BP Energy Outlook 2035

Paul Appleby, head of energy economics

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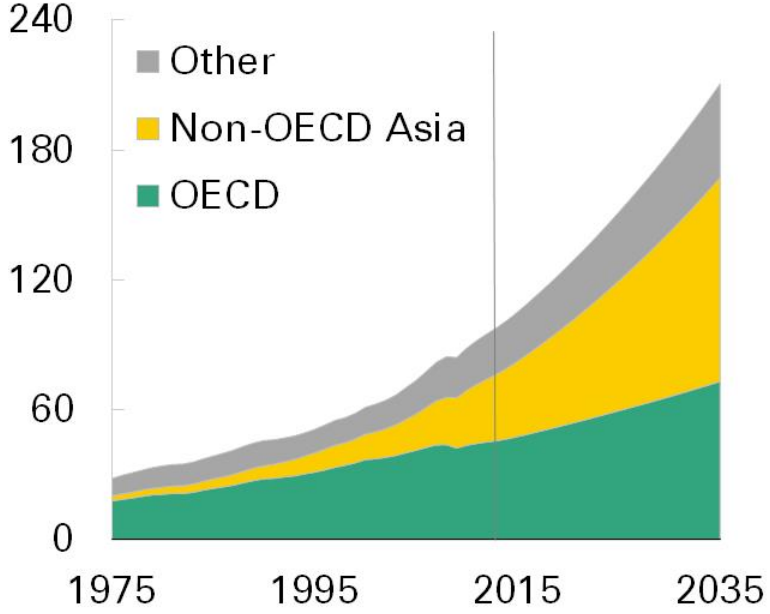
Economic backdrop

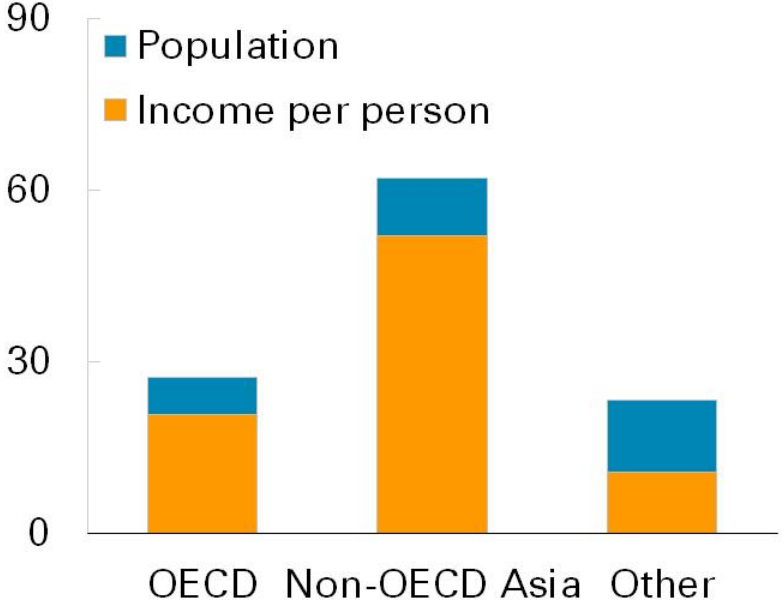
GDP

Trillion, $2011 PPP



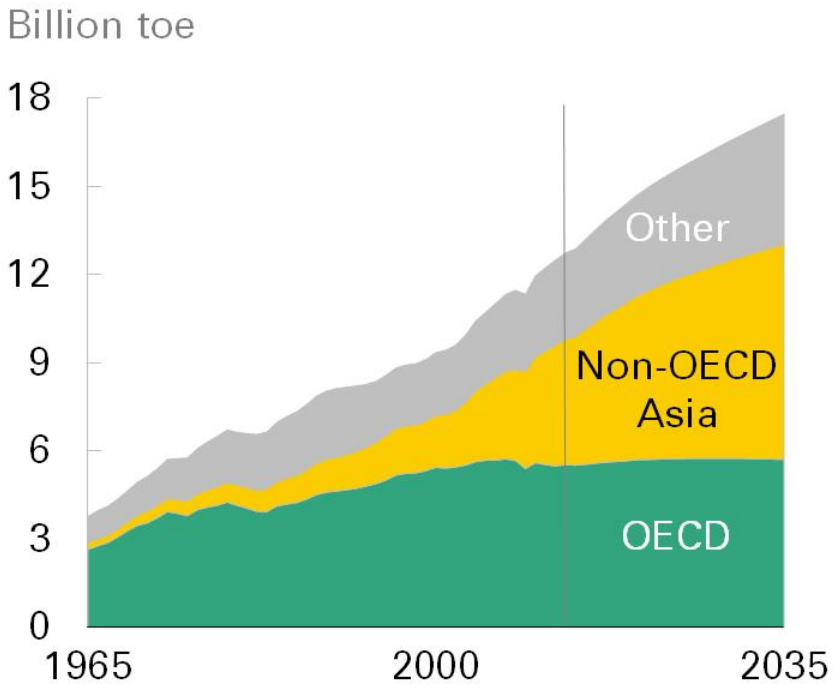
Contribution to GDP growth

Trillion $2011 PPP, 2013-35

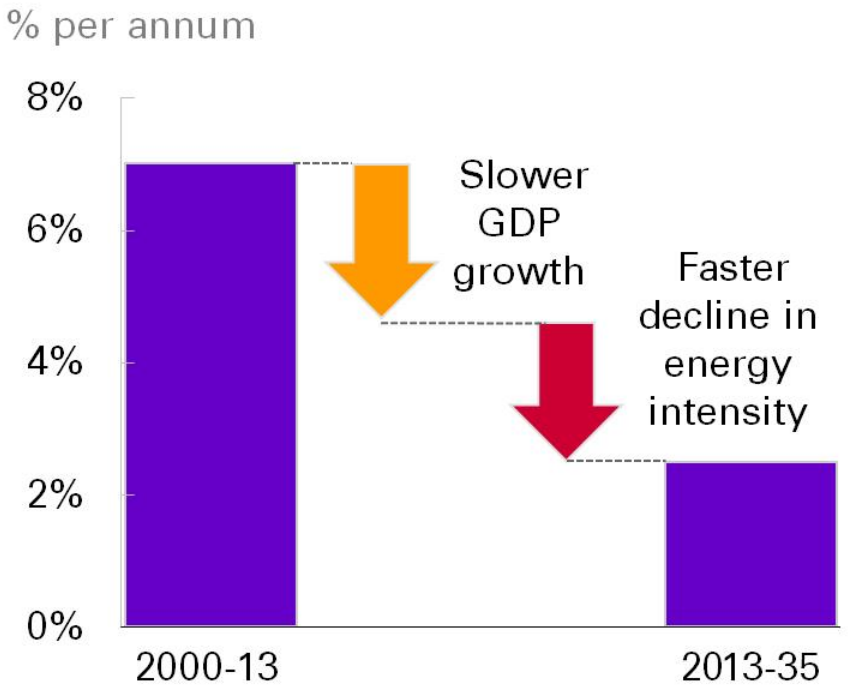


Global energy demand

Consumption by region



Non-OECD Asia energy growth



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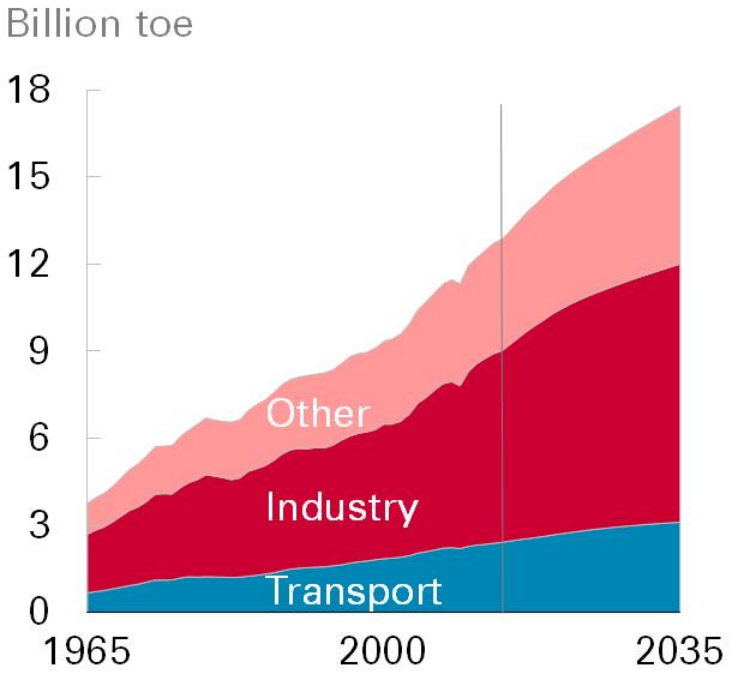
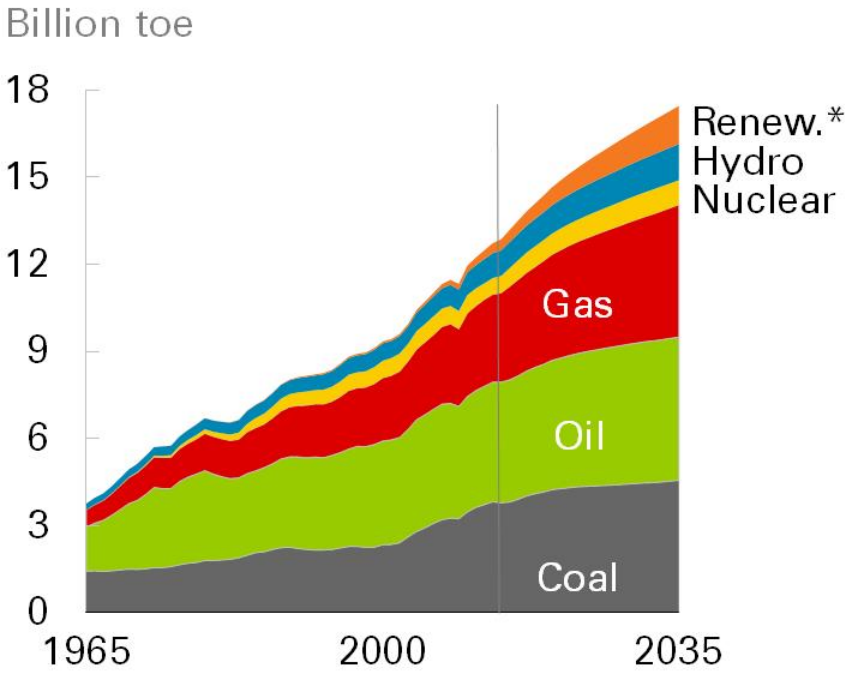
Global energy demand by sector and fuel

Consumption by sector



Consumption by fuel



*Includes biofuels

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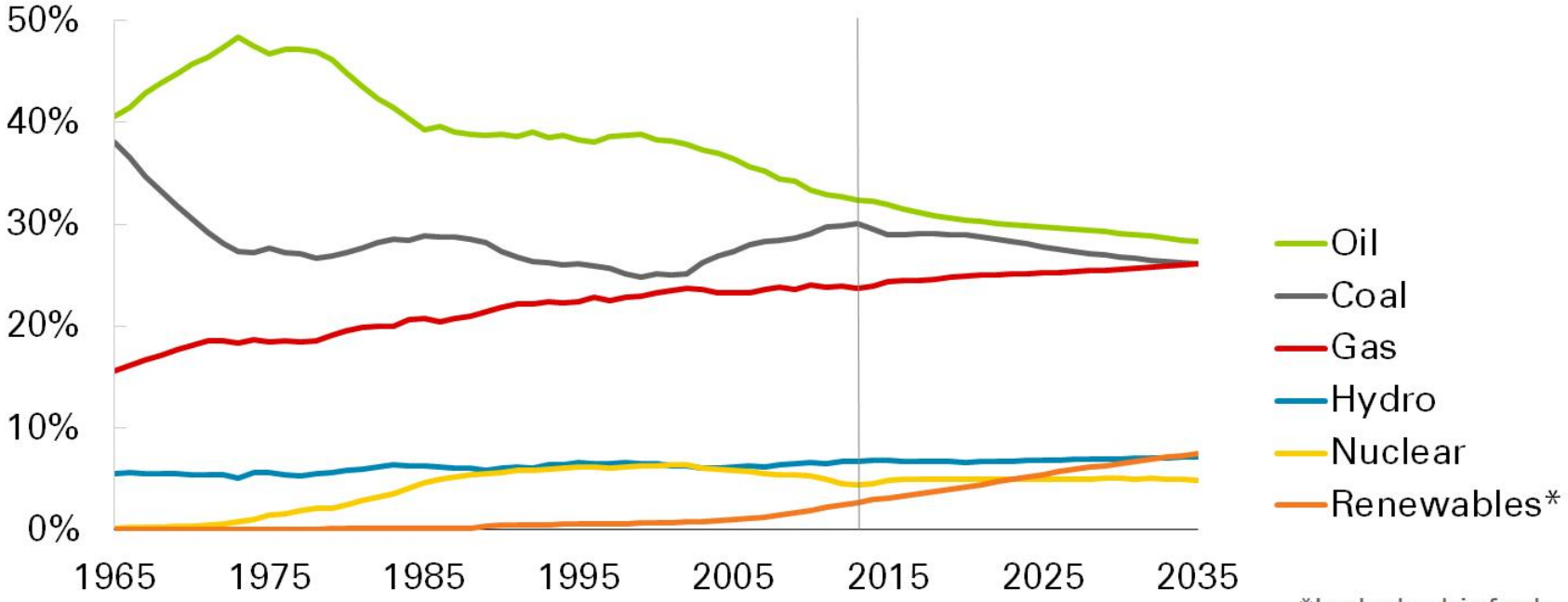
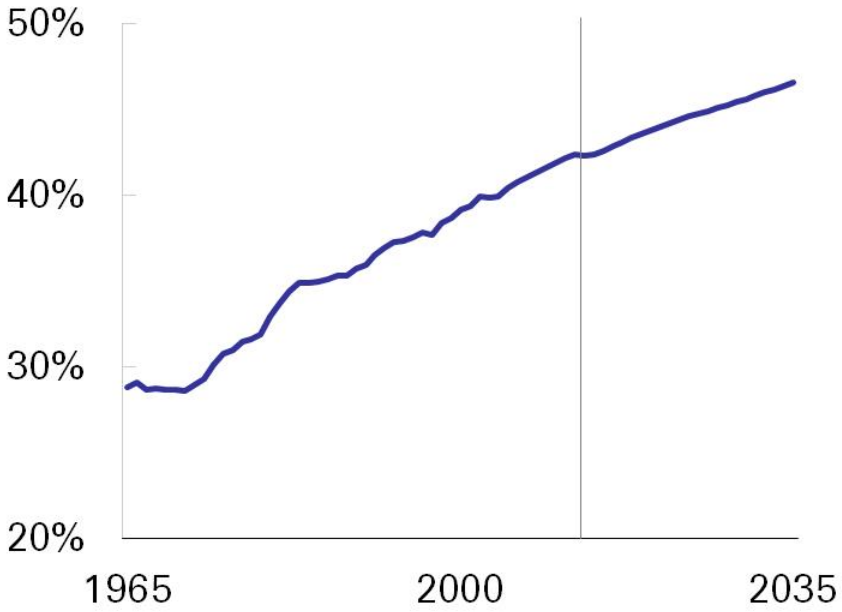
Shares of primary energy



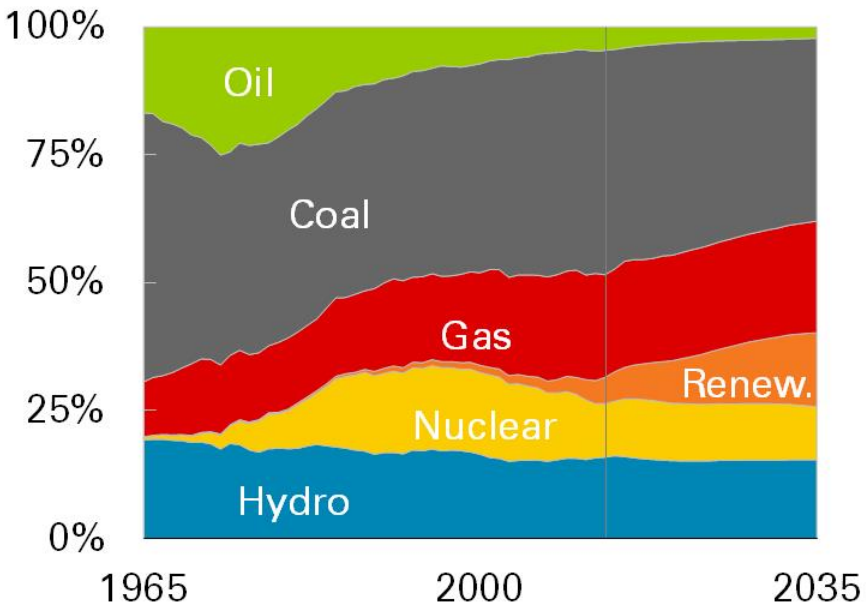
*Includes biofuels

Power sector

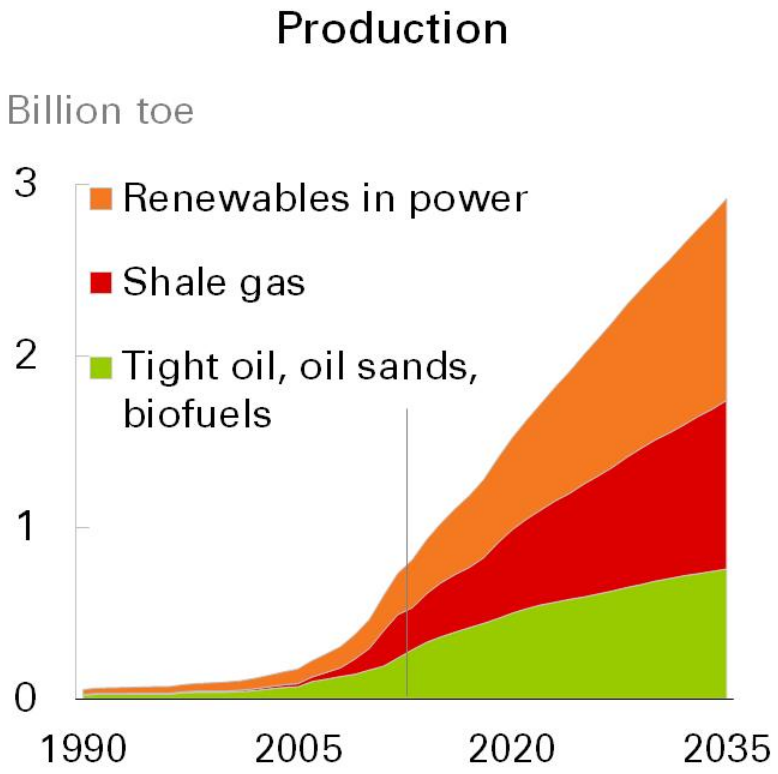
Inputs to power as a share of total primary energy



Primary inputs to power



New sources of energy supply



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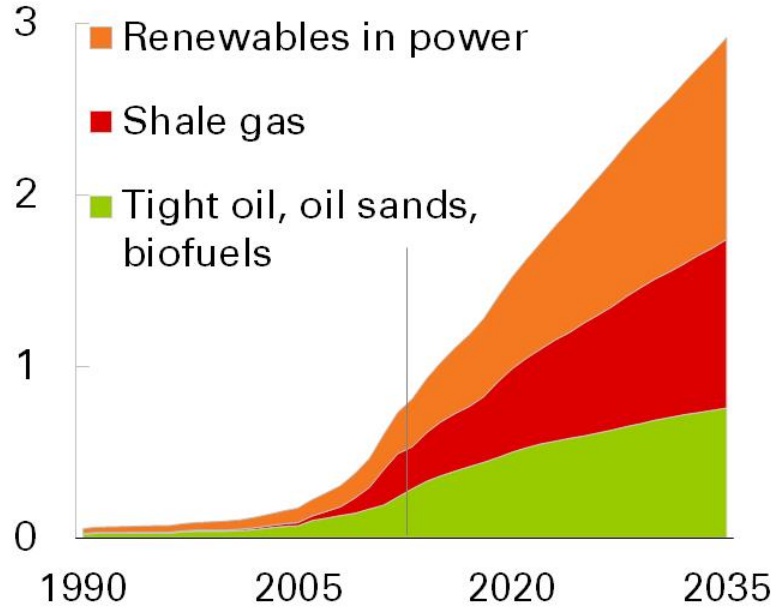
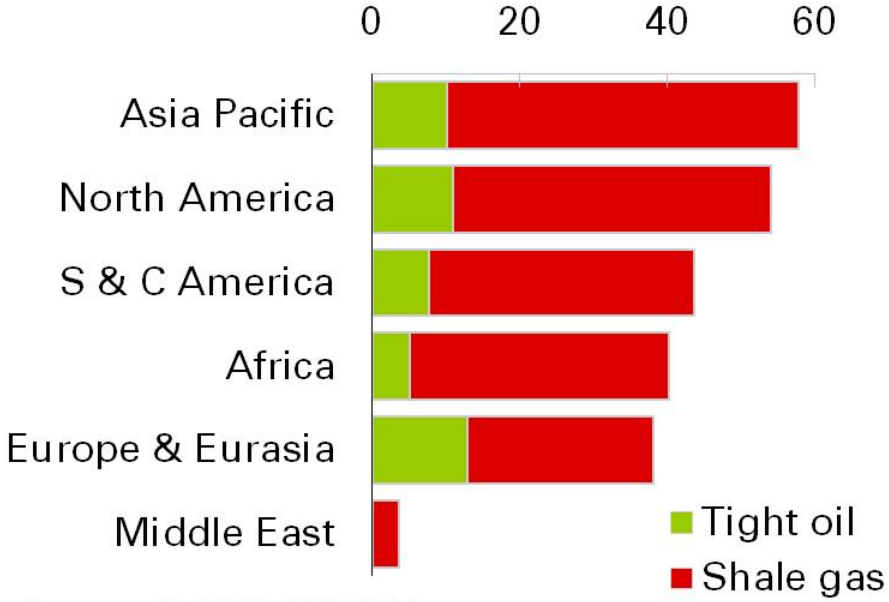
New sources of energy supply

Production



Technically recoverable resources



Source: © OECD/IEA 2014

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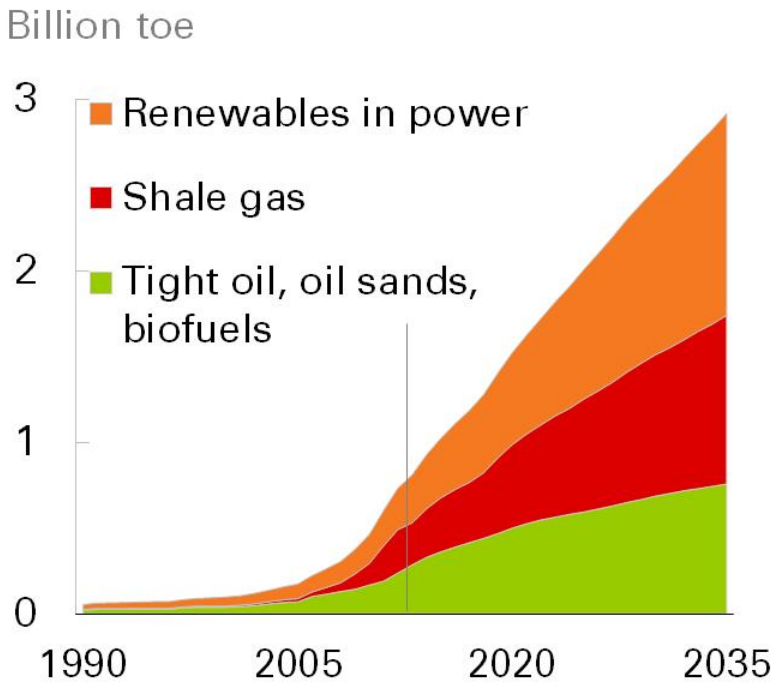
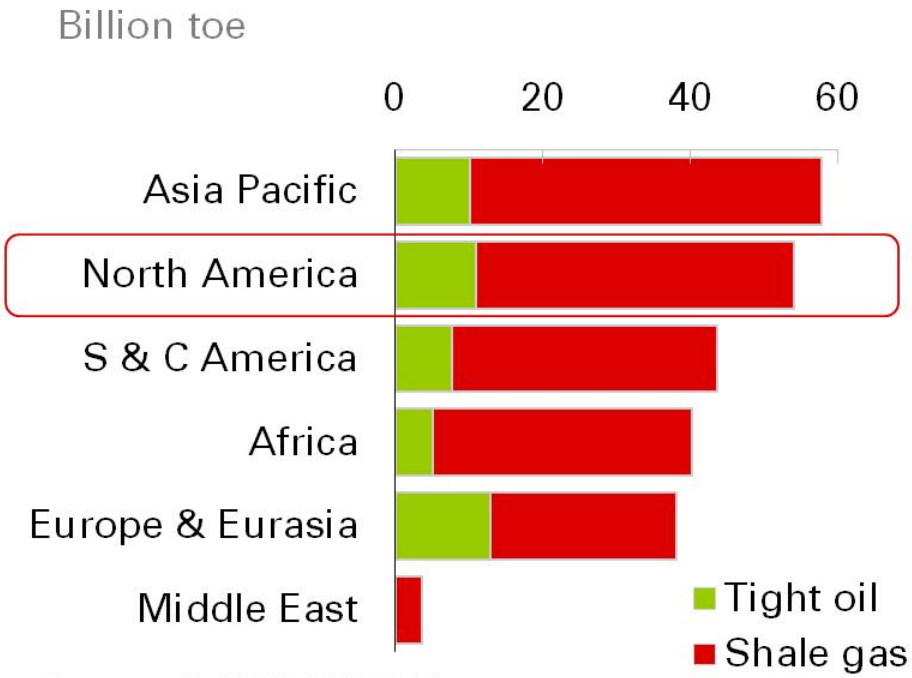
New sources of energy supply

Production



Technically recoverable resources



Source: © OECD/IEA 2014

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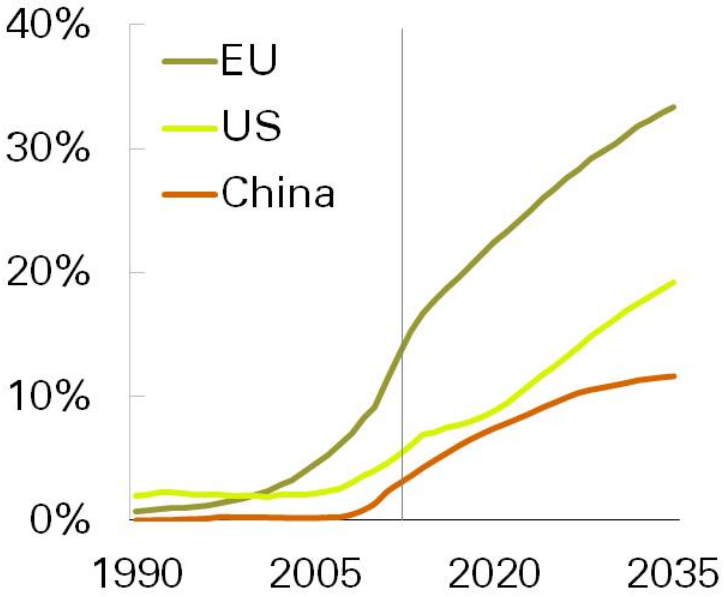
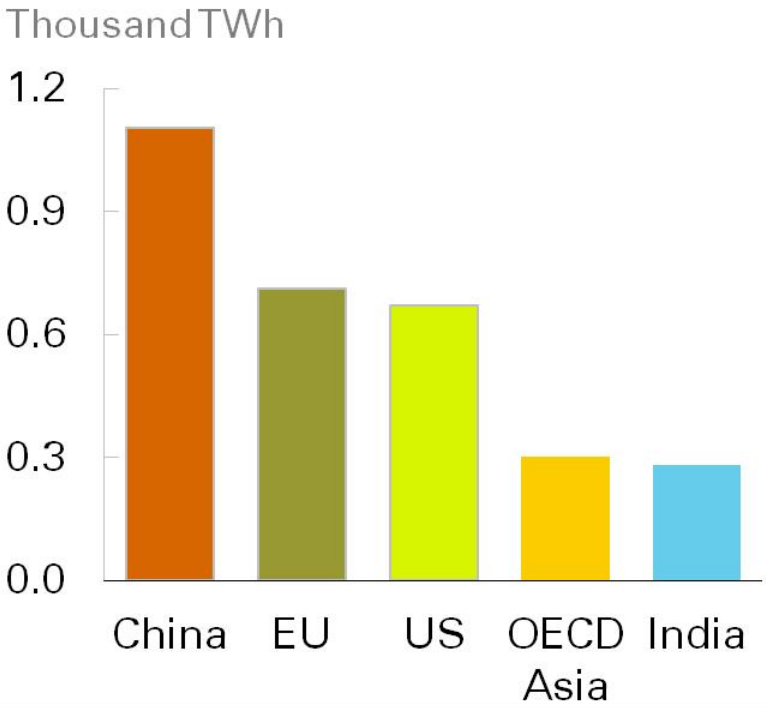
Renewables in power generation

Renewables share of power



Renewables growth 2013 to 2035



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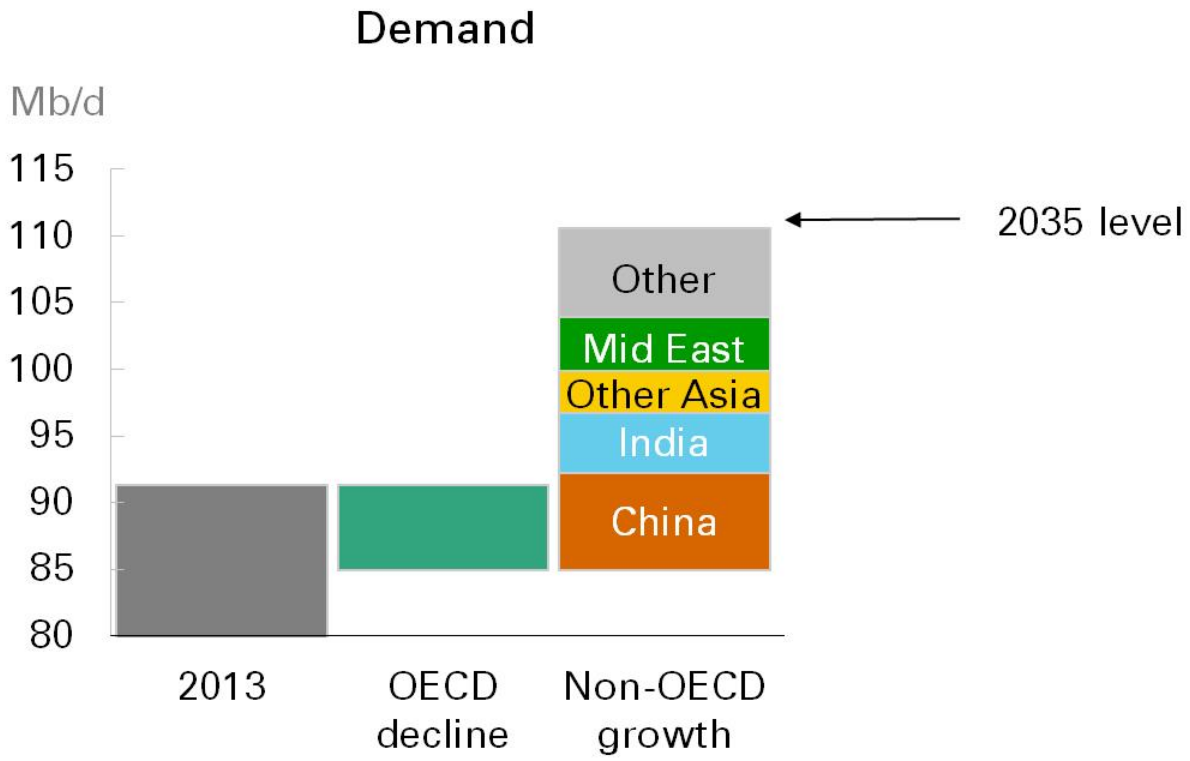
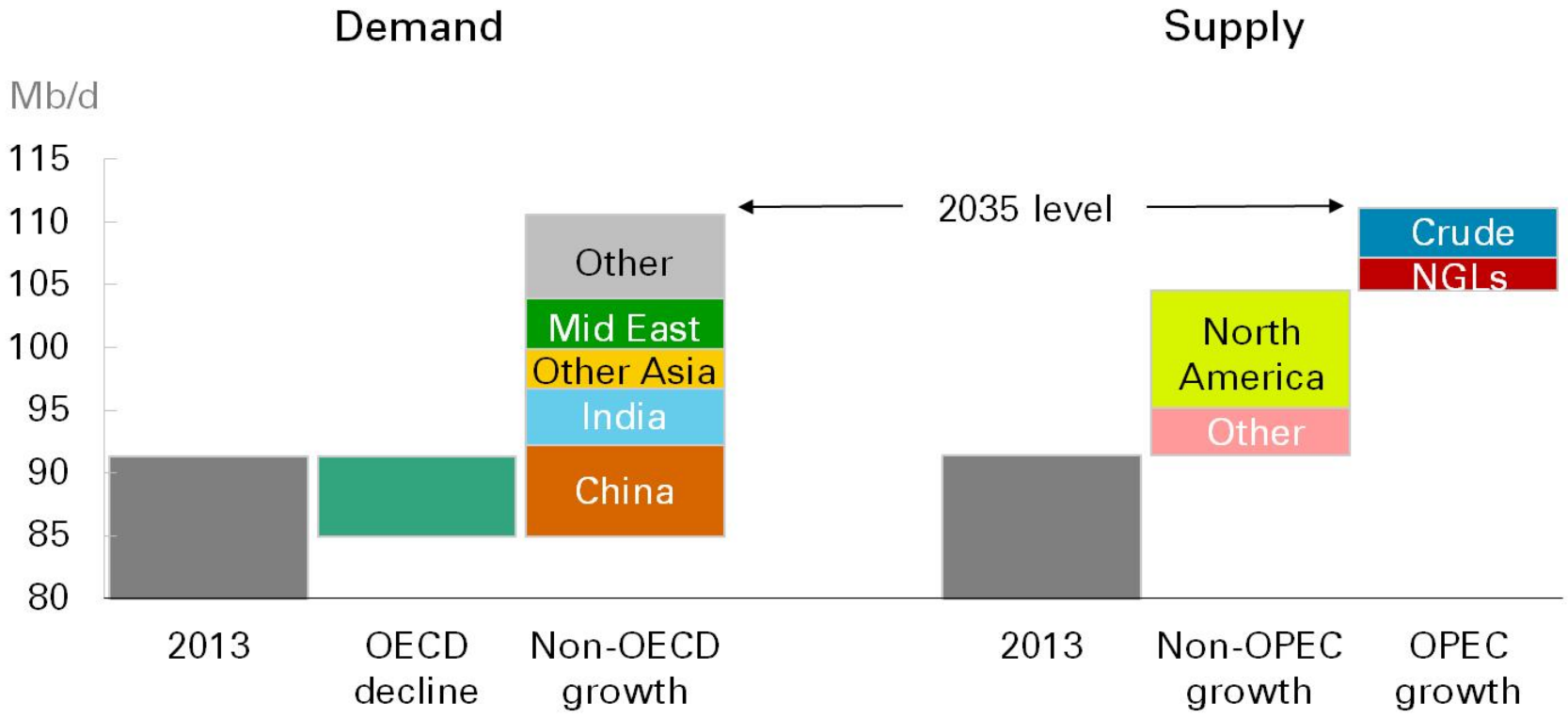
Oil and other liquid fuels

Global liquids demand

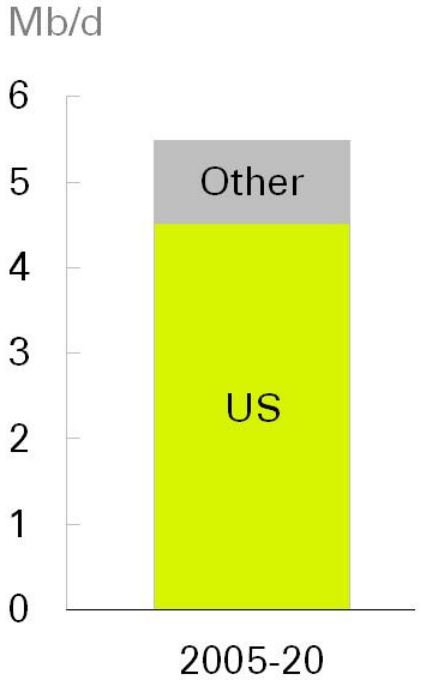


Global liquids demand and supply

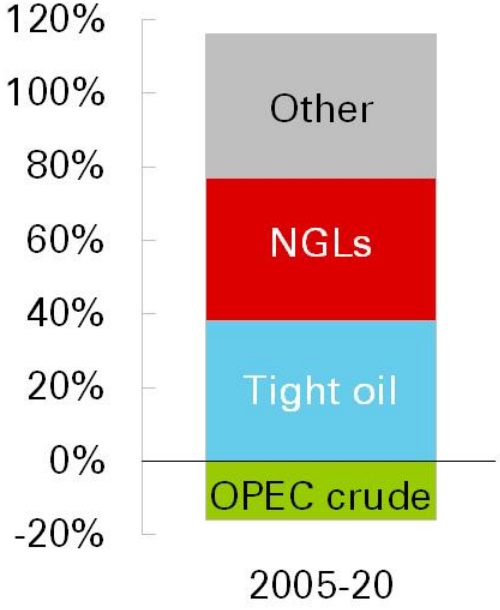


Tight oil and OPEC balance

Tight oil supply growth



Share of global liquids growth



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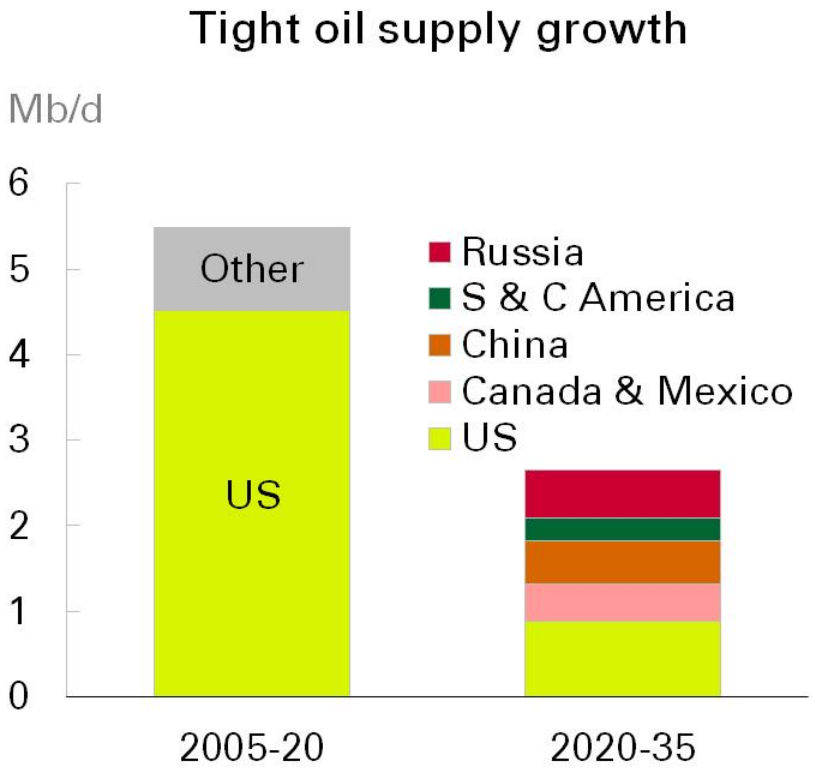

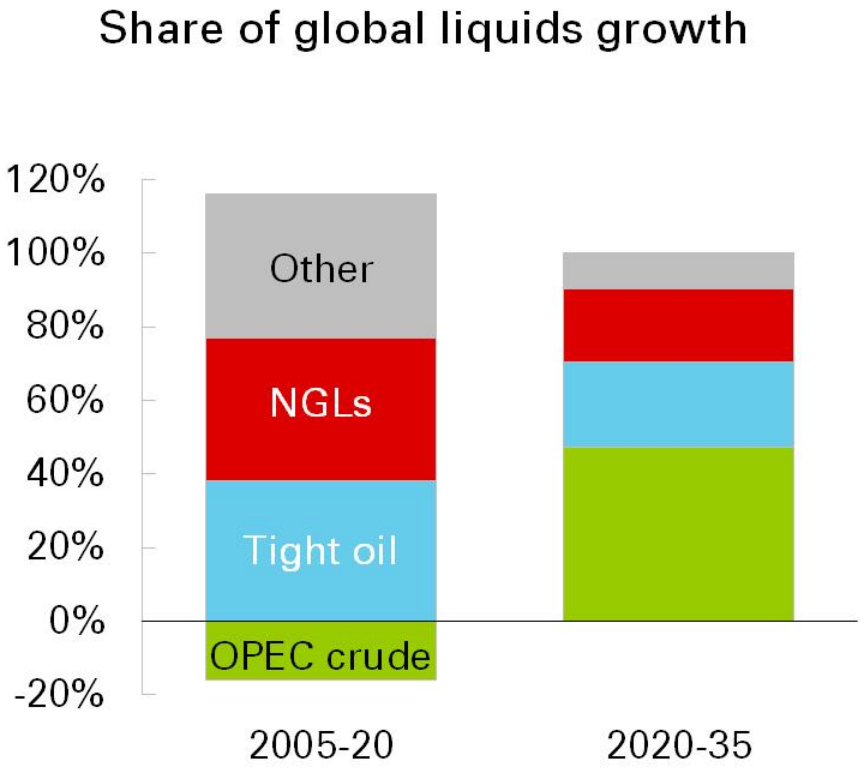

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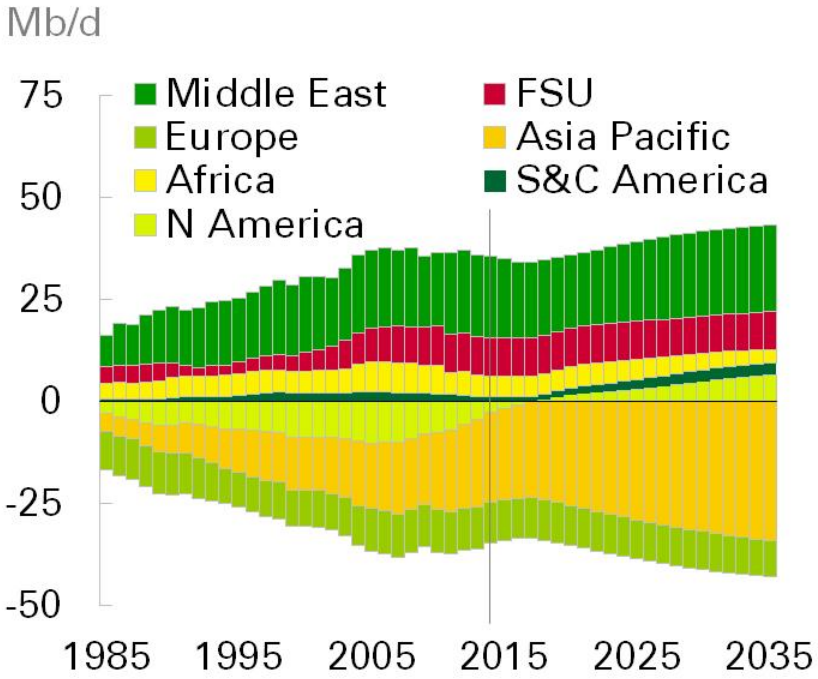
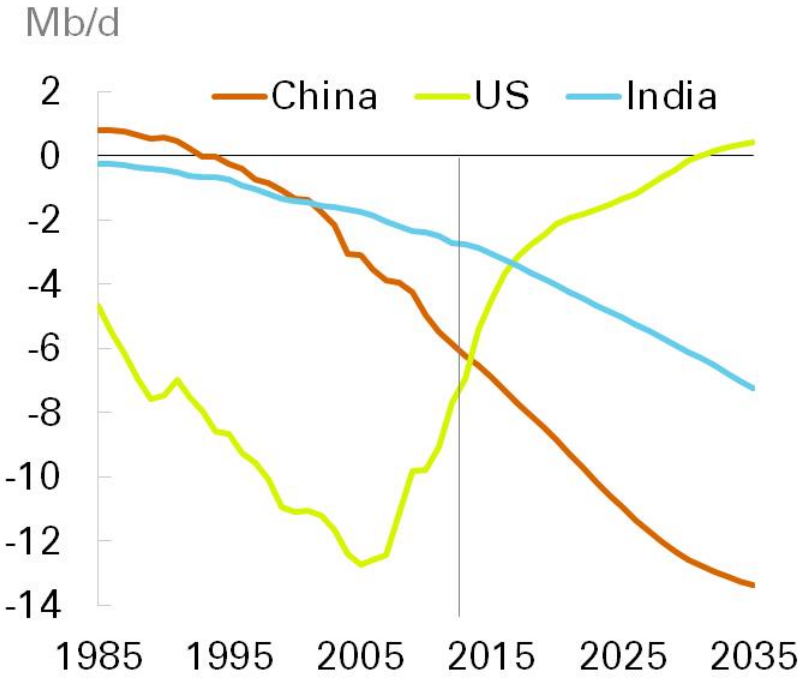
Oil trade

Regional imbalances



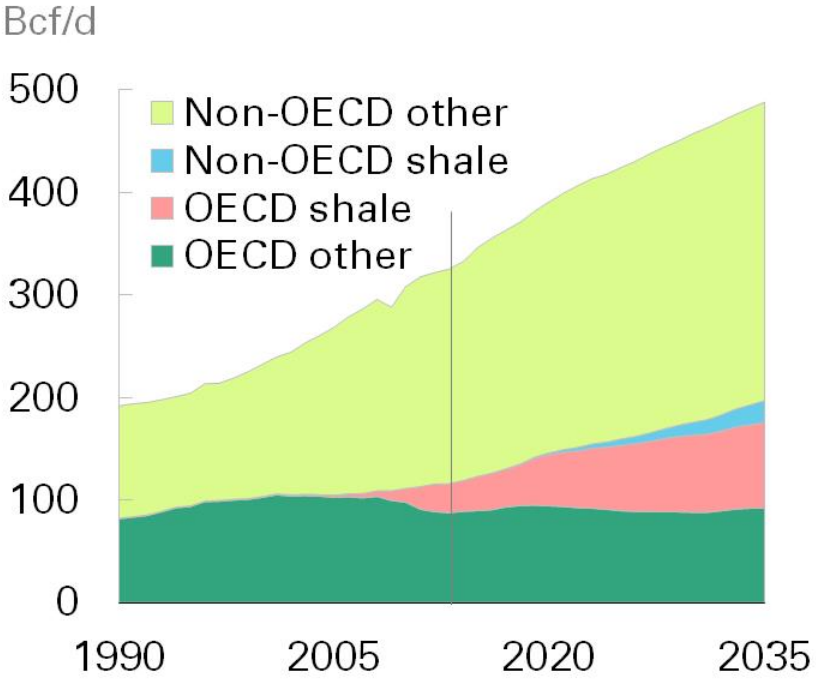
Net exports



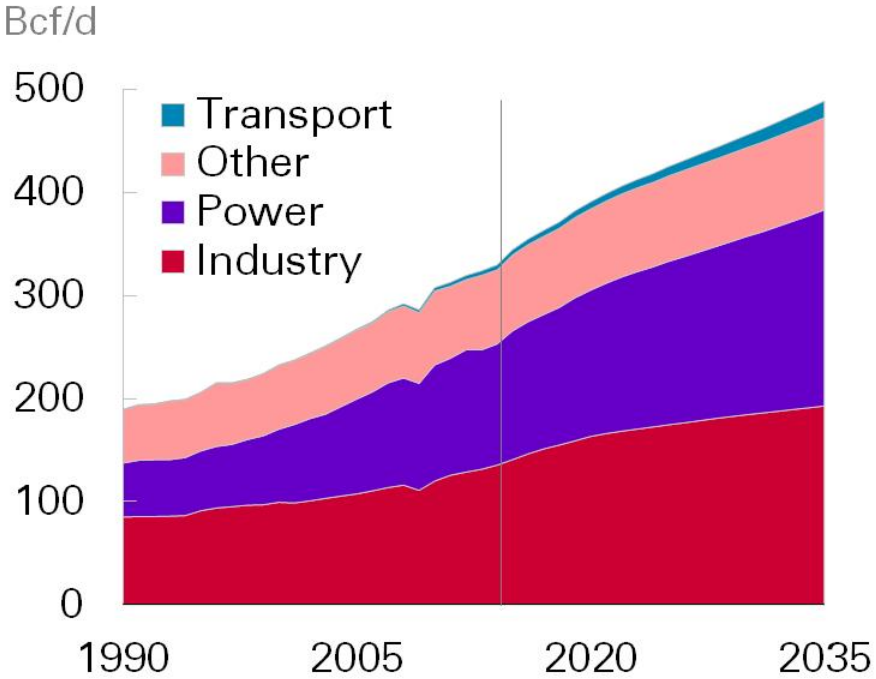
Natural gas

Global supply and demand for natural gas

Production by type and region



Consumption by sector



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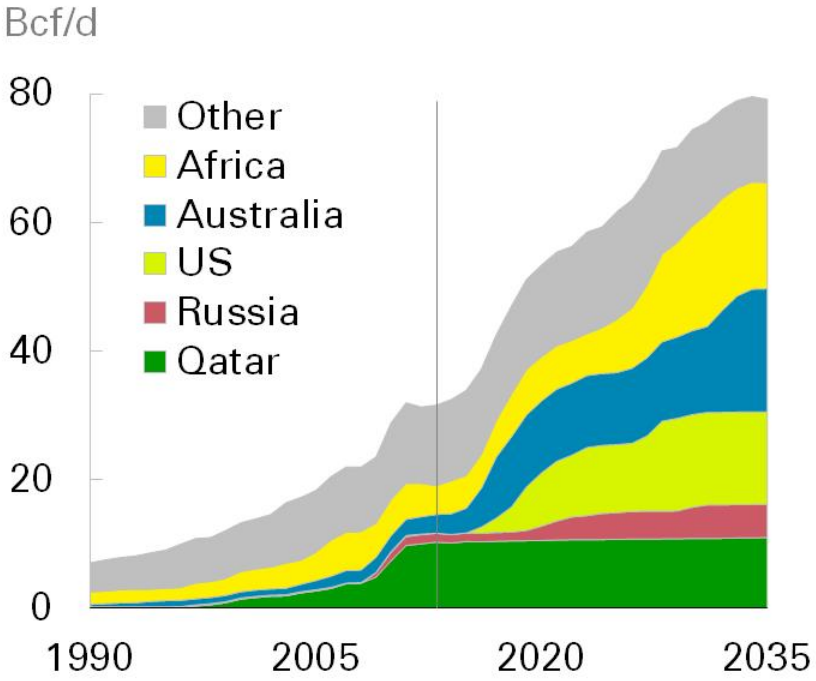
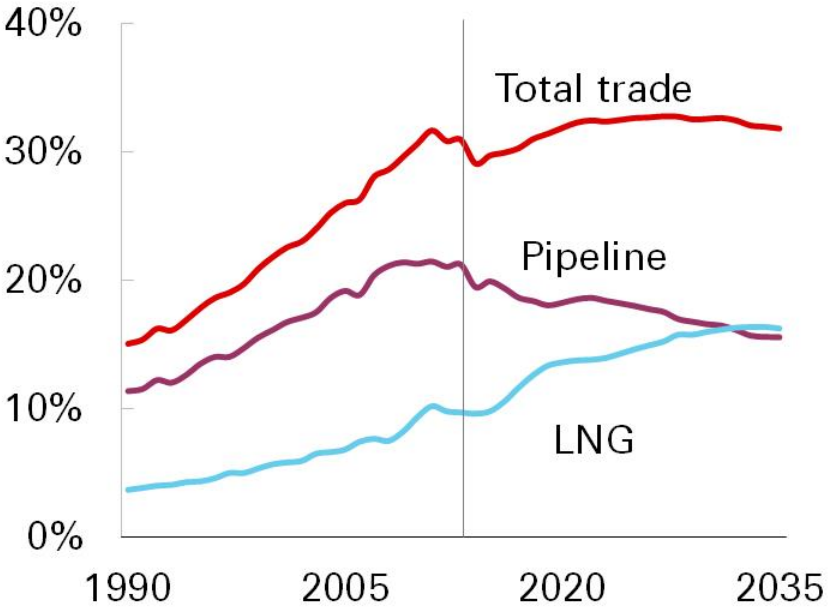
Growth of LNG

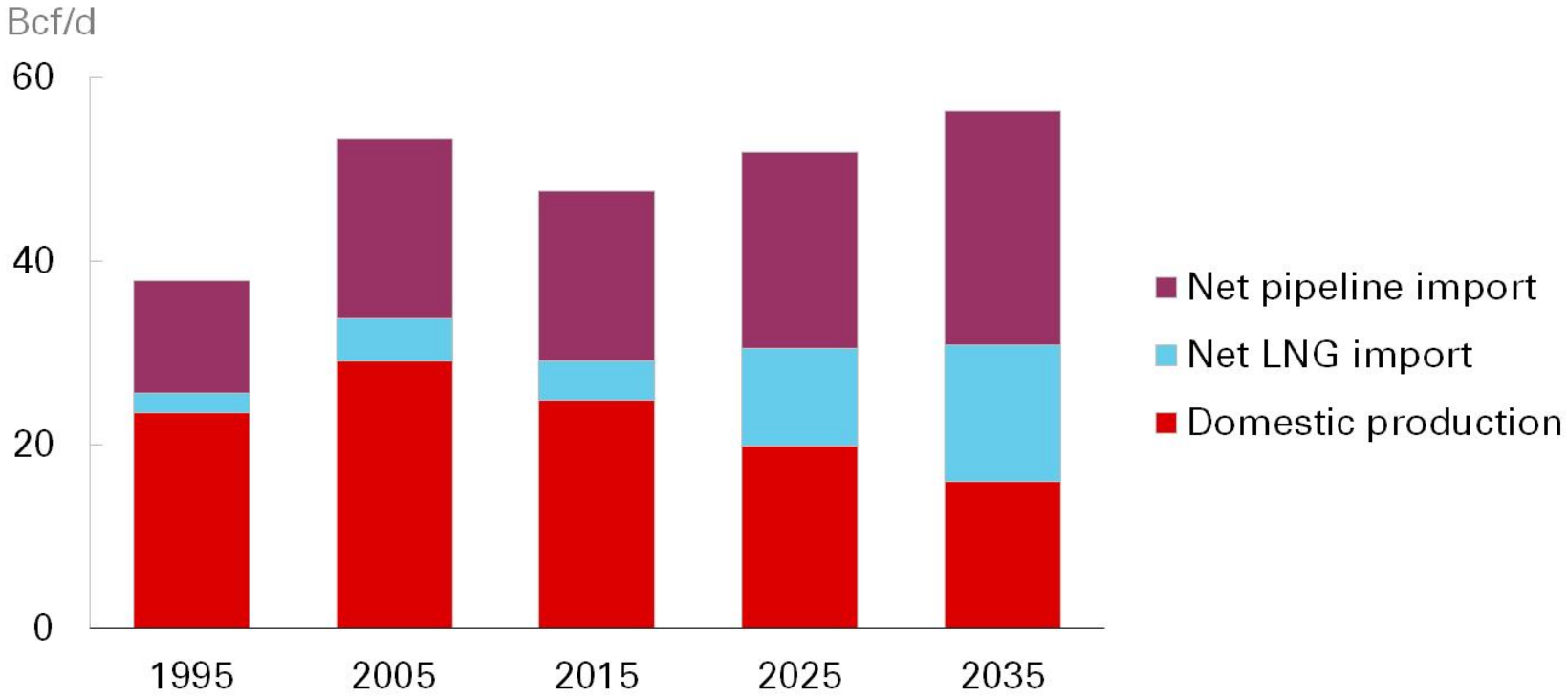
LNG supply



Shares of global gas consumption



Sources of gas supply to Europe



Key uncertainties

Low GDP growth

- what if growth in China and India slows more rapidly than assumed?

Climate policies

- what if policymakers take more actions to reduce emissions?

Geopolitics

- what are the implications of heightened geopolitical risks?

China's electrification

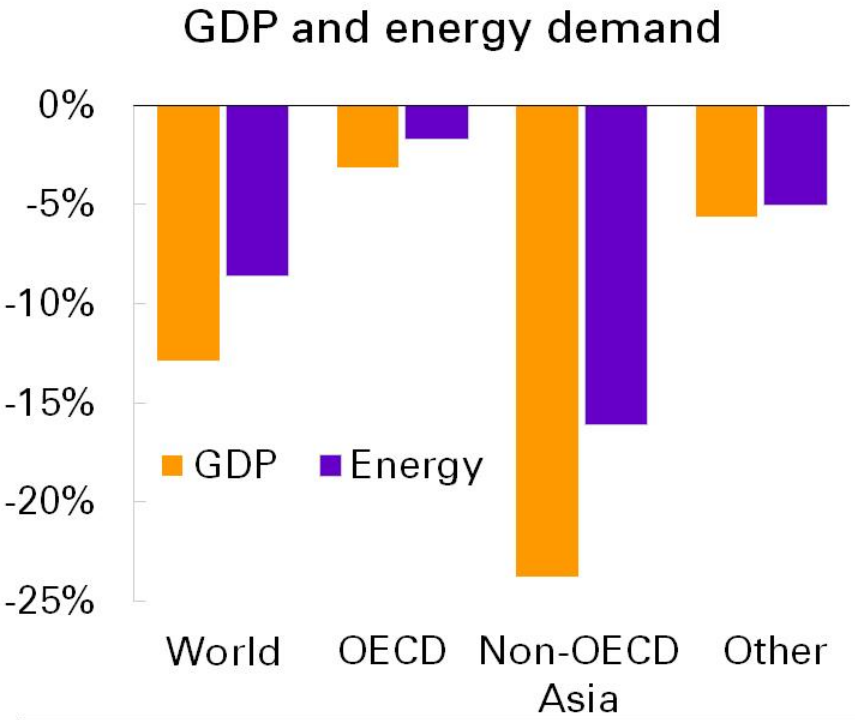
- what if China's electricity use follows a different path?

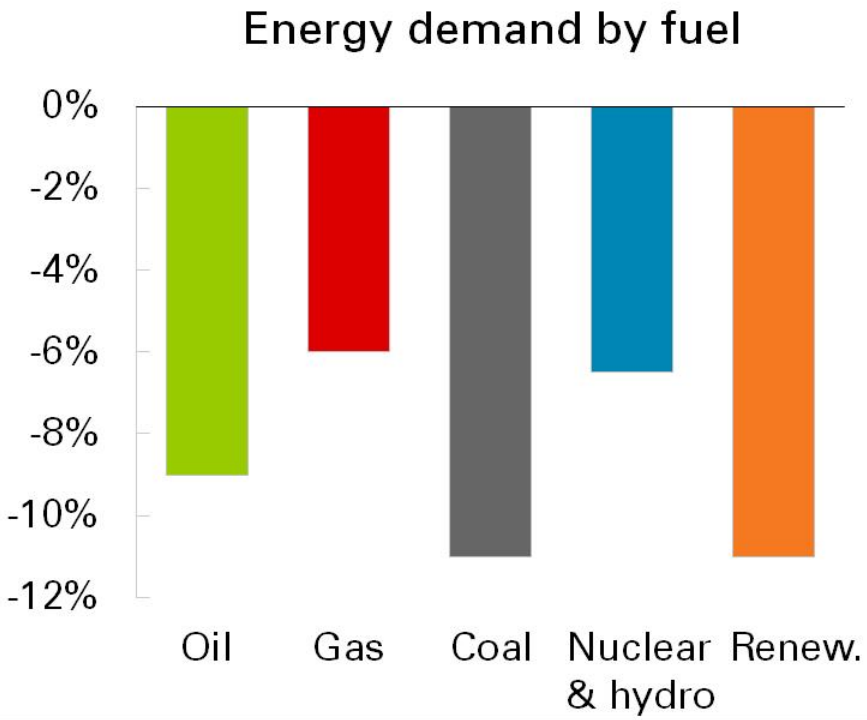
Low GDP growth

what if growth in China and India slows more rapidly than assumed?

Low GDP growth alternative

Differences from base case in 2035

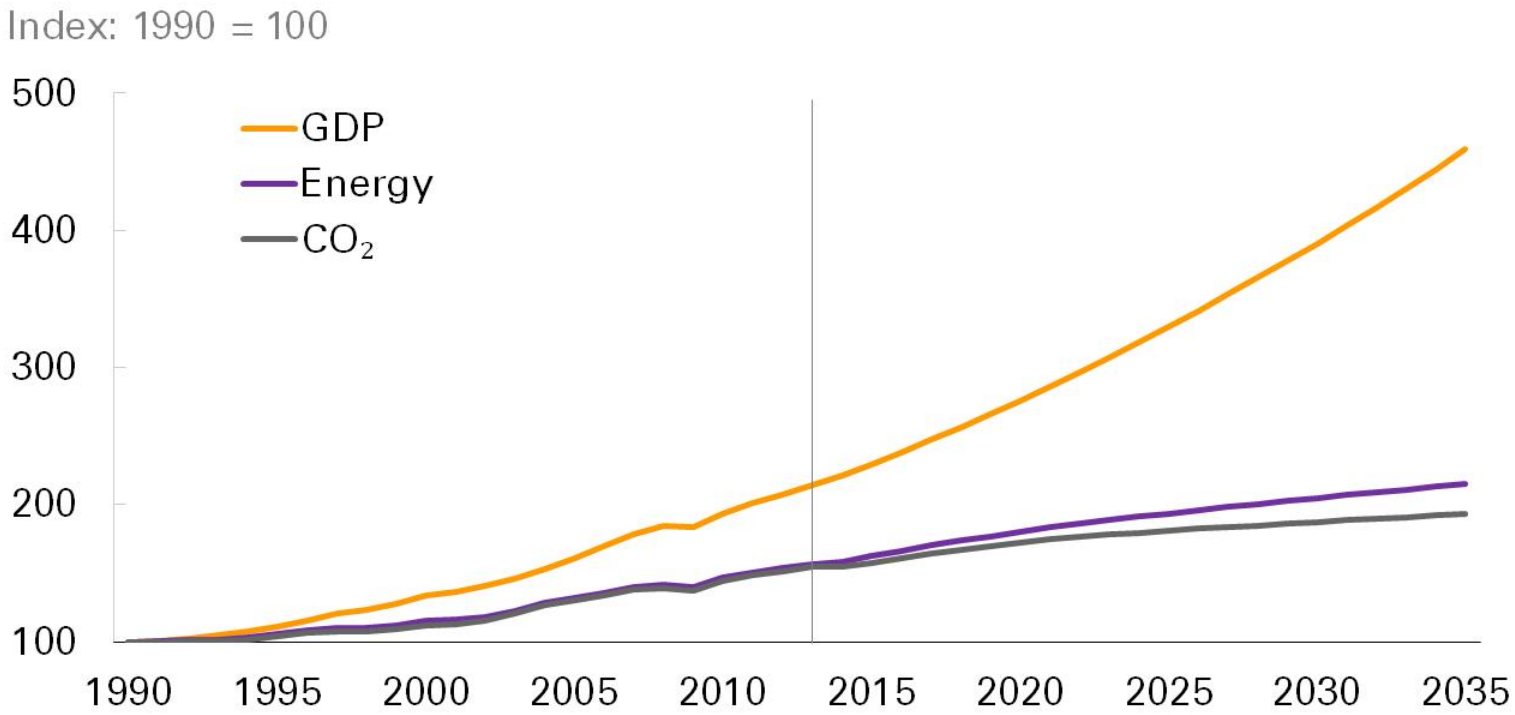




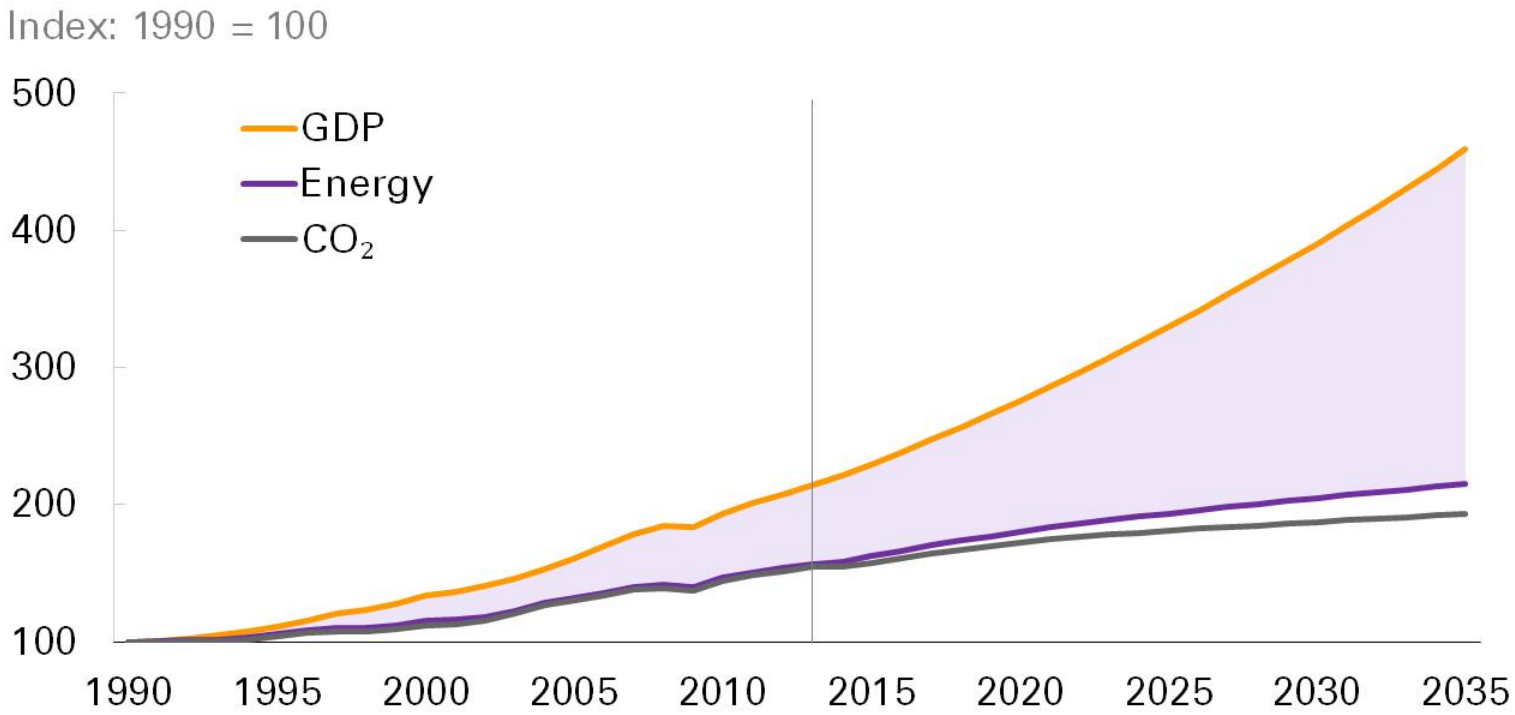
Climate policies

what if policymakers take more actions to reduce emissions?

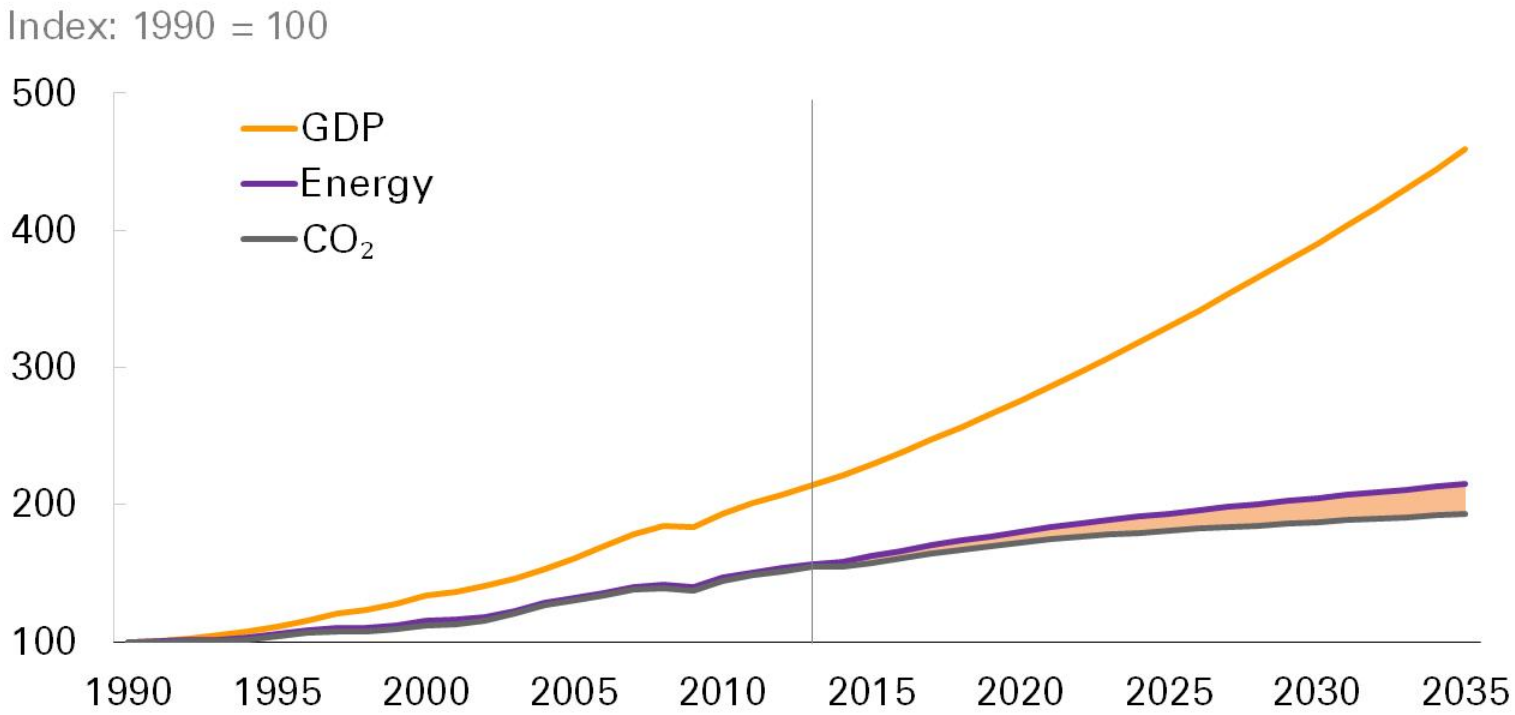
GDP, energy demand and carbon emissions



GDP, energy demand and carbon emissions

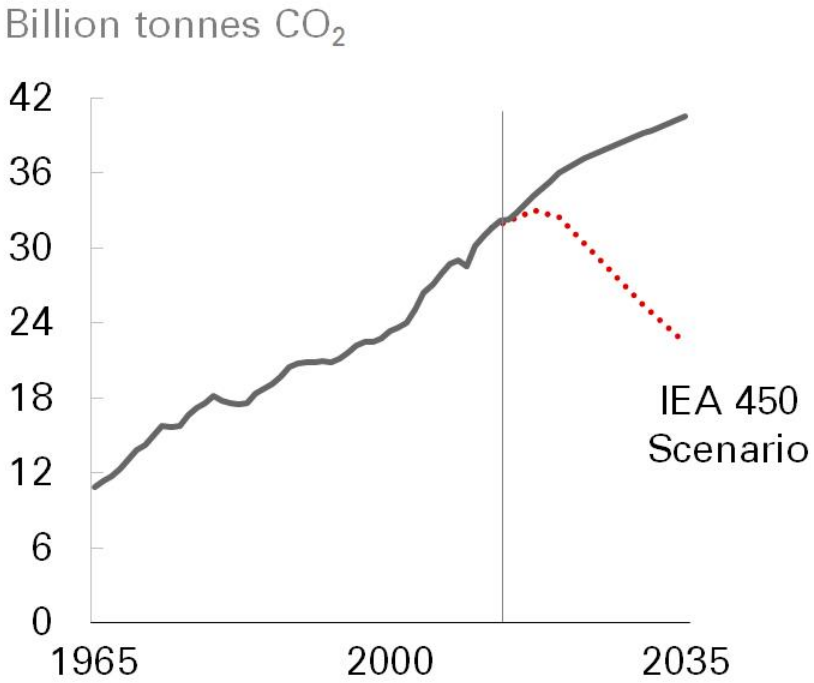


GDP, energy demand and carbon emissions



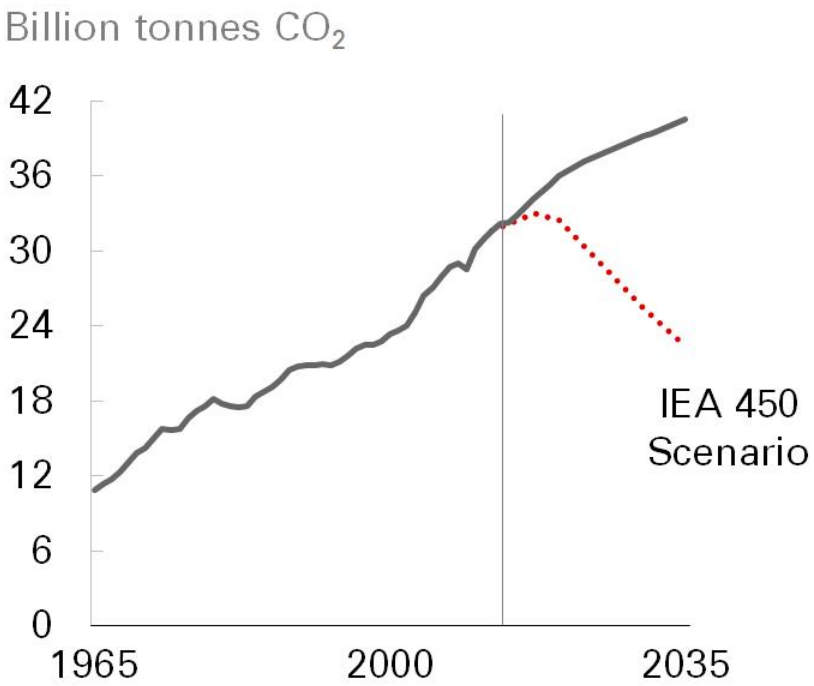
Carbon emissions

Global emissions



Carbon emissions: some possible options

Global emissions



Options that achieve equal CO_2 emissions reductions

Abatement option	Change required
Replace coal with gas in power (% of total power)	1%
Add CCS to coal power plants (% of total power)	0.7%
Increase renewables power generation	11%
Increase nuclear power generation	6%
Improve vehicle efficiency	2%
Improve 'other sector' energy efficiency	1%
Improve efficiency of power production	1%

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Conclusion

Continuous change is the norm for energy markets

- Changing energy mix
  - gas fastest growing fossil fuel, coal the slowest
  - continued rapid growth in renewables
- Changing energy trade patterns
  - increasingly flowing from West to East
- Changing the carbon emissions path?
  - no silver bullet, need action on many fronts
  - let the market pick the winners

A trend is a trend is a trend.
But the question is, will it bend?
Will it alter its course
Through some unforeseen force
And come to a premature end?

(Alec Cairncross)

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Q&A

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