International Energy Agency
Secure Sustainable Together

WORLD ENERGY OUTLOOK 2017

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BRU21 Conference 2017

Trondheim, 30 May 2017

Global CO_2 emissions flat for 3 years

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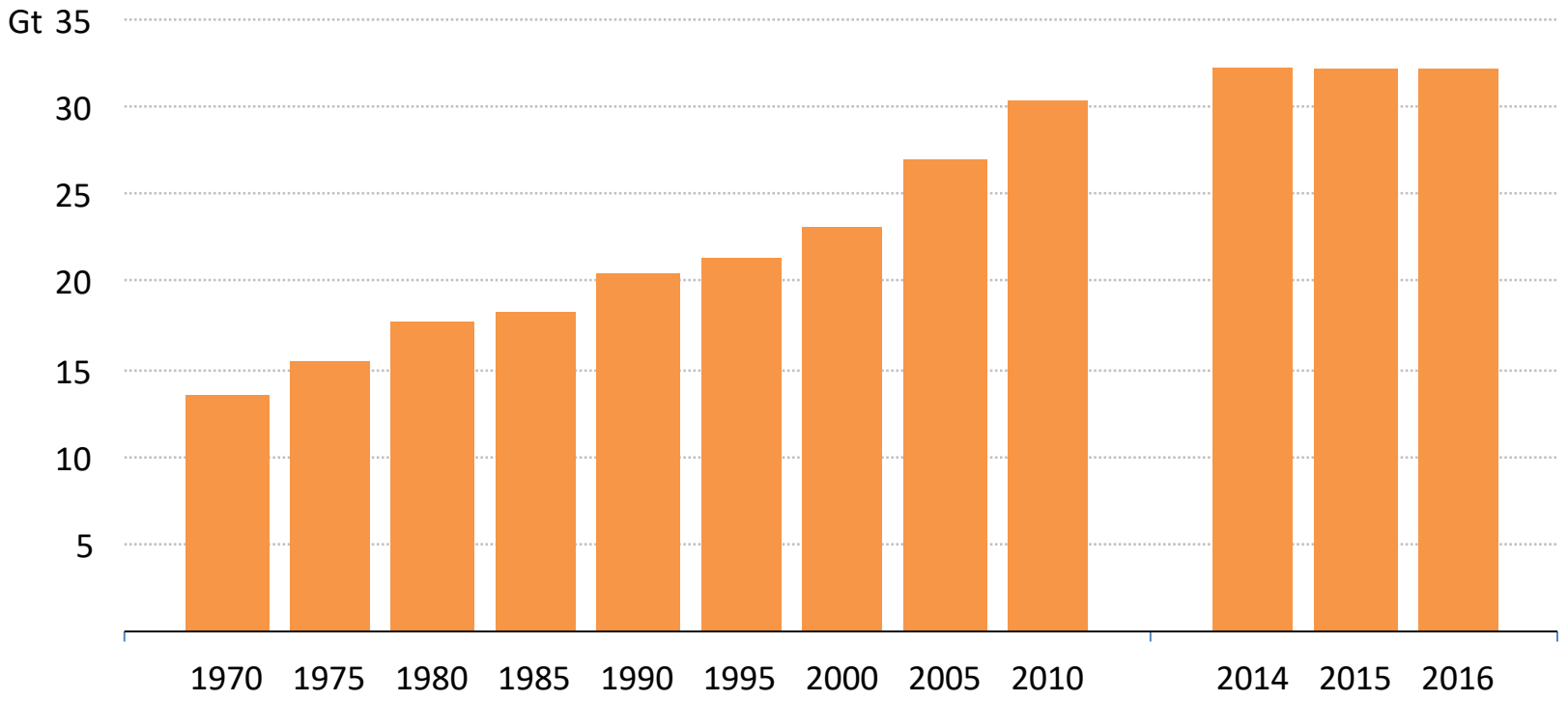
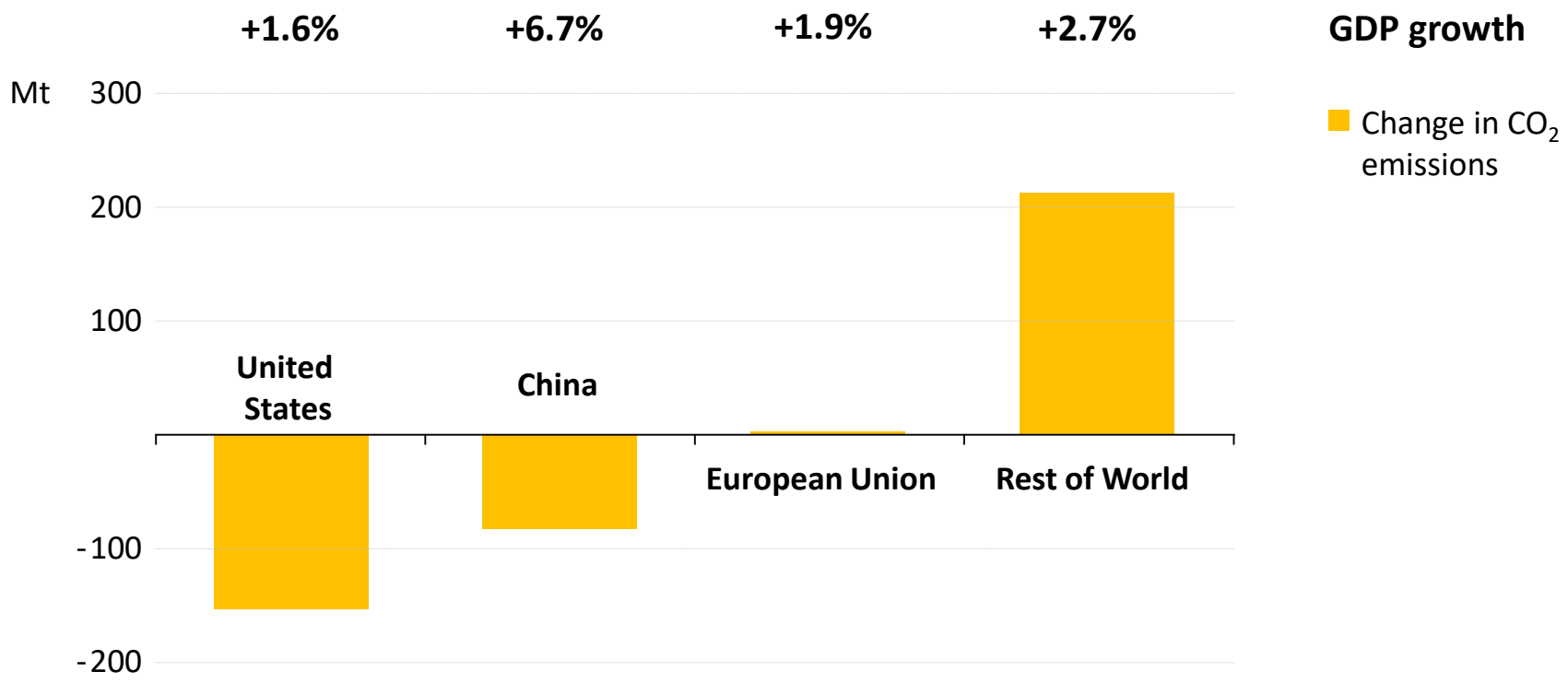
Global energy-related CO_2 emissions



IEA analysis for 2016 shows that global CO_2 emissions did not increase for the third consecutive year in a row, even though the global economy grew

.. with regional variations

Change in annual energy-related CO_2 emissions, 2016



Coal-to-gas switching, alongside strong growth in low-carbon fuels & technologies, has been instrumental to the fall in emissions in the United States & China

But this is not (yet) a story about oil

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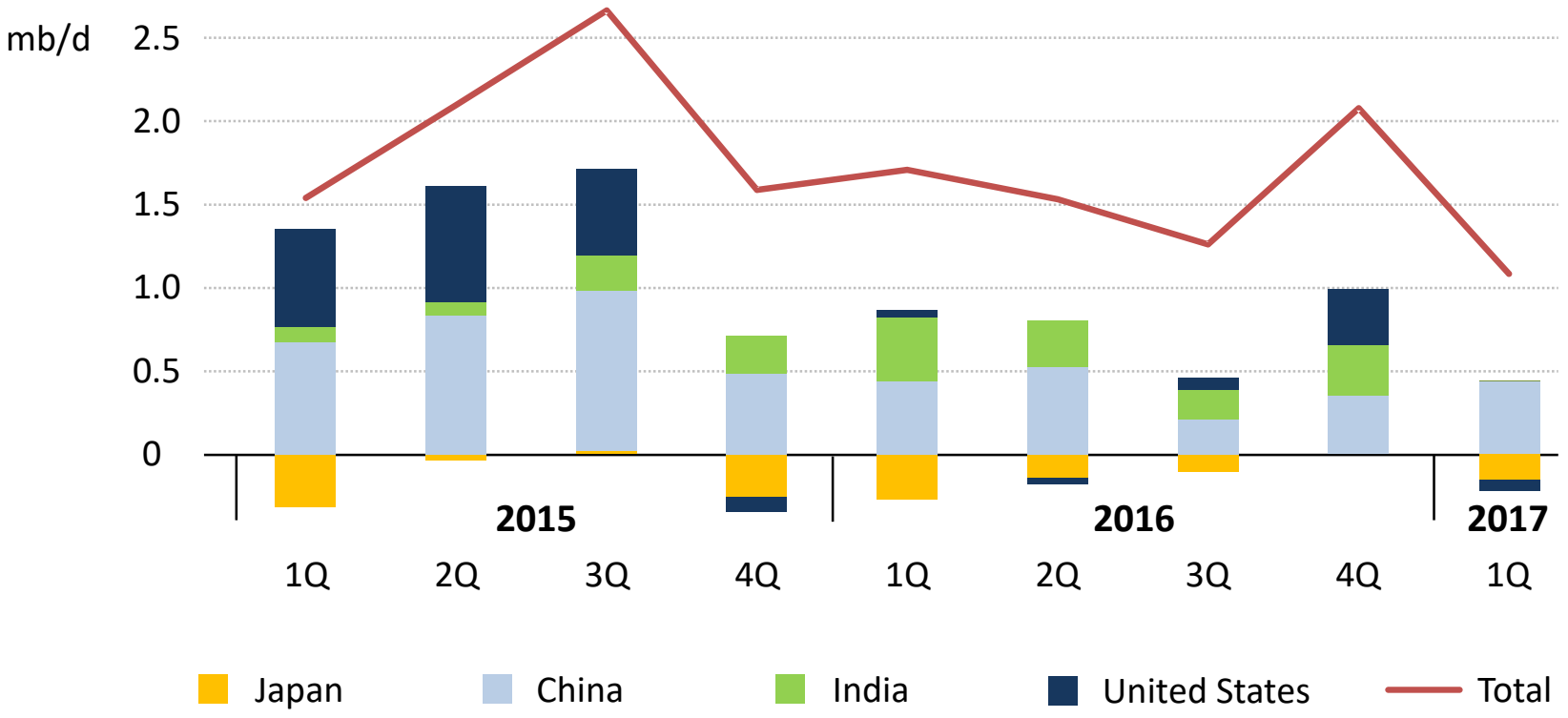
Global oil demand growth, year-on-year



Demand growth has decelerated since 2015, but lower prices have helped to keep year-on-year growth in consumption well above 1 mb/d

Air pollution is an energy problem

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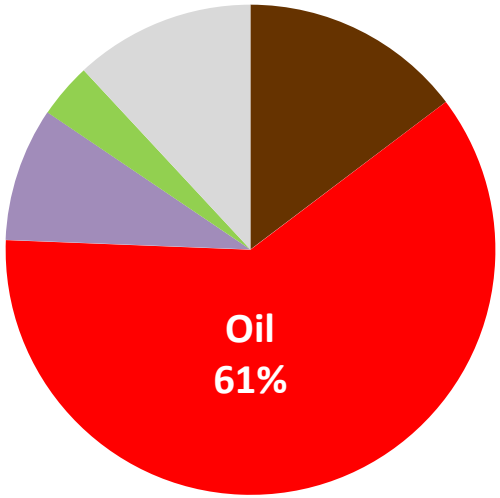
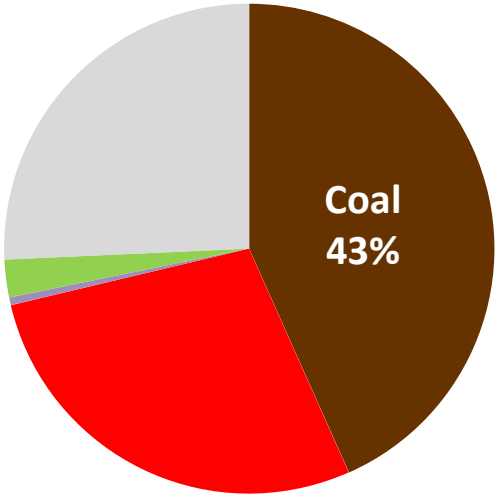
Pollutant emissions, 2015

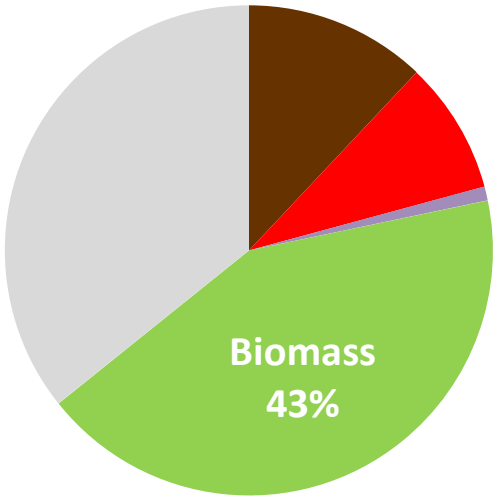
Nitrogen oxides (NO_X)
108 Mt



Sulfur dioxide (SO_2)
81 Mt



Fine particulate matter ($PM_{2.5}$)
41 Mt



Coal Oil Gas Bioenergy Other

Source: WEO Special Report: Energy and Air Pollution

Energy is the single most important cause of emissions of all the main pollutants

Global demand: emerging economies set the pace

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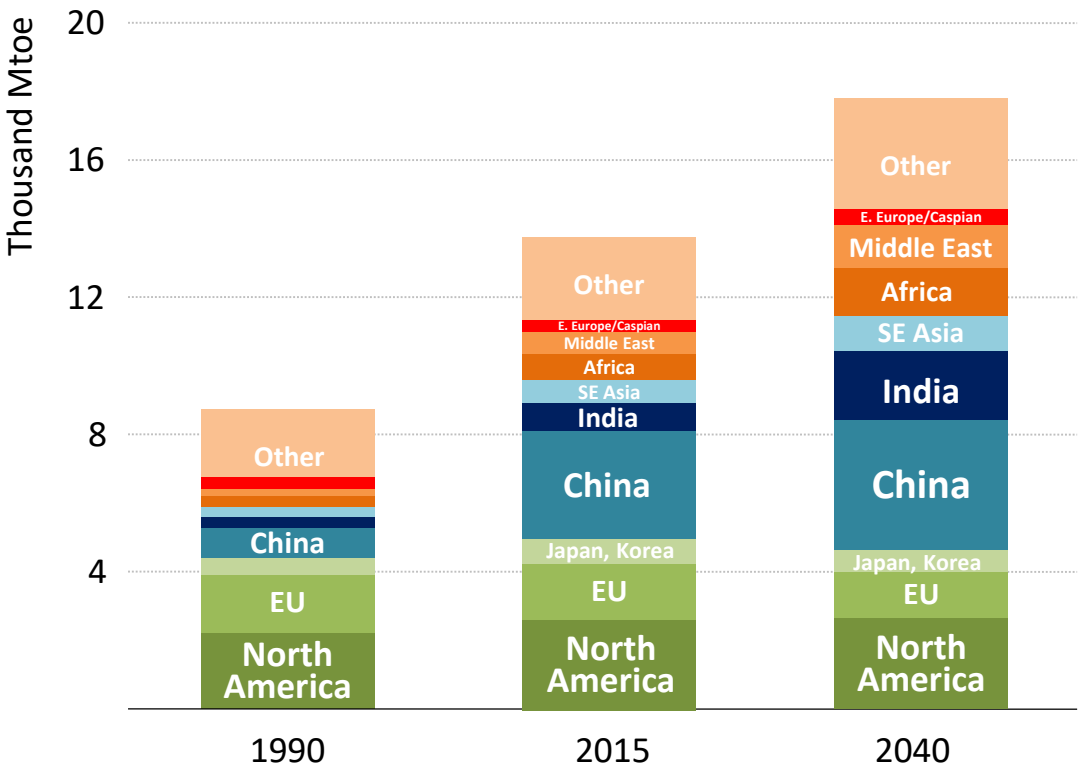
Primary energy demand by region



Rising access, incomes & urbanisation mean that emerging economies, led by India, account for all of the growth in global energy demand growth to 2040

A new ‘fuel’ in pole position

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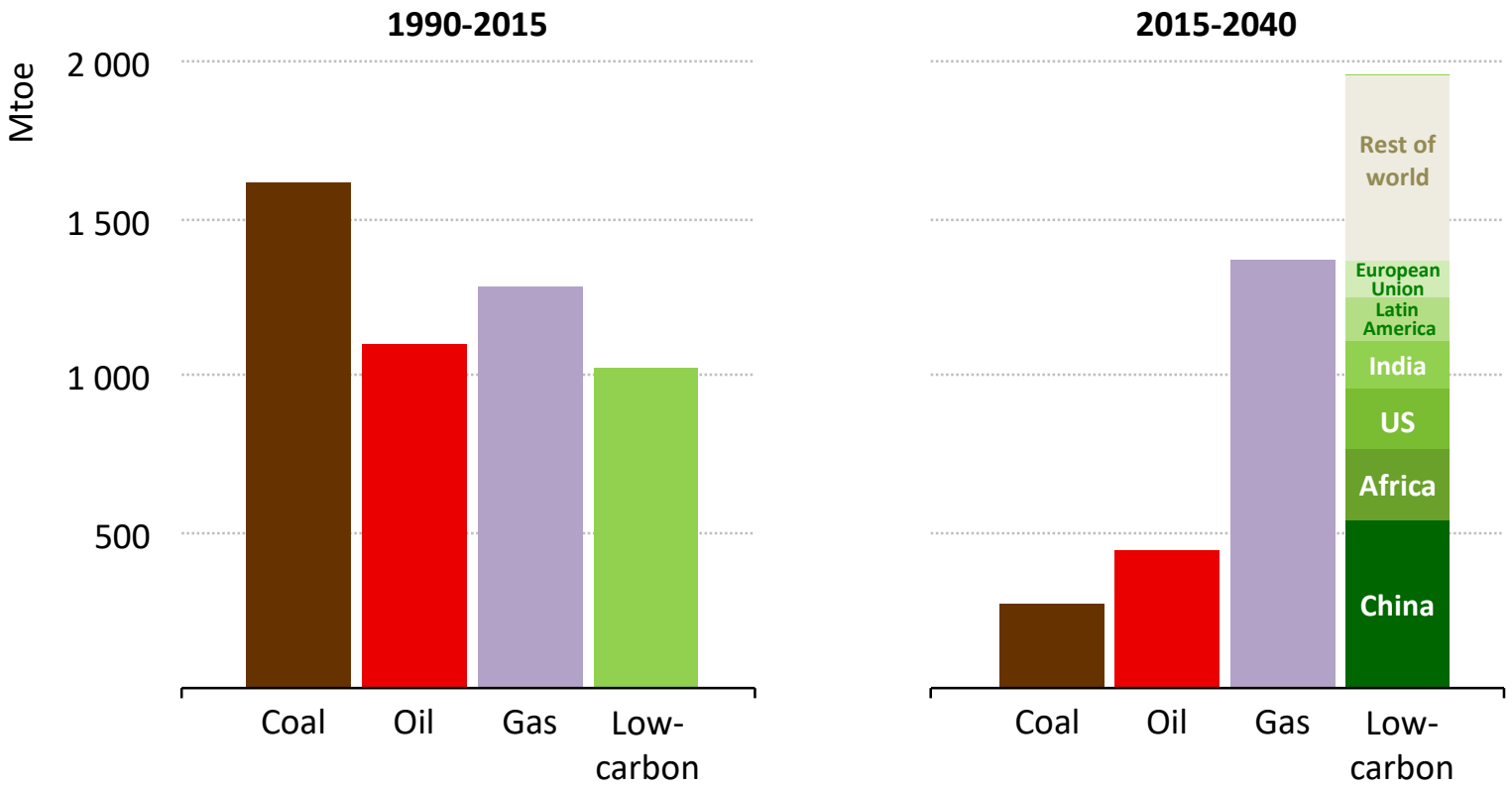
Change in total primary energy demand



Low-carbon fuels & technologies, mostly renewables, supply nearly half of the increase in energy demand to 2040

China's economic transition re-shapes global trends

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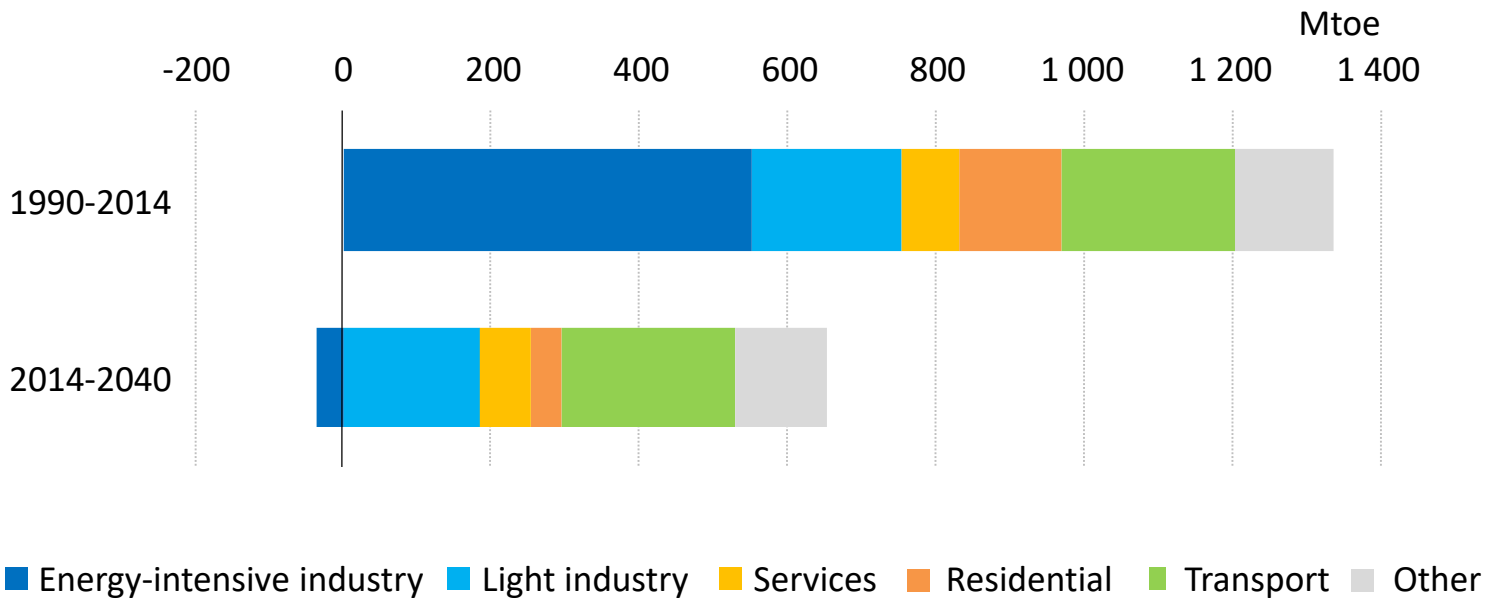
Change in total final energy consumption in China



China's energy-intensive industries are no longer the spur for future growth; the resulting fall in coal demand makes way for a strong rise in electricity & gas use

Renewables are increasingly competitive in all markets

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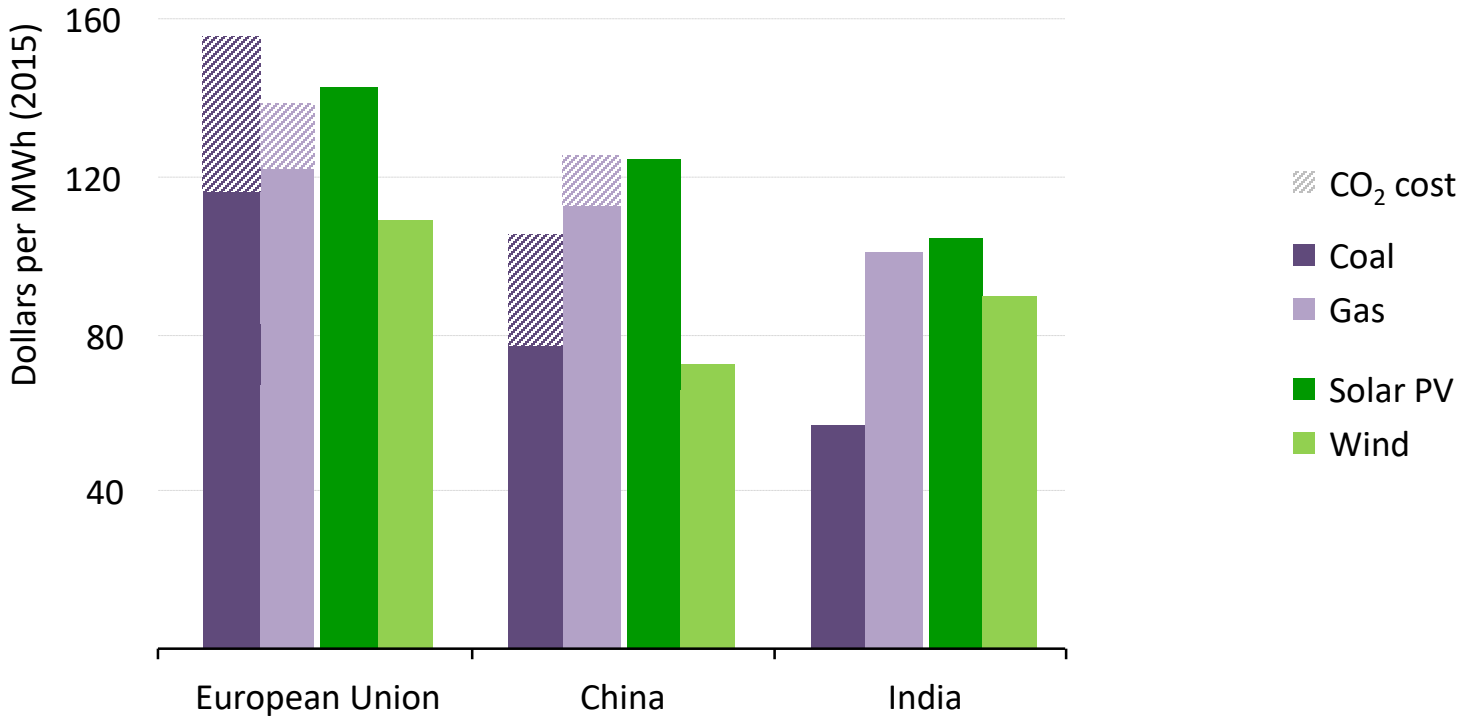
Levelised cost of electricity by selected technologies, 2040



Falling costs and rising electricity prices lead more renewables to be competitive; by 2040, nearly half of wind and solar PV do not require any subsidies

An oil market in the balance

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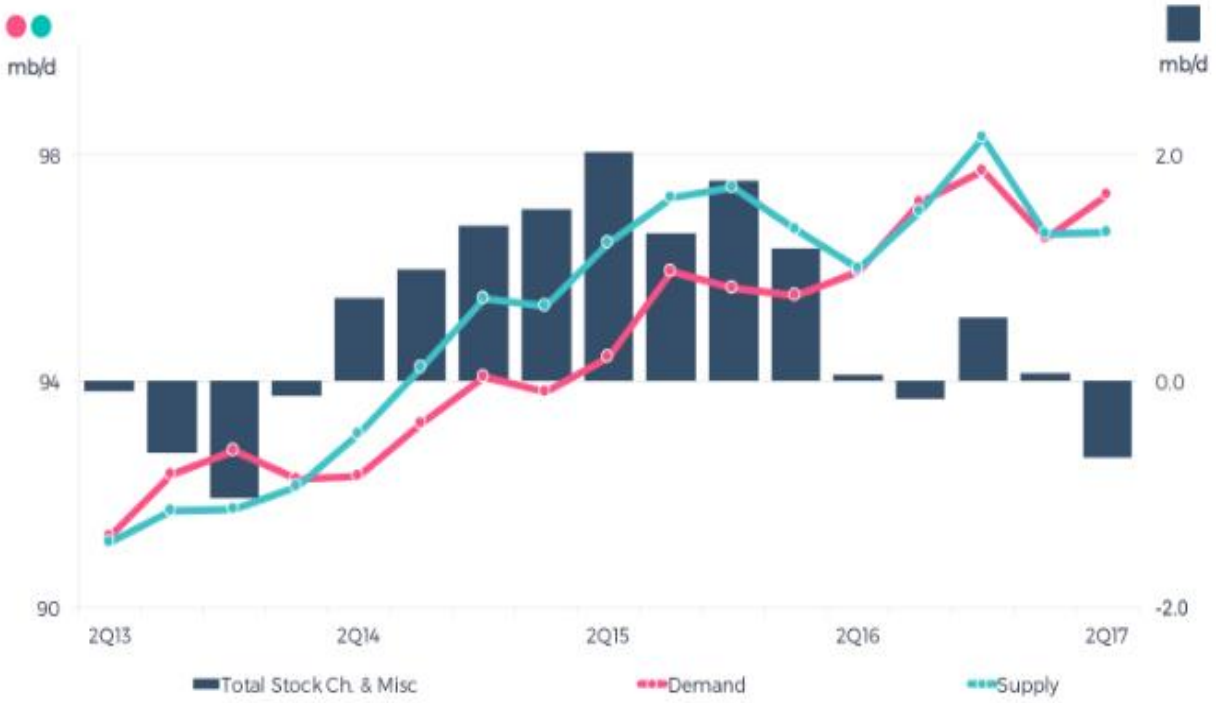
Demand / supply balance until 2Q 2017



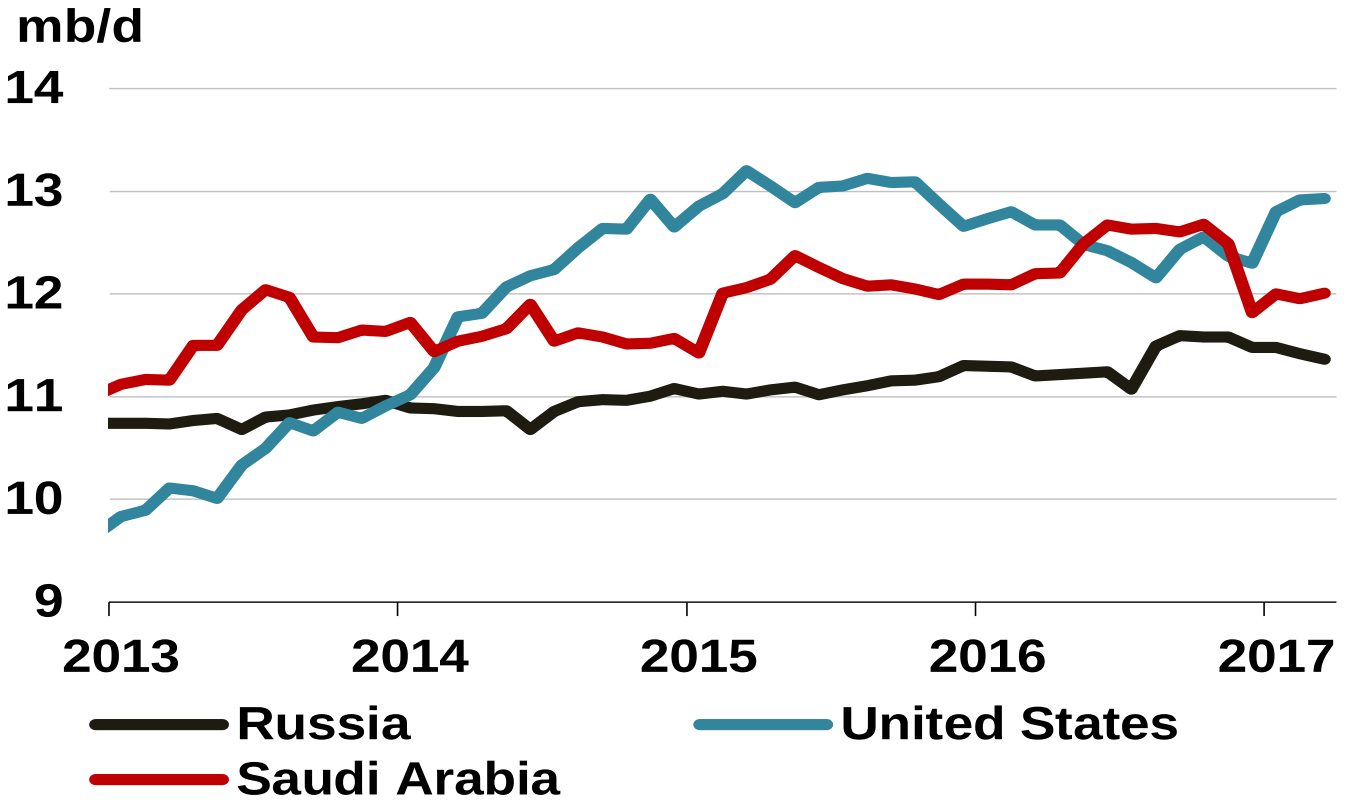
Note: For scenario purposes only, IEA assumes OPEC Production remains unchanged to end-2Q17

Source: IEA Oil Market Report

In 2Q17, if OPEC's crude oil production level of 31.8 mb/d is maintained & nothing changes elsewhere in the balance, there is an implied stock draw of 0.7 mb/d

An oil market in the balance

World's largest oil producers (total liquids)



Source: IEA Oil Market Report

But things are changing elsewhere, notably in the US shale sector where, as of May, the rig count had doubled from a year earlier

Entering a period of greater oil market volatility

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- Approvals of new conventional crude oil projects in 2015-2016 have fallen to the lowest level since the 1950s
- If approvals remains low in 2017, an unprecedented effort will be needed to avoid a supply-demand gap in a few years' time
- US tight oil provides a potential lifeline, but cannot be relied upon to cover a major shortfall in the 'baseload' of oil supply
- Without a pick-up in investment, or a rapid slowdown in demand growth, the stage is set for the next boom-and-bust cycle for oil

No peak yet in sight, but a slowdown in growth for oil demand

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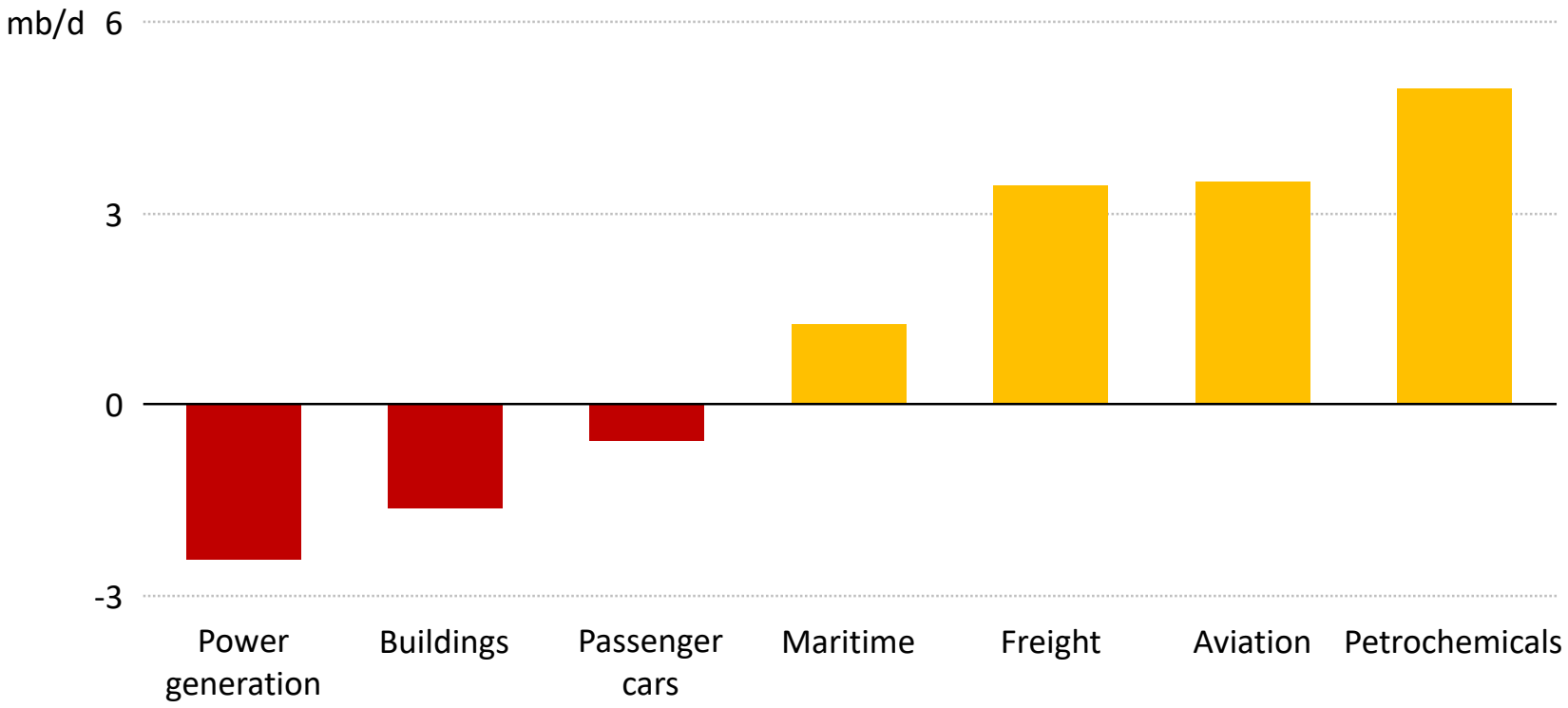
Change in oil demand by sector, 2015-2040



The global car fleet doubles, but efficiency gains, biofuels & electric cars reduce oil demand for passenger cars; growth elsewhere pushes total demand higher

A wave of LNG spurs a second natural gas revolution

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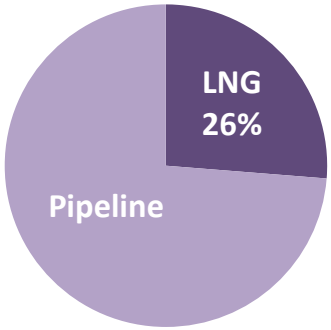
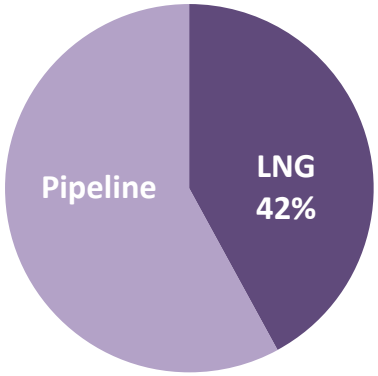
Share of LNG in global long-distance gas trade

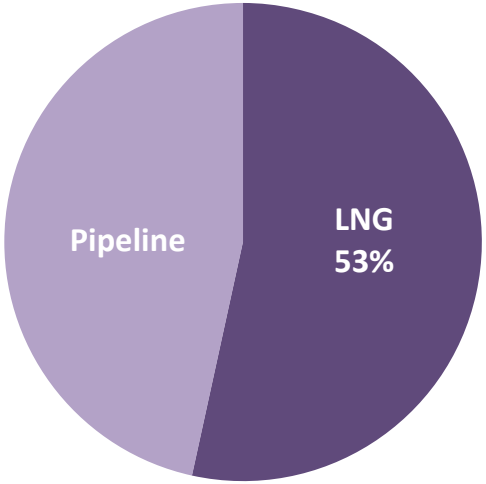
2000
525 bcm



2014
685 bcm



2040
1 150 bcm



Contractual terms and pricing arrangements are all being tested as new LNG from Australia, the US & others collides into an already well-supplied market

Unfinished business

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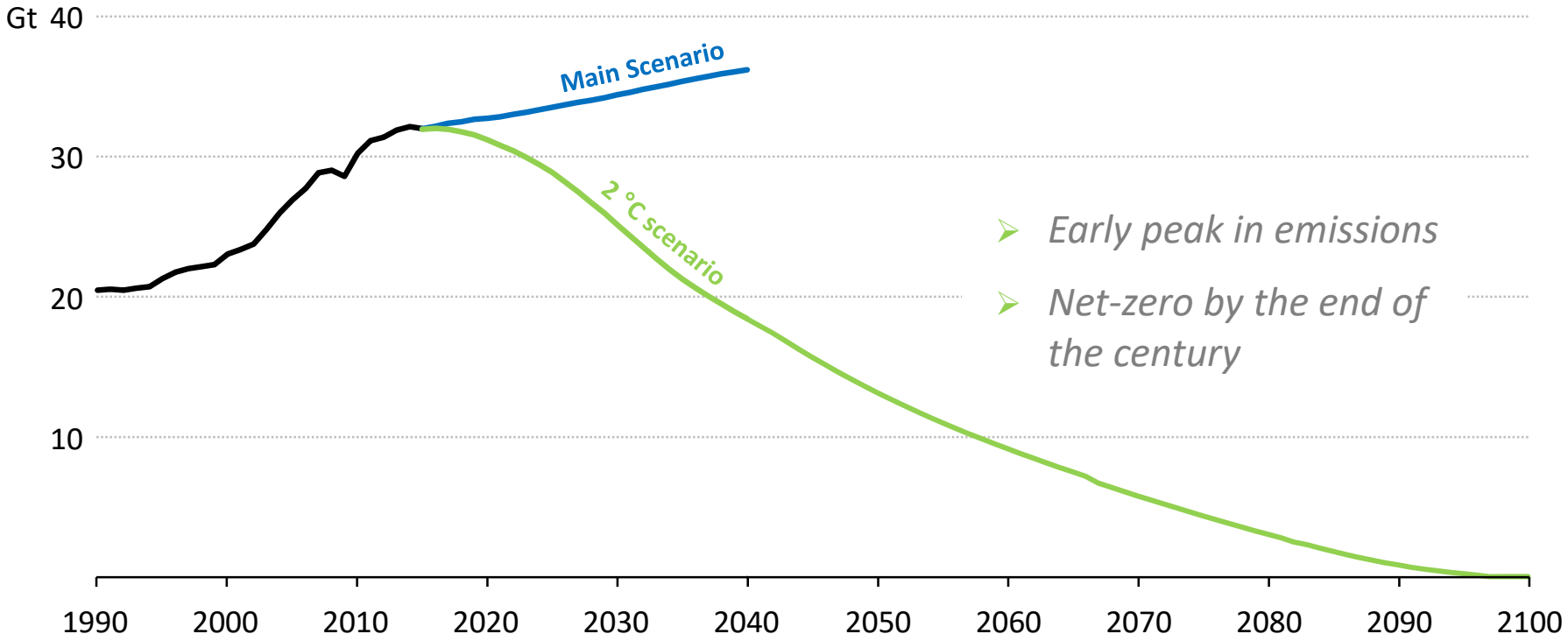
Energy-sector CO_2 emissions



- *Early peak in emissions*
- *Net-zero by the end of the century*

Current pledges fall well short of limiting the temperature increase to below 2 °C

… but new investment still needed

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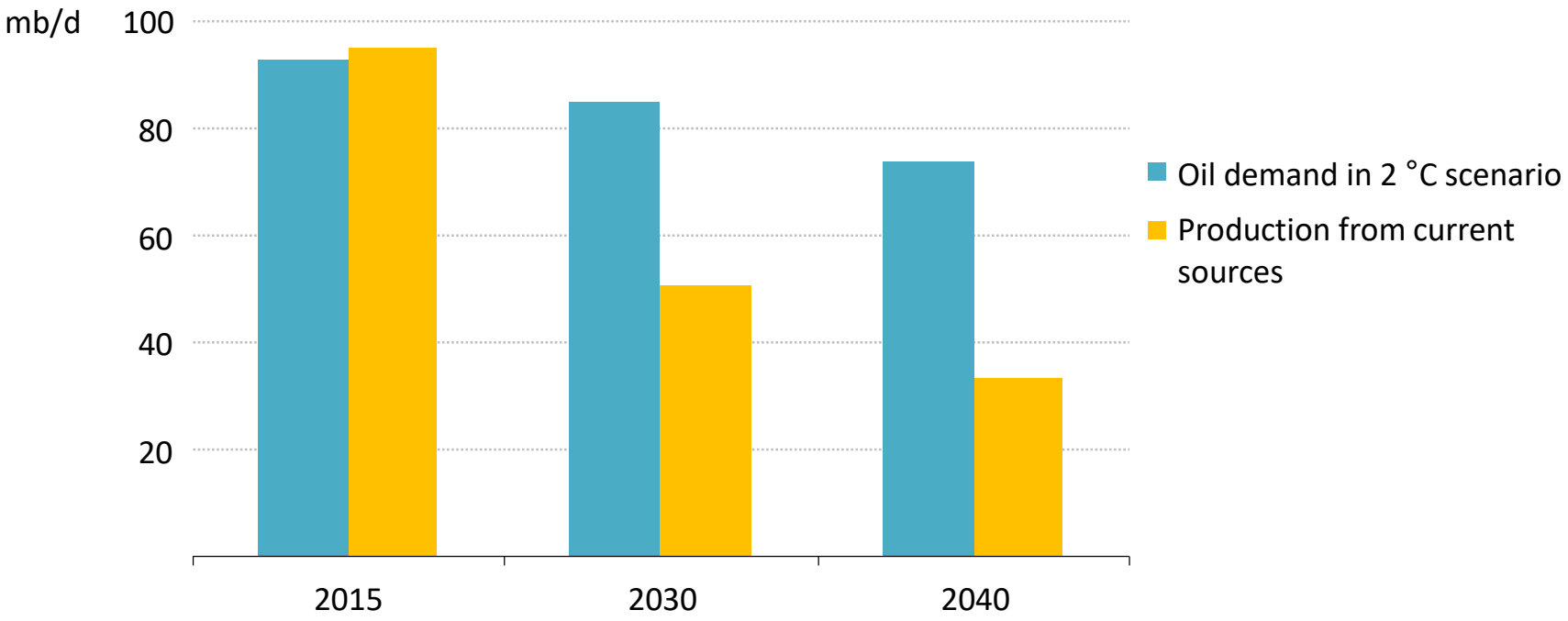
Global oil demand in 2 °C scenario & decline in current supply sources



Production from today's fields declines much faster than the fall in oil demand in a 2 degree scenario, leaving a gap that needs to be filled with new investments

Conclusions

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- Energy security remains a major concern; potential vulnerabilities are growing, so too is the range of tools available to address them
- New oil market dynamics & subdued conventional upstream investment are ushering in a period of greater market volatility
- A wave of LNG is the catalyst for a second natural gas revolution, with far-reaching implications for gas pricing & contracts
- The next chapter in the rise of renewables requires policies to push their role in heat & transport & changes in power market design
- There is no single story about the future of energy: reaching energy & environmental goals depends on government policy actions