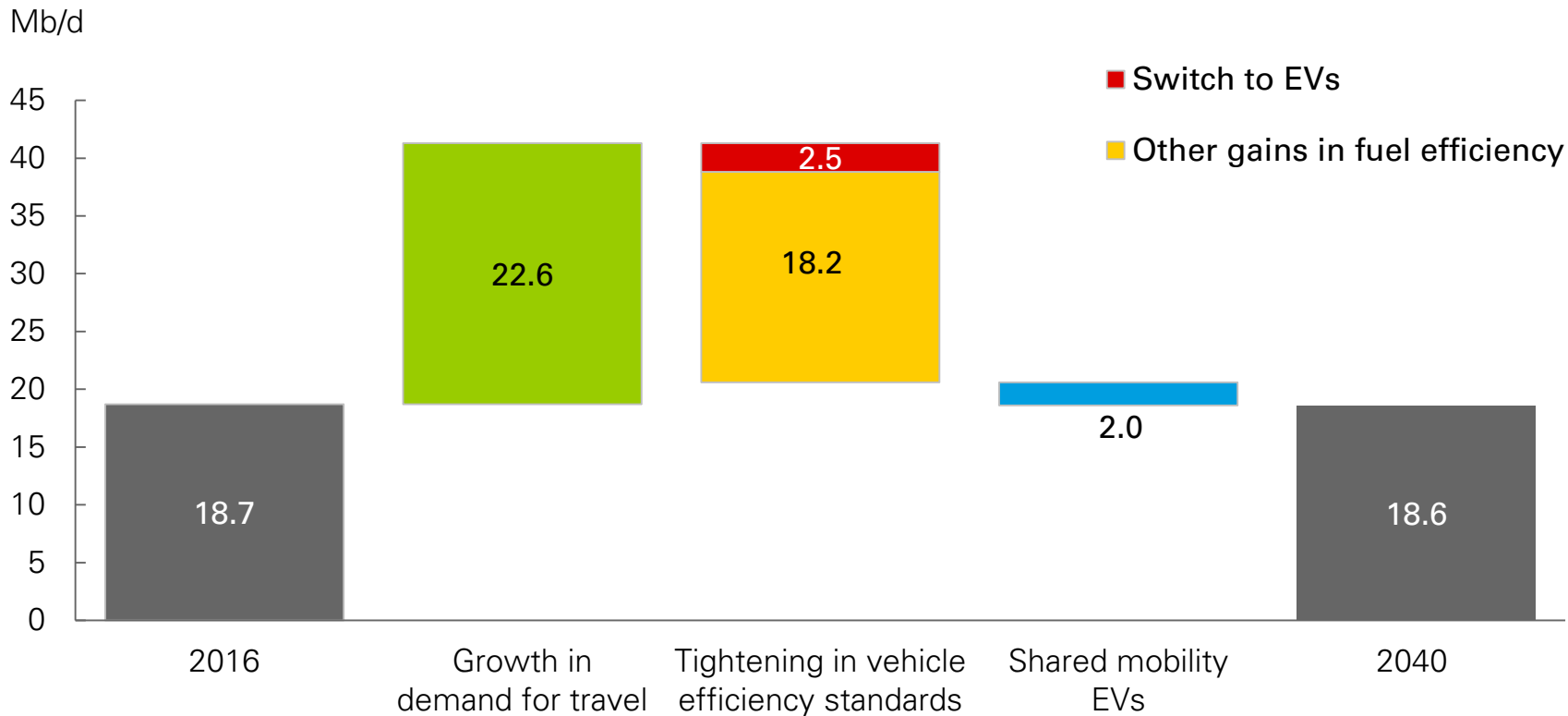


New mobility share of Vkm



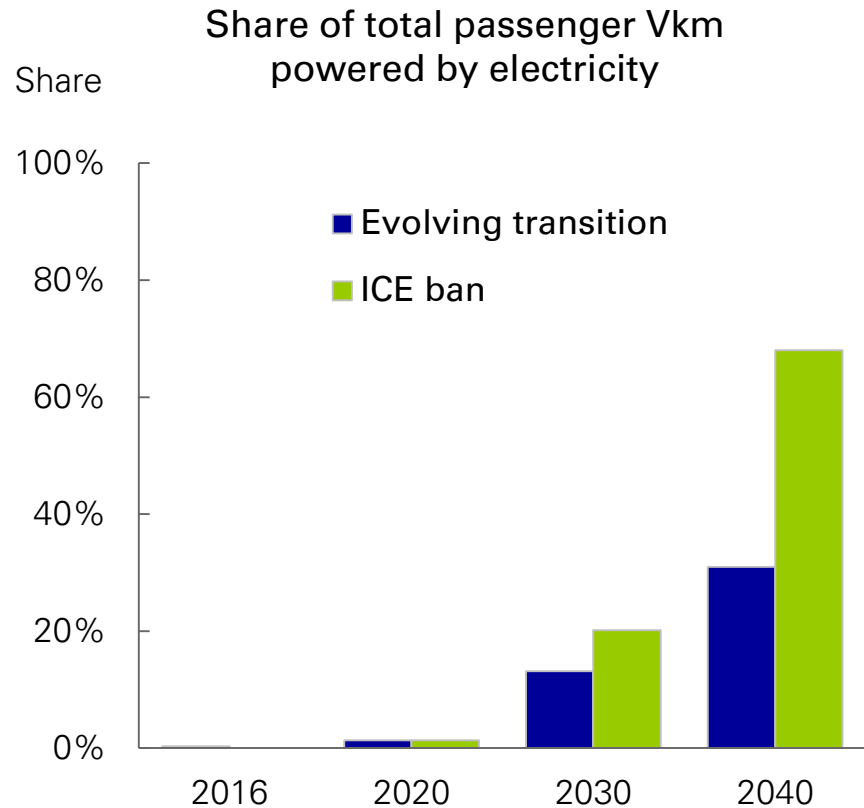
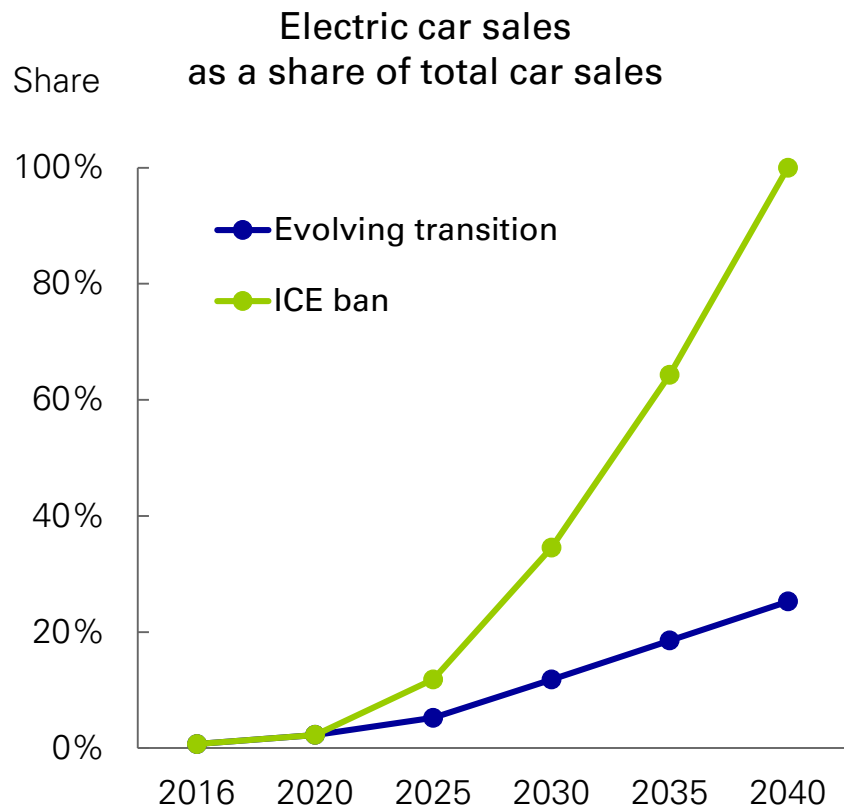
Liquid fuel demand from passenger cars

Changes in liquids demand from cars: 2016-2040



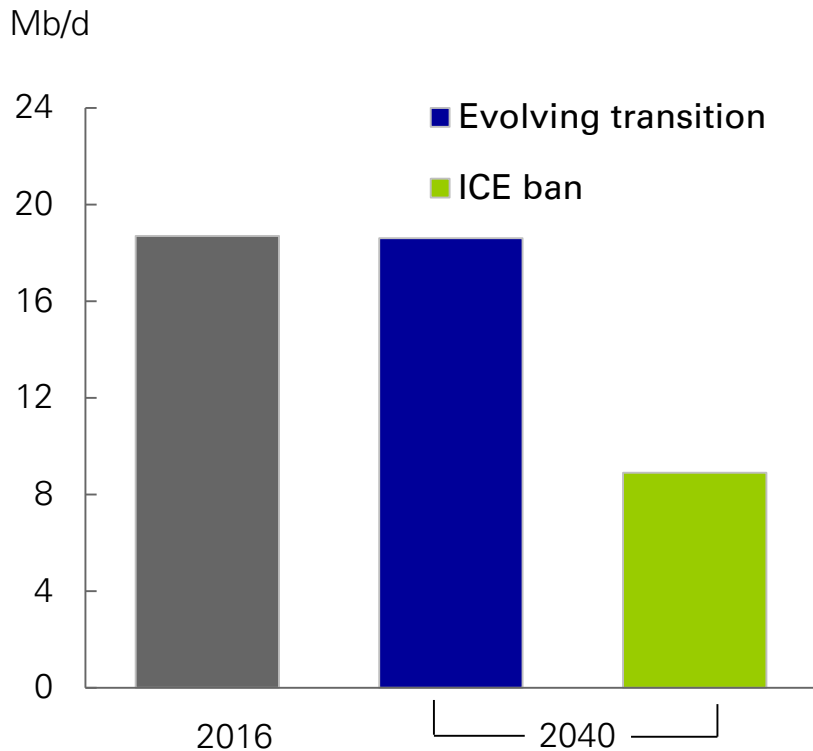


Global ban on internal-combustion engine (ICE) cars

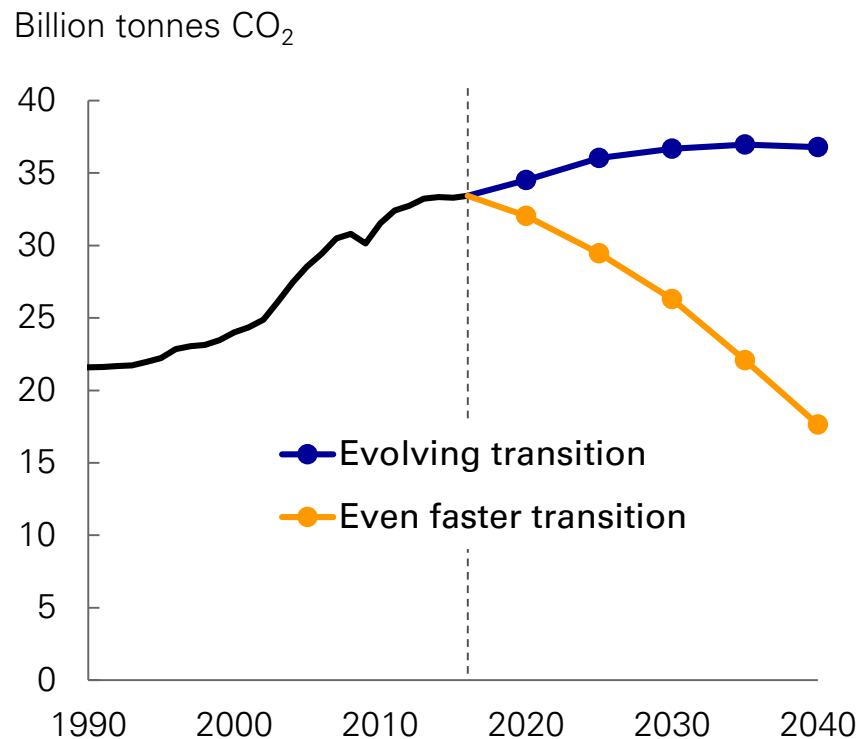


Impact of ICE ban

Passenger cars liquids demand

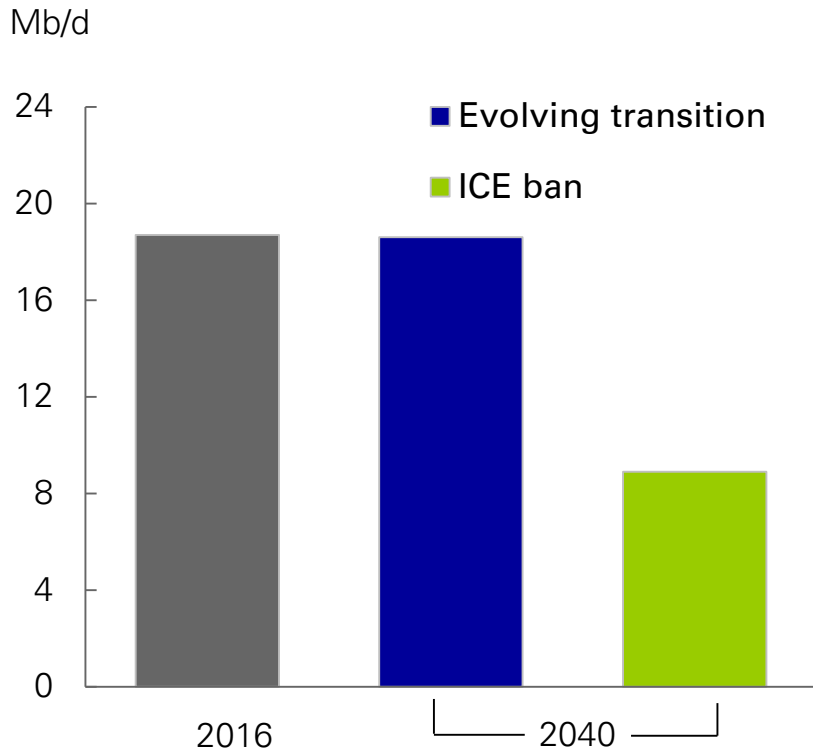


Carbon emissions from energy

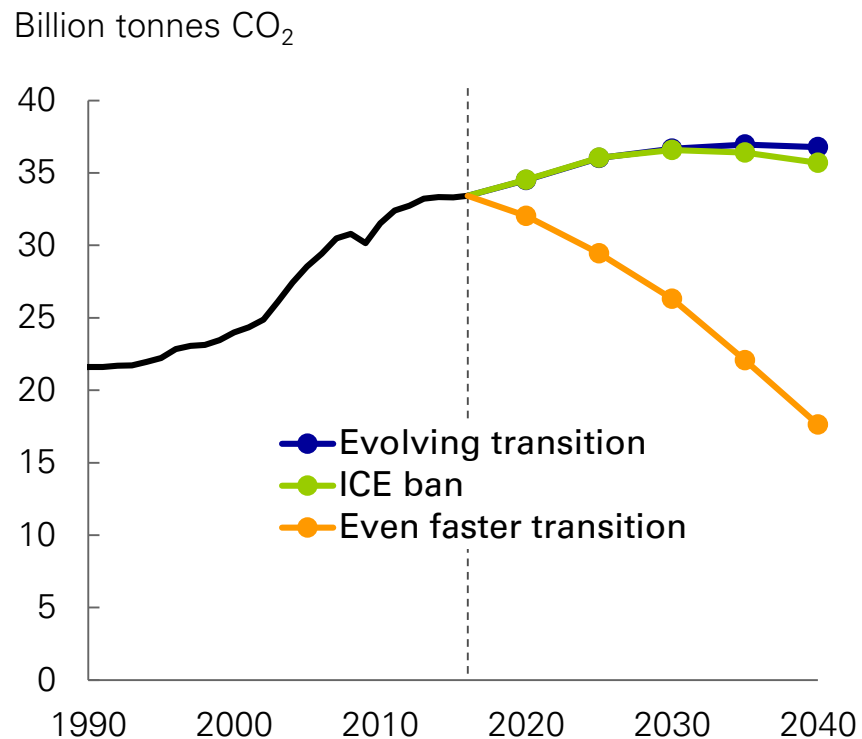


Impact of ICE ban

Passenger cars liquids demand



Carbon emissions from energy

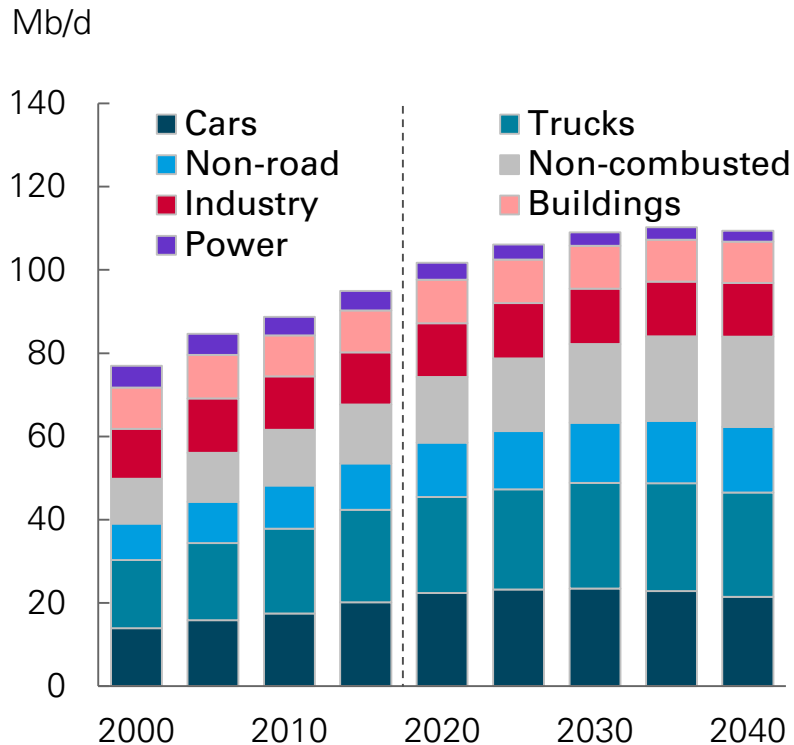


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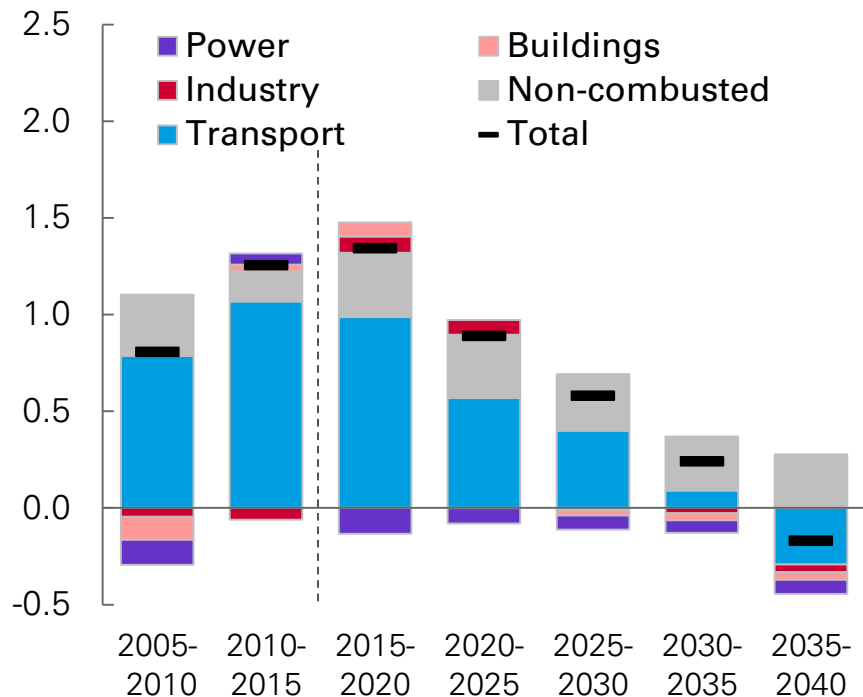
Demand for oil and other liquid fuels

Liquids demand



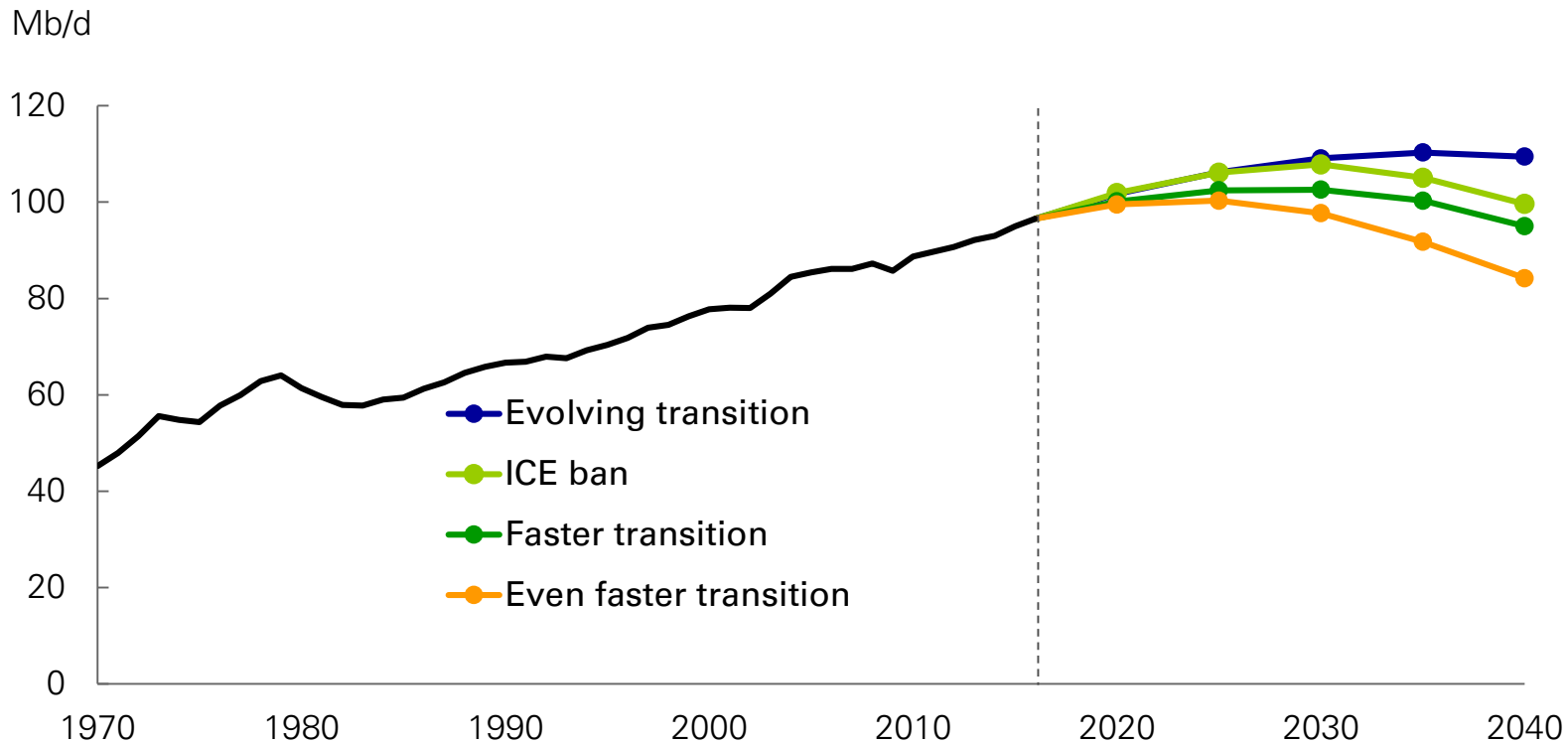
Liquids demand growth

Mb/d, average annual growth



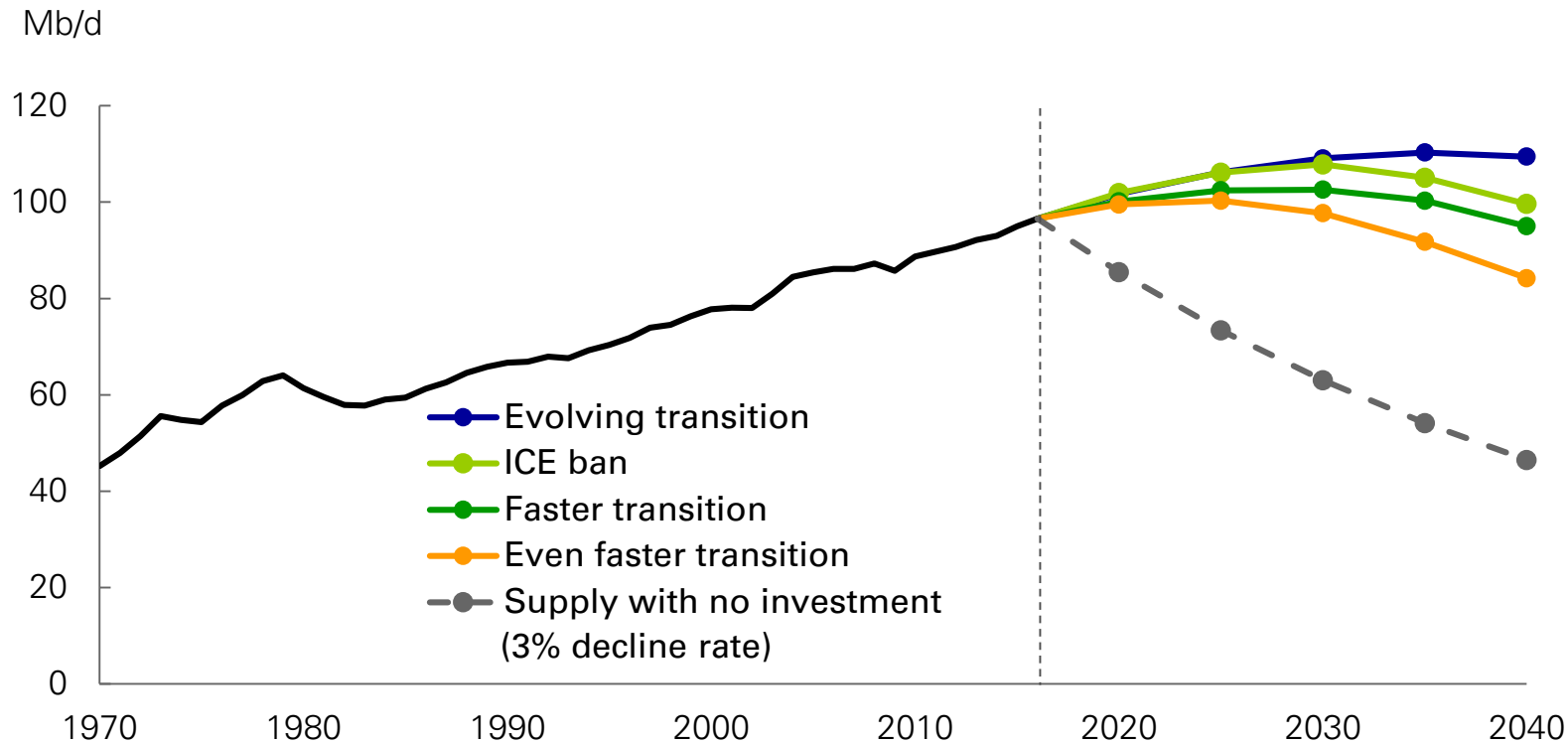
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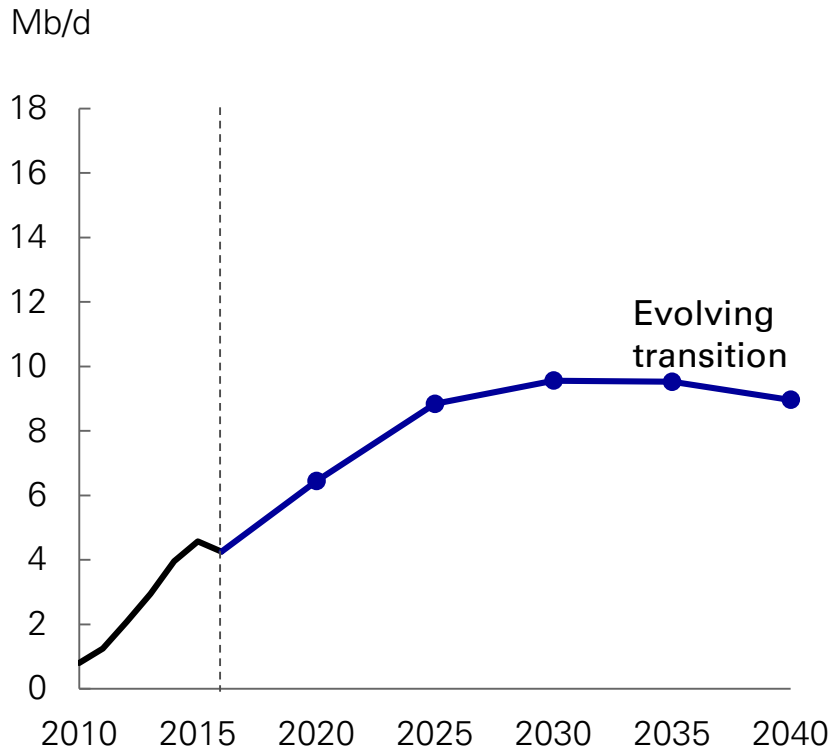
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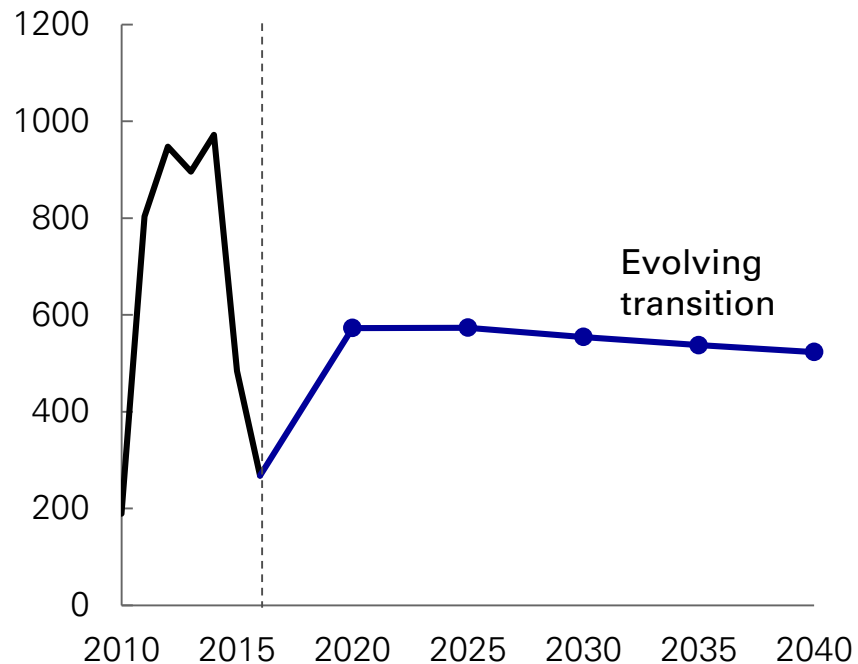


US tight oil: alternative scenarios

US tight oil production



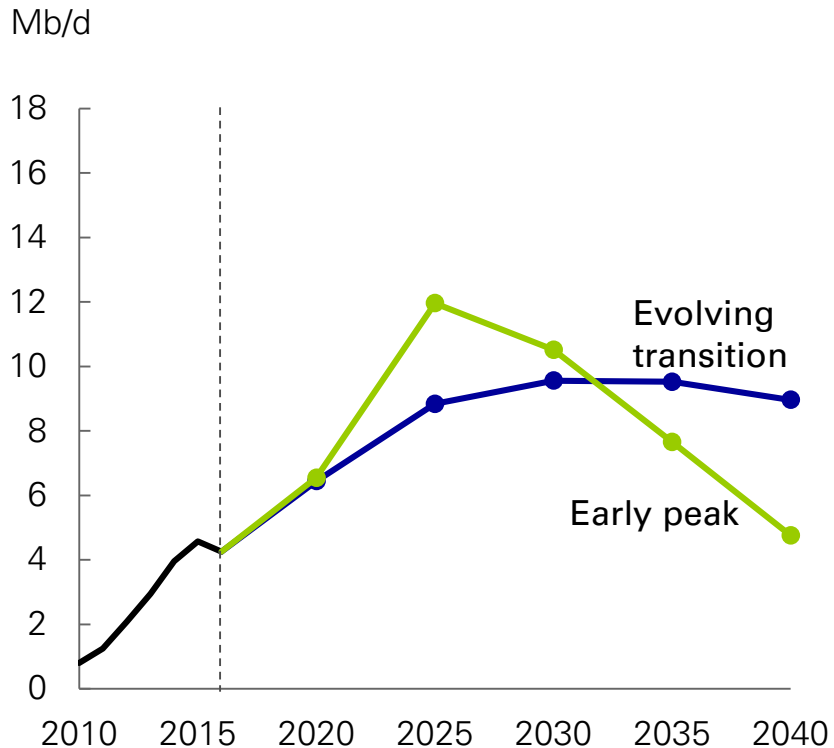
Number of US oil rigs (in the four main producing regions*)



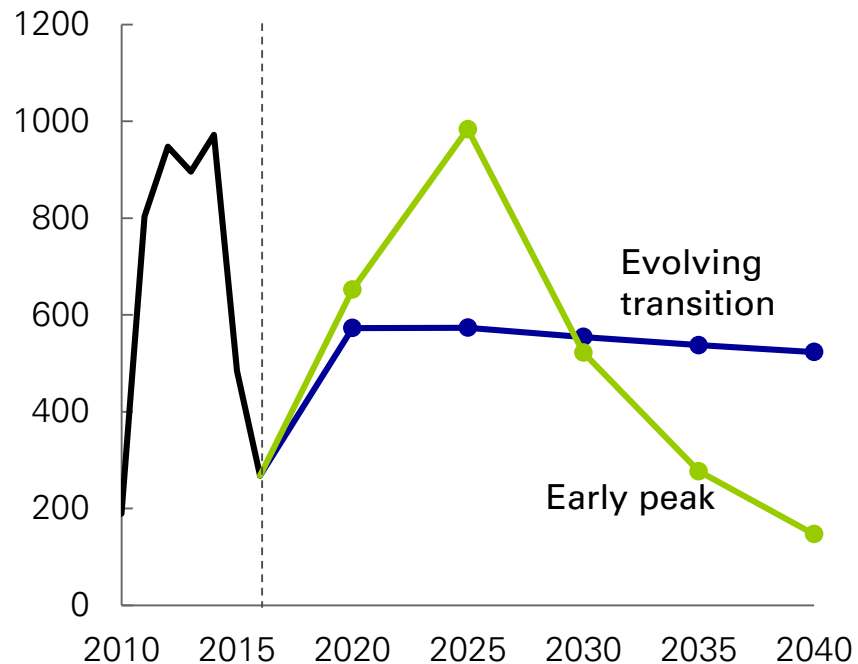
*Permian, Eagle Ford, Bakken and Niobrara

US tight oil: alternative scenarios

US tight oil production



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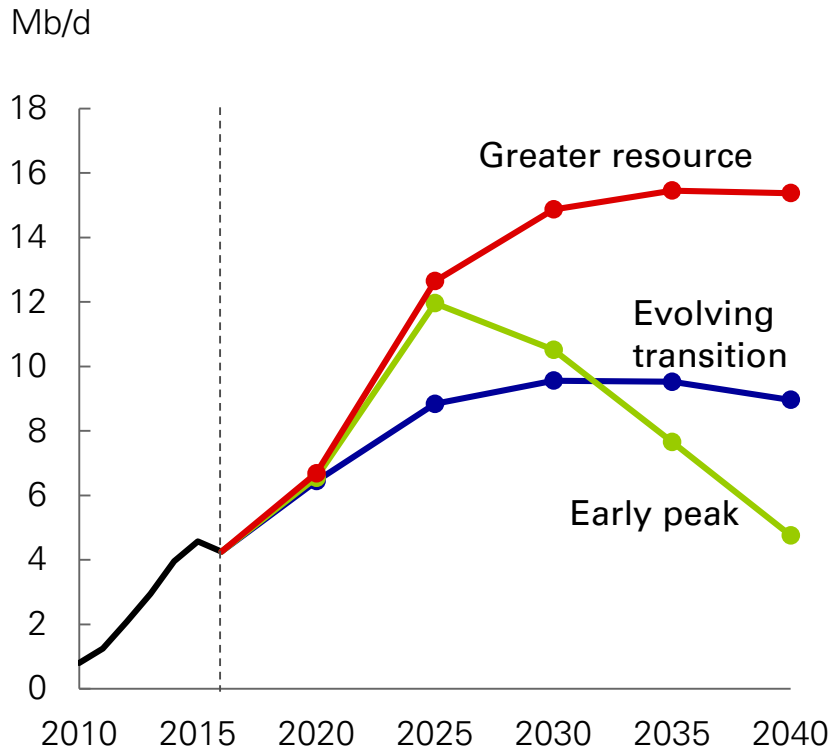


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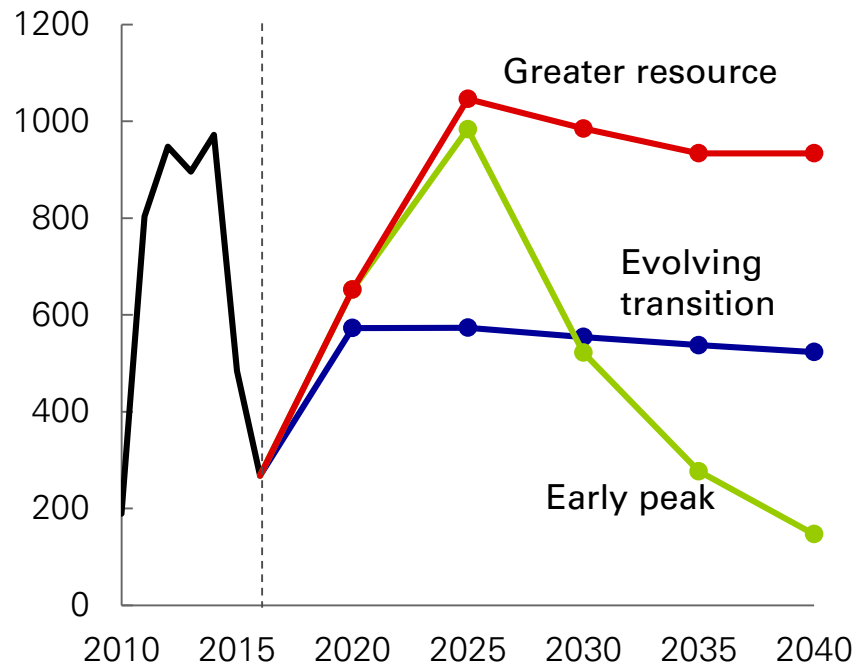


US tight oil: alternative scenarios

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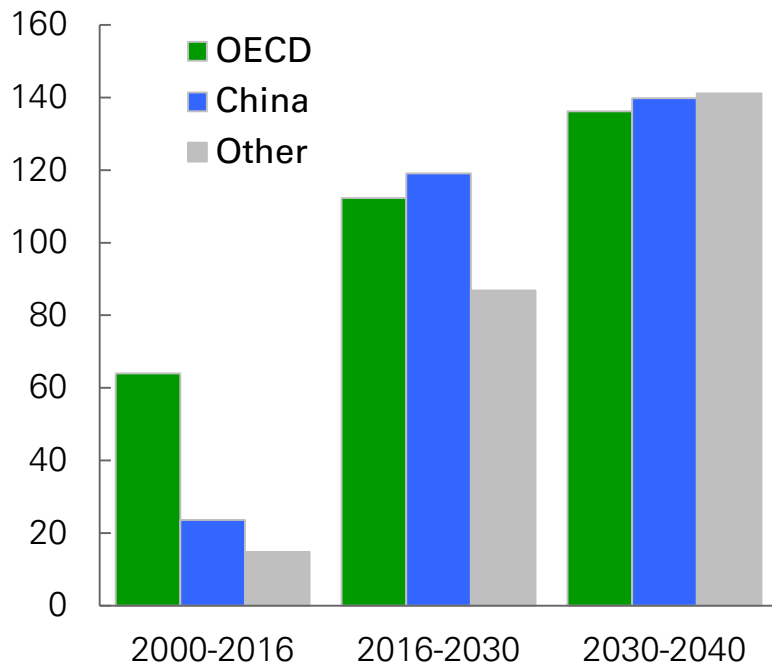
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Rapid growth in renewable energy

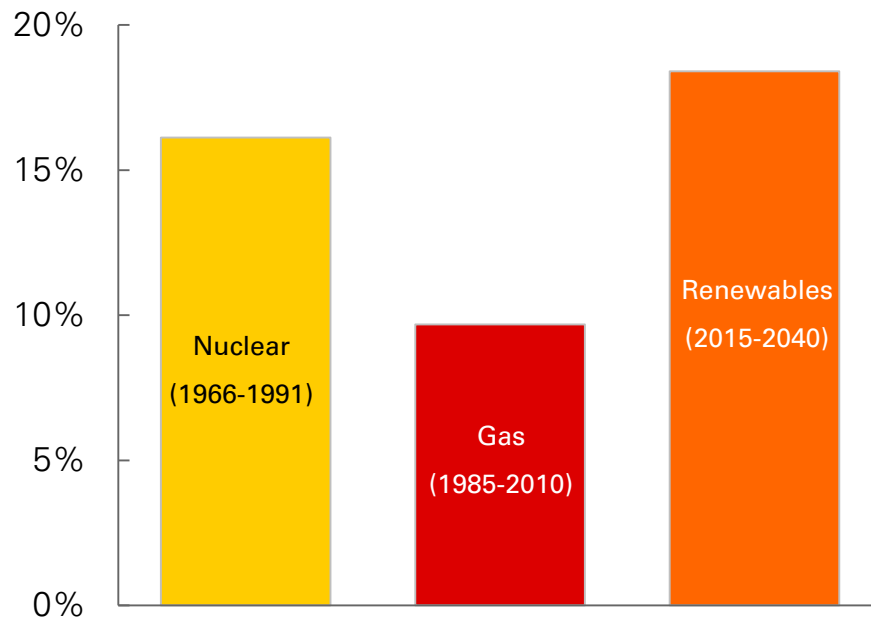
Growth of renewable power

TWh, average annual growth



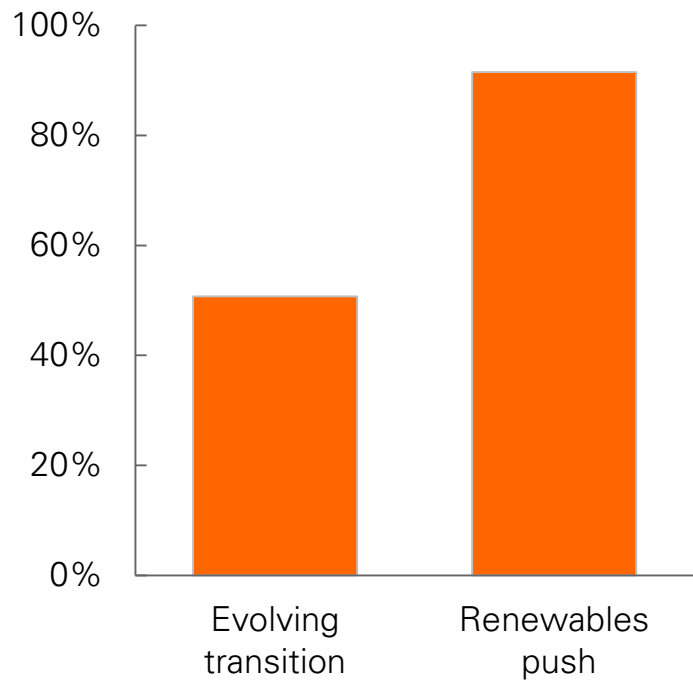
Pace of power market penetration

Largest gains in market share over 25 years, %pts



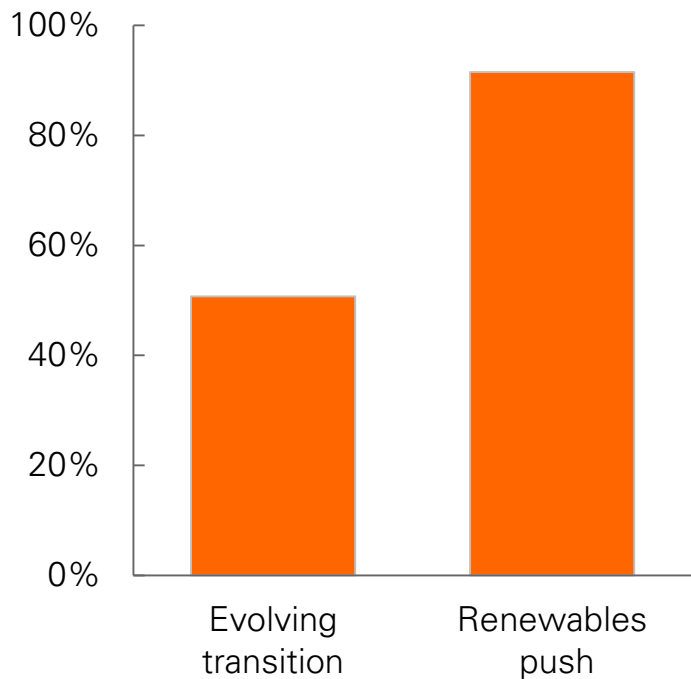
'Renewables push' scenario

Renewables share of power growth
2016-2040

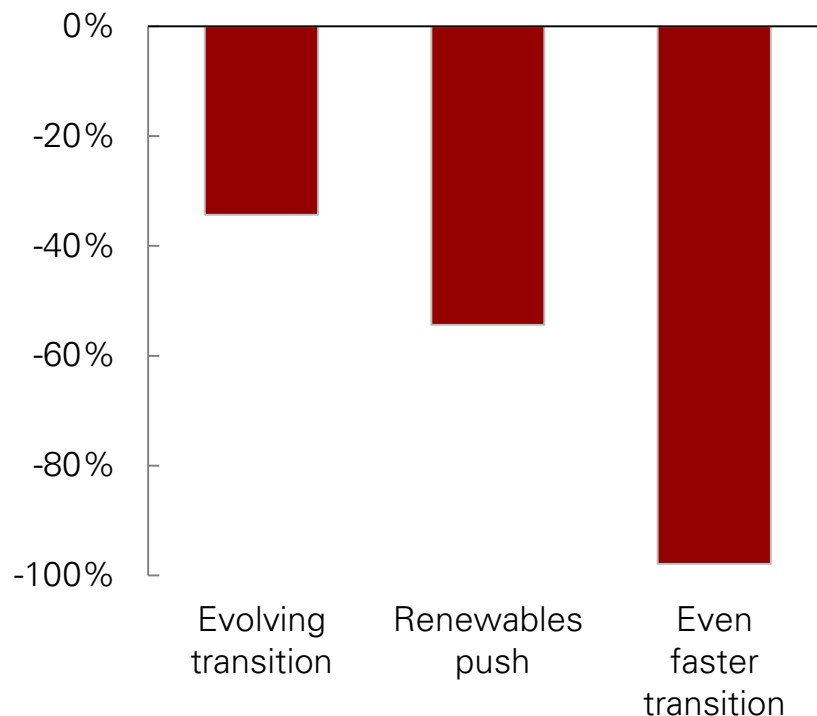


'Renewables push' scenario

Renewables share of power growth
2016-2040



Change in carbon intensity of power
2016-2040

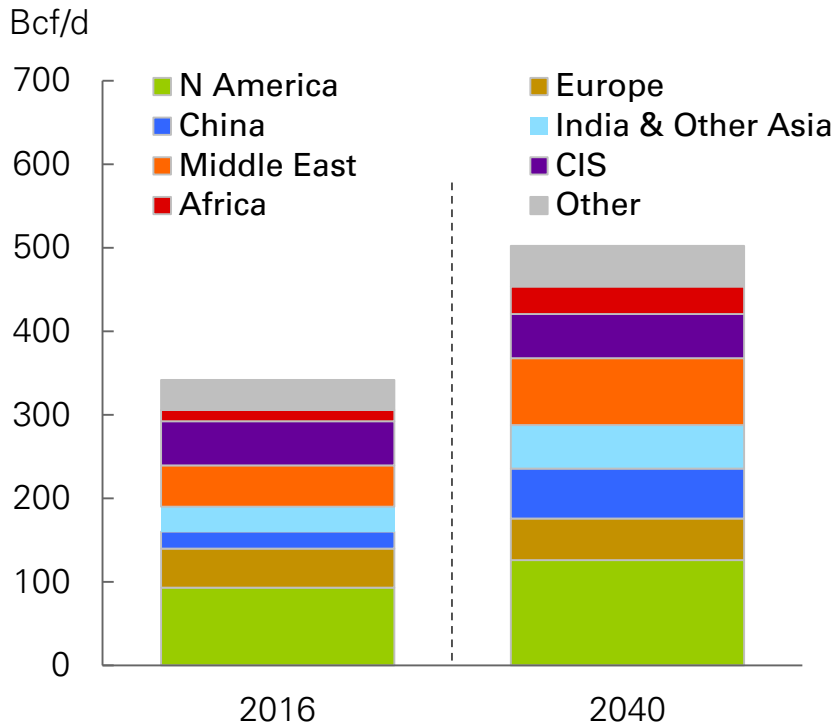


Five key questions

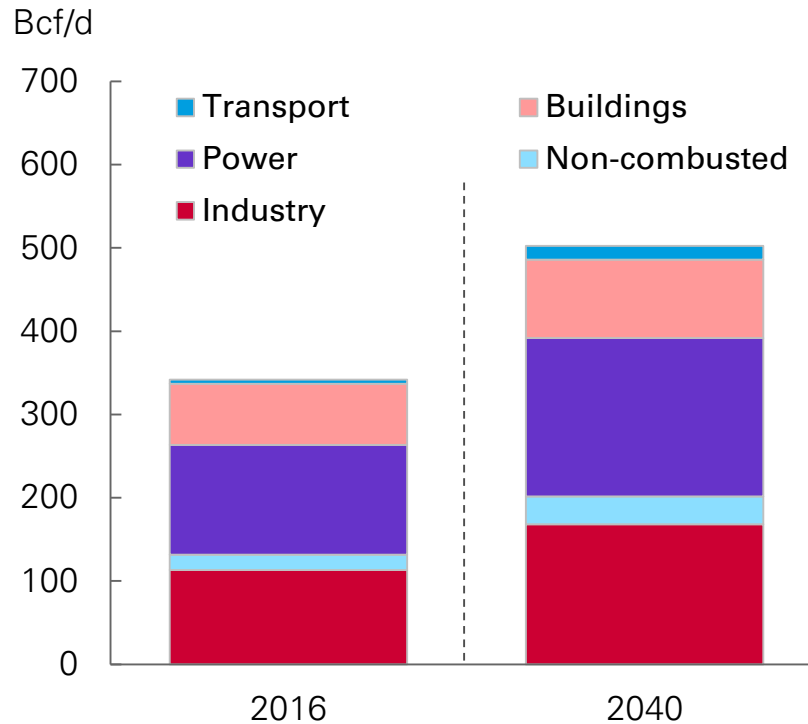
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Growth in natural gas demand

Gas consumption by region

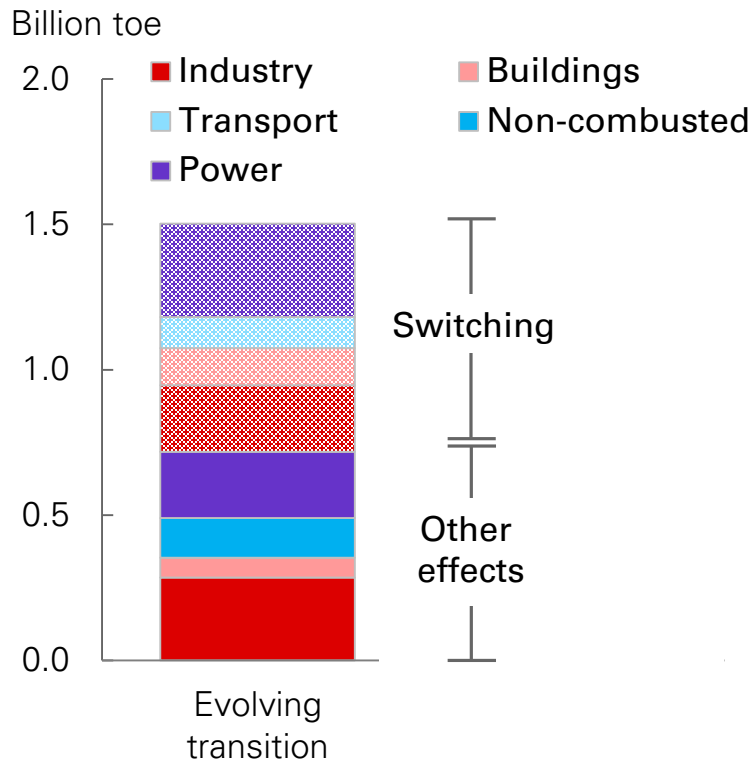


Gas consumption by sector



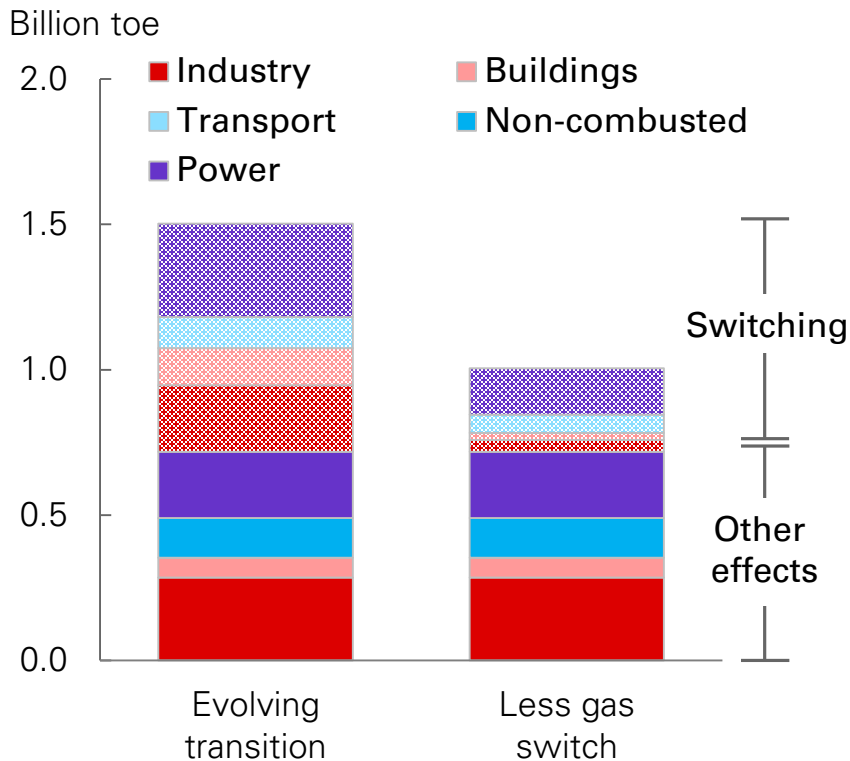
Possible risks to the outlook for natural gas

Gas demand increase
2016-2040

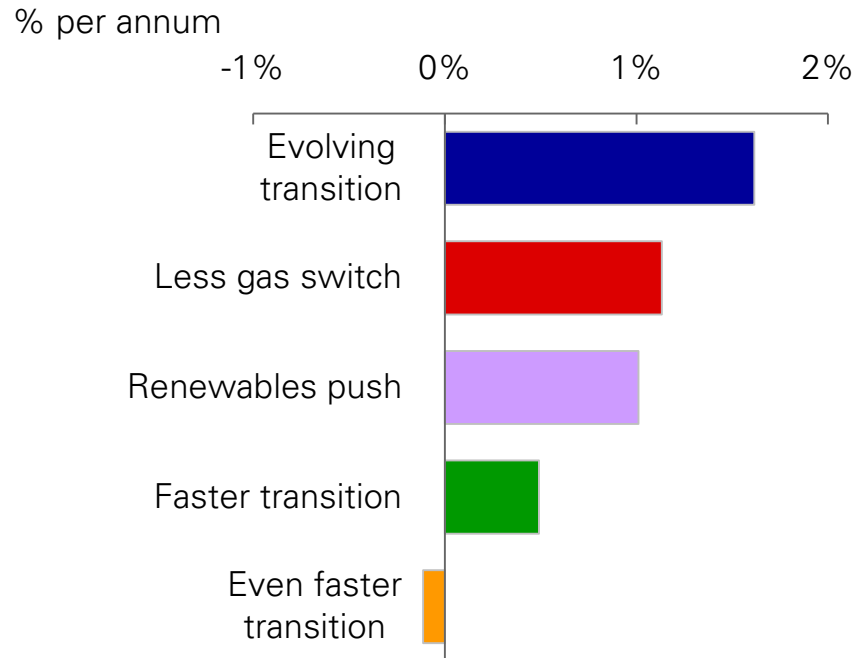


Possible risks to the outlook for natural gas

Gas demand increase
2016-2040



Gas demand growth
2016-2040

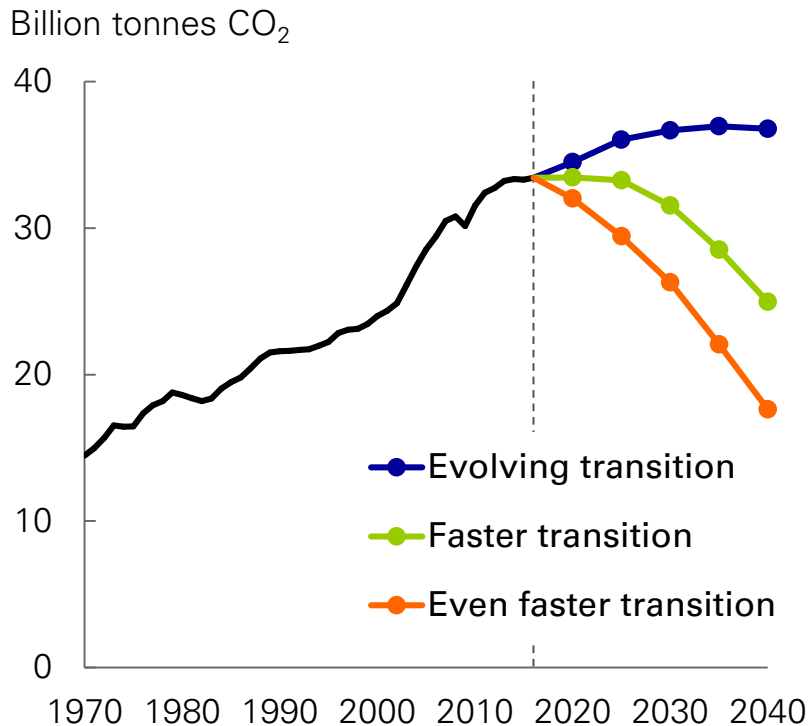


Five key questions

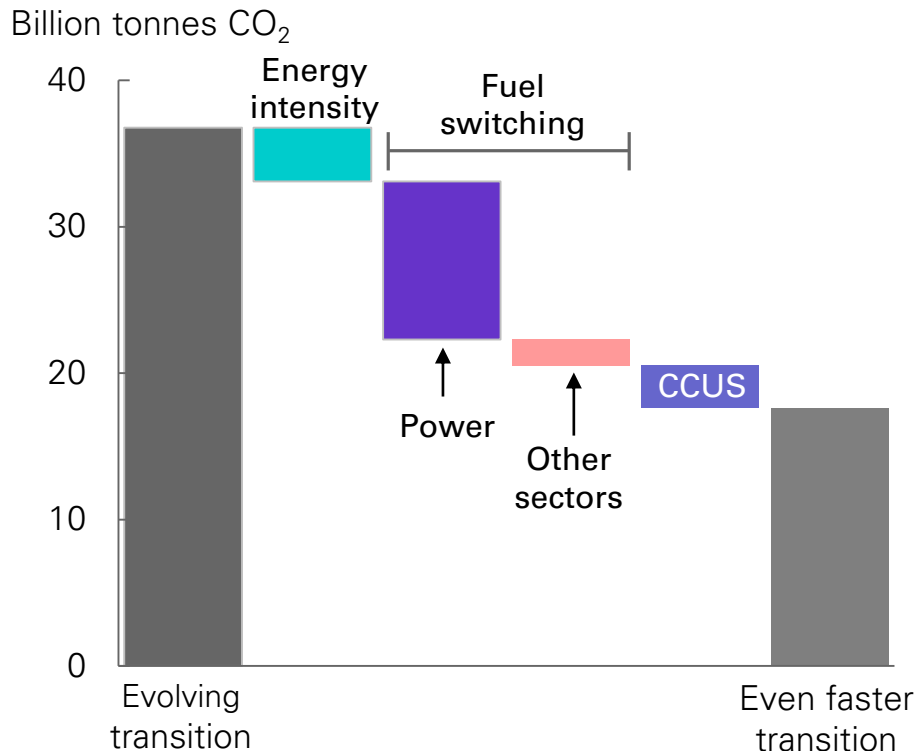
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Carbon emissions continue to rise in the ET scenario

Carbon emissions



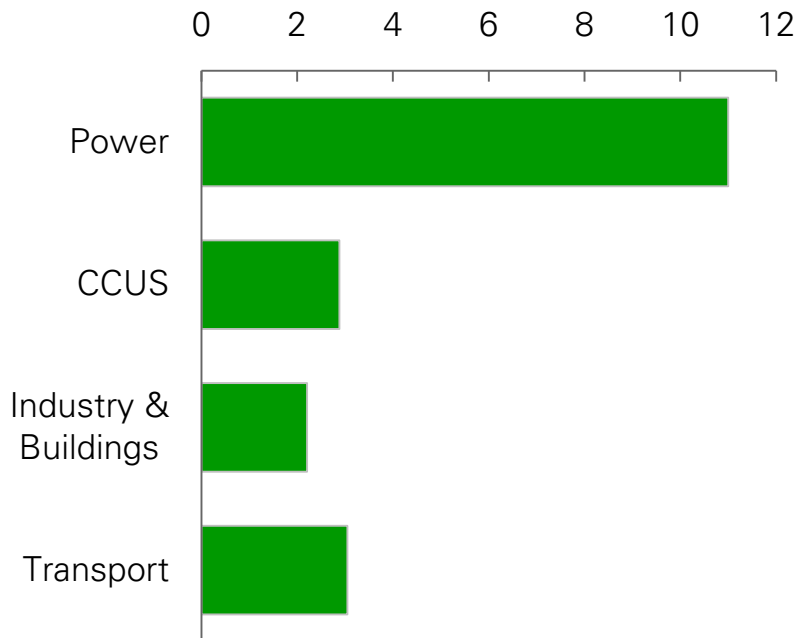
Carbon emissions in 2040:
EFT versus ET scenario



Impact of faster transition on global energy system

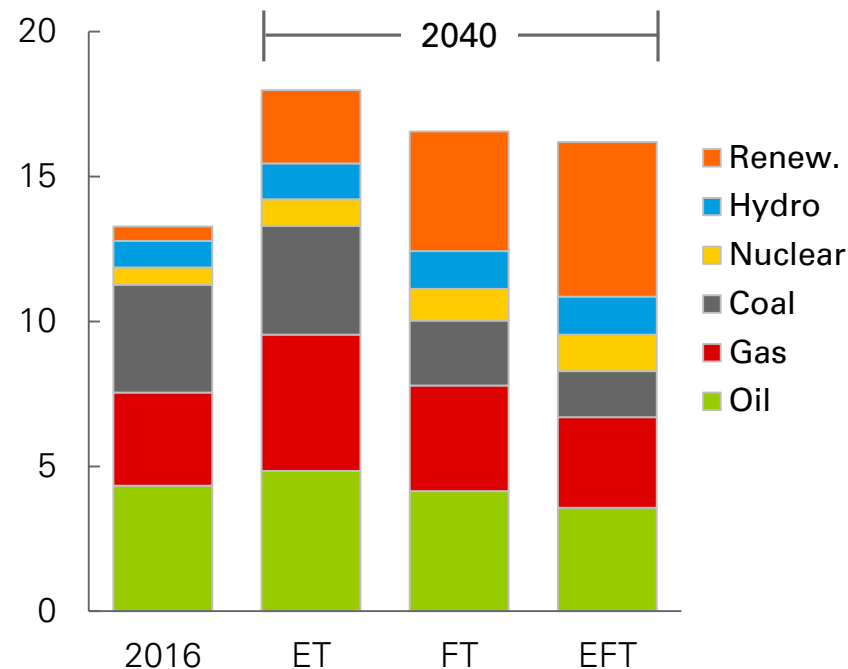
Reductions in carbon emissions:
EFT versus ET scenario

Billion tonnes CO₂ in 2040



Primary energy consumption under
different scenarios

Billion toe



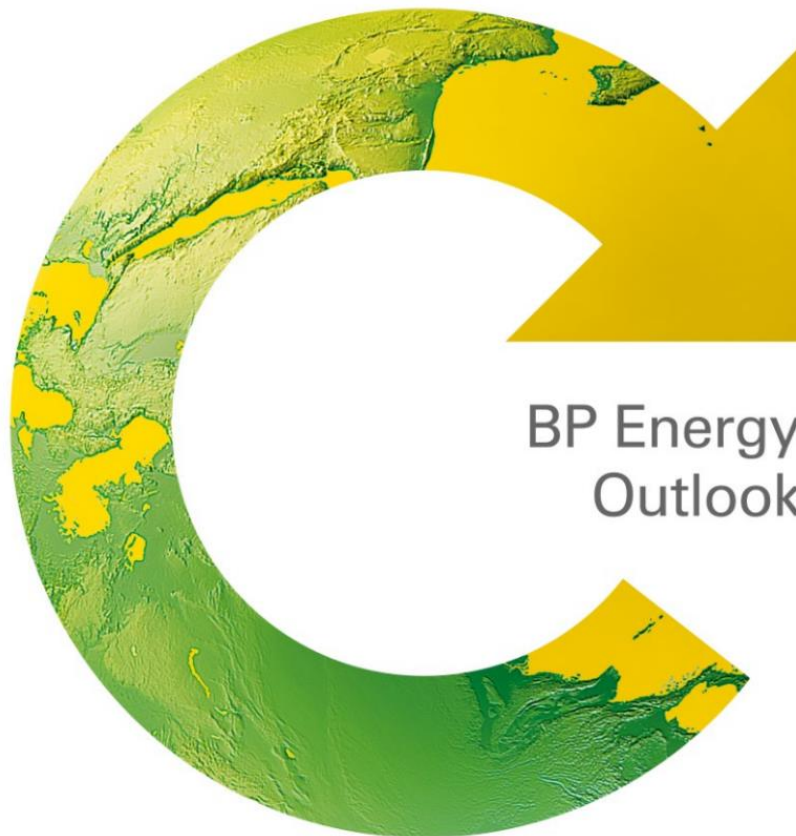
Conclusion

- Some aspects of energy transition seem relatively likely:
 - global energy demand continues to grow – driven by increasing prosperity
 - slower growth as we learn to do more with less
 - increasing abundance and diversification of energy supplies
 - renewable energy growing in importance
 - oil and gas continue to play a central role in the global energy system
- Other aspects remain far more uncertain:
 - impact of EVs and autonomy in reshaping transport sector
 - role of natural gas and renewables in lower carbon transition
 - how will we achieve a more decisive break from past to achieve sharp fall in carbon emissions?



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