International Energy Agency

Natural gas fuel switching and emissions implications

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The role of gas in today's energy transitions + Methane Tracker

- *The Role of Gas in Today's Energy Transitions,* released in July 2019, examines the role of fuel switching, primarily from coal to natural gas, to reduce CO_2 emissions and air pollutants.

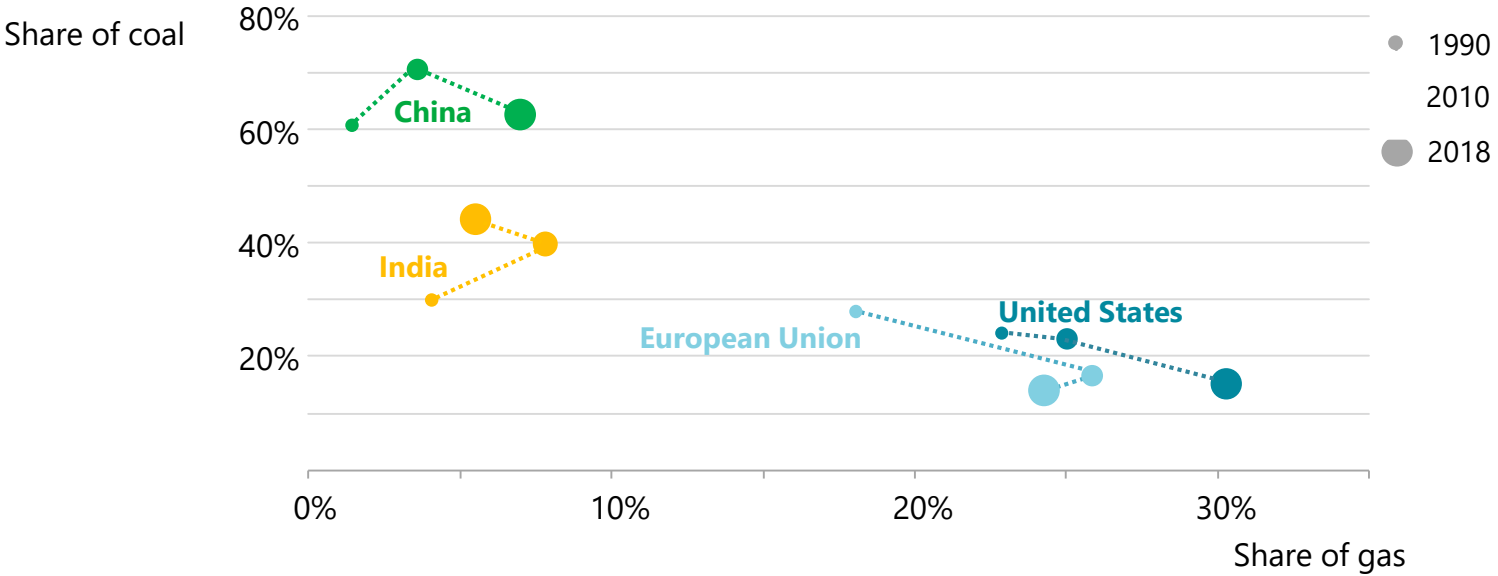
- Four case studies, covering the United States, the European Union, China, and India, reveal the various opportunities, hurdles and limits of fuel switching as a way to address environmental challenges.

- The IEA has also released a 'Methane Tracker' database, showing country-level estimates of emissions sources along the full oil and natural gas value chains, by resource type.

The Role of Gas report can be freely downloaded here:
https://www.iea.org/publications/roleofgas/
The Methane Tracker can be accessed here:
https://www.iea.org/weo/methane/database/

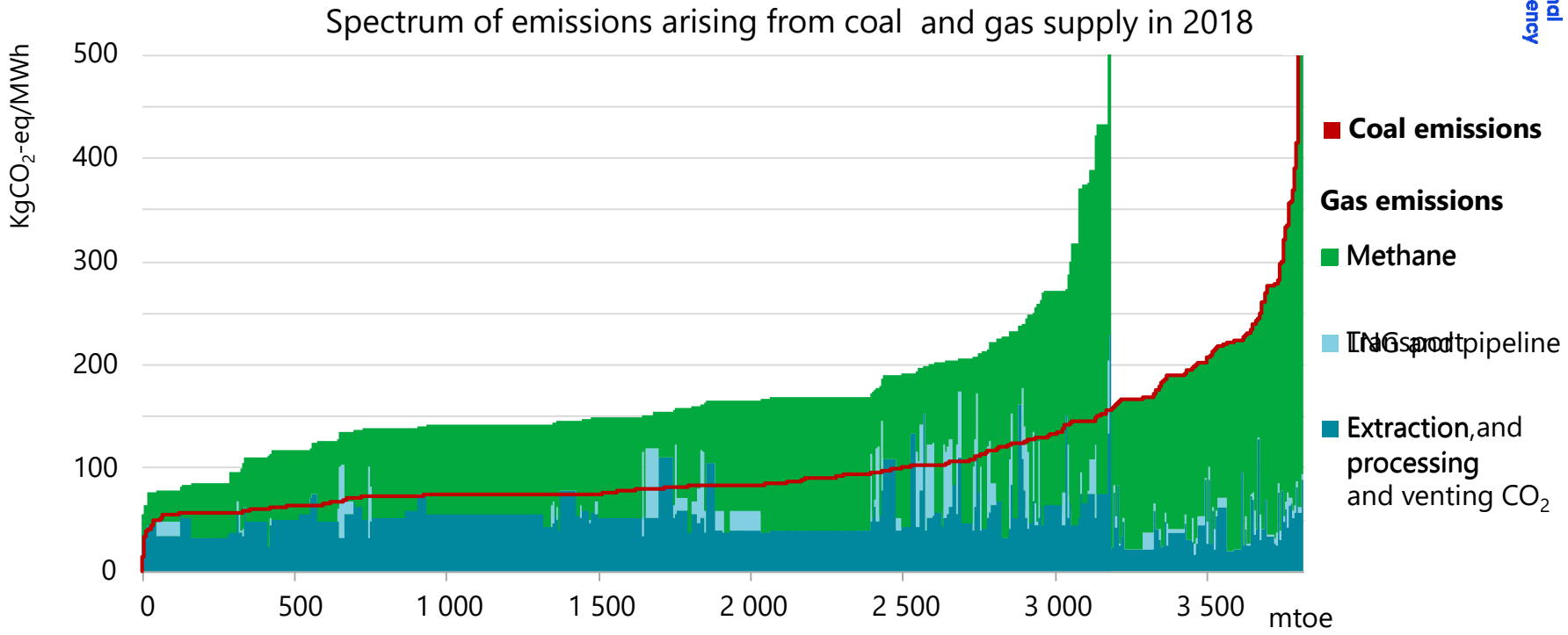
There have been major shifts in the coal-gas balance in key markets

Change in shares of coal and gas in primary energy in selected regions between 1990 and 2018



The shares and trajectories of gas use in major economies have varied widely in recent years. Each region has its own price and policy dynamics that affect the outlook for gas.

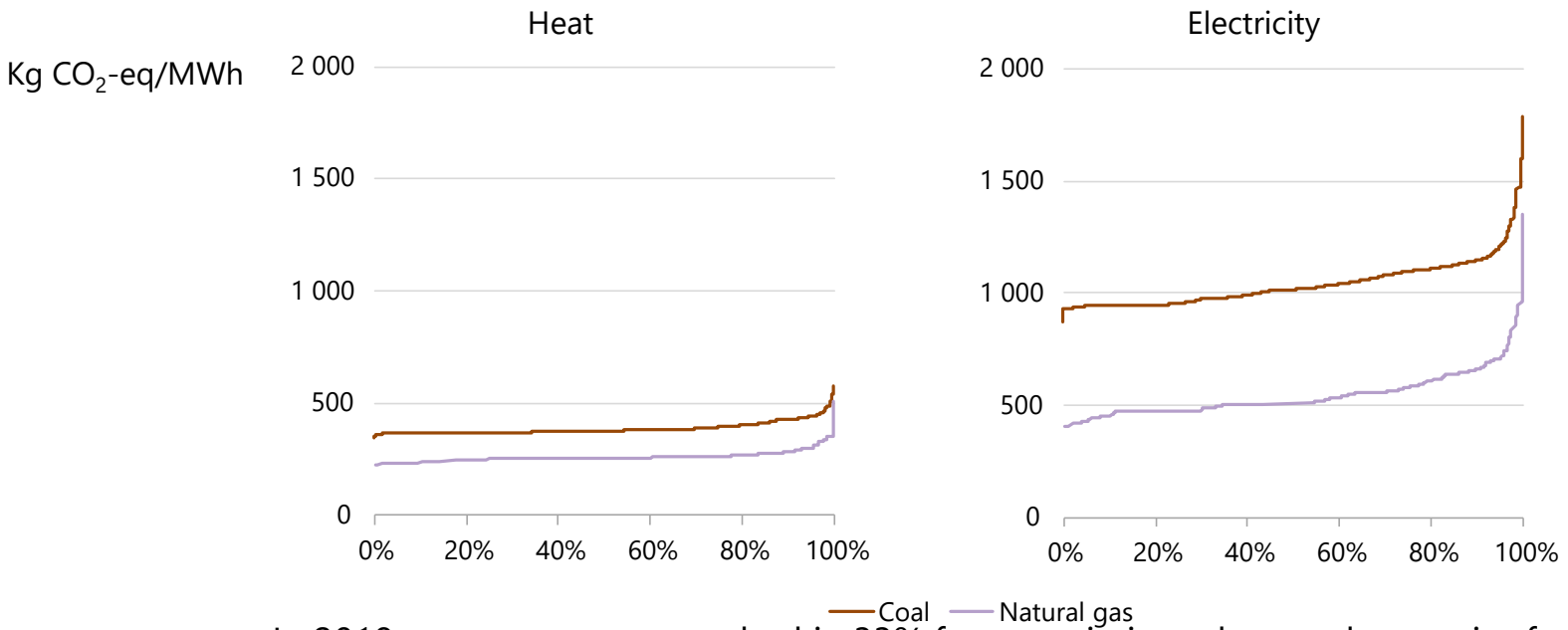
Comparing the indirect emissions from coal versus gas supply



The global average emissions intensity of the coal supply chain is around 120 $kgCO_2$/MWh, a third lower than that of natural gas; on a lifecycle basis, however, 98% of gas is cleaner than coal

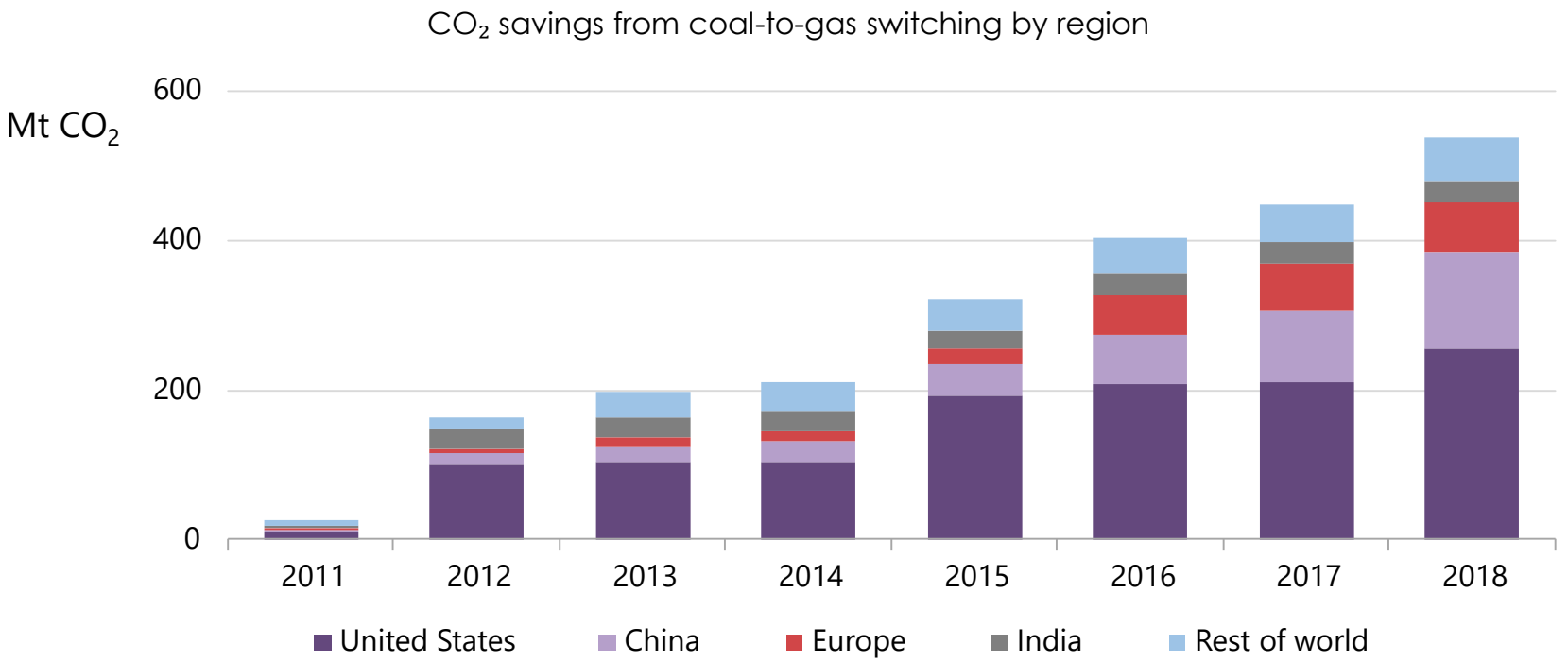
A full lifecycle analysis shows emissions benefits of gas versus coal

Full lifecycle emissions intensity of global coal and gas supply, 2018



In 2018, gas on average resulted in 33% fewer emissions than coal per unit of heat used in industry and buildings, and 50% fewer emissions than coal per unit of electricity generated.

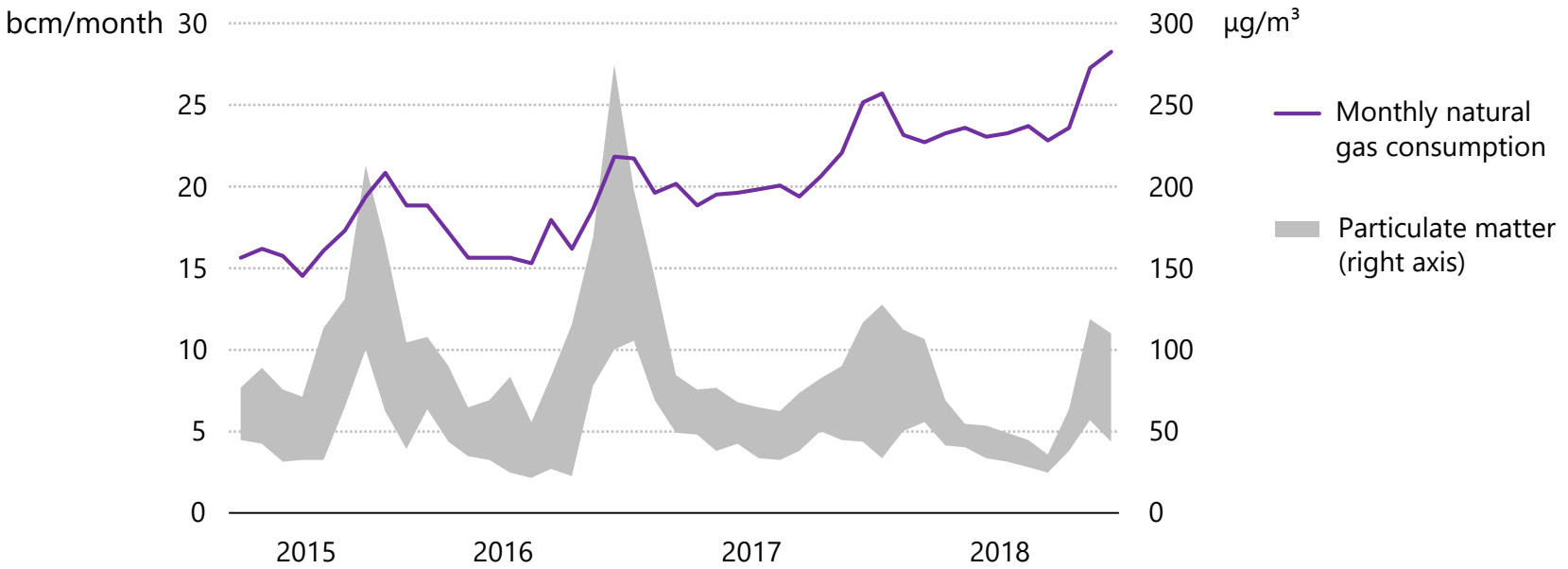
Switching has prevented faster growth in carbon emissions



Coal-to-gas switching has abated over 500 million tonnes of CO_2 since 2010. The United States and China account for the majority of the gains from switching.

Gas has been a key ally in China's war on pollution

China monthly gas consumption vs air quality measurements for targeted cities



Natural gas use results in very few pollutant emissions & lower CO_2 emissions than other fossil fuels. China's drive for cleaner air has been the main impetus for gas growth.

Gas use in China has seen rapid growth in recent years

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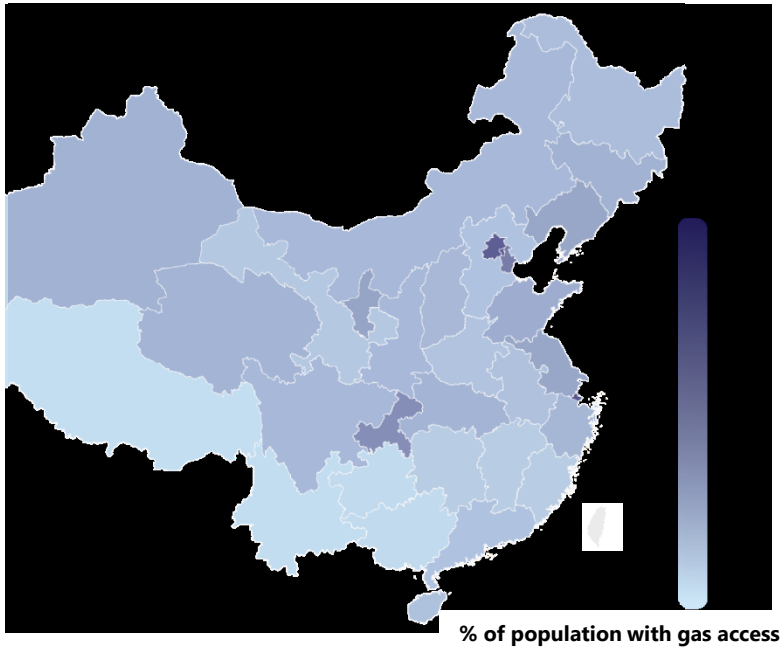
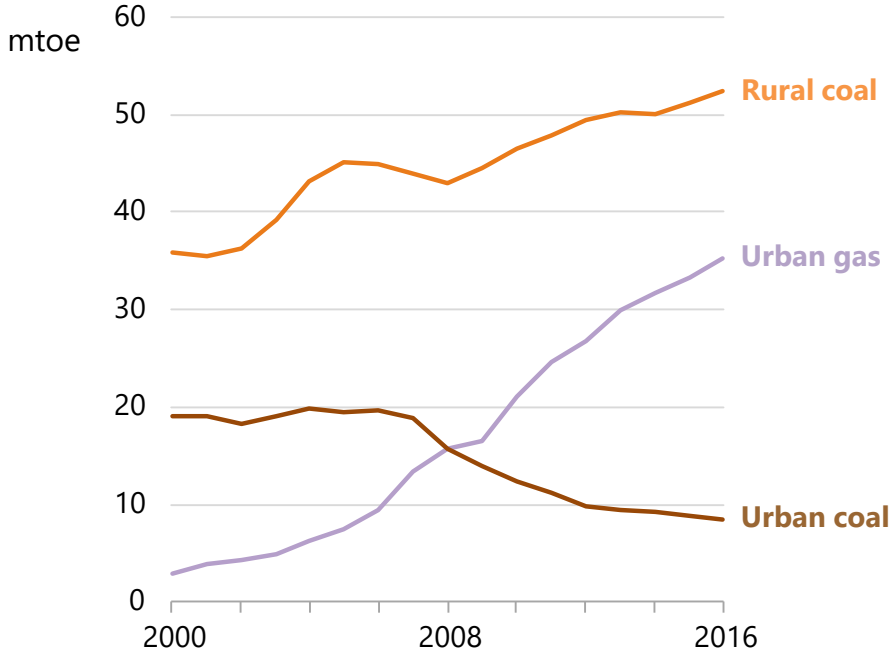
Percentage of the population with access to natural gas



Rural and urban coal and urban gas use in China



Access to natural gas in China has greatly increased in recent years, underpinned by rising gas consumption in China's urban areas.

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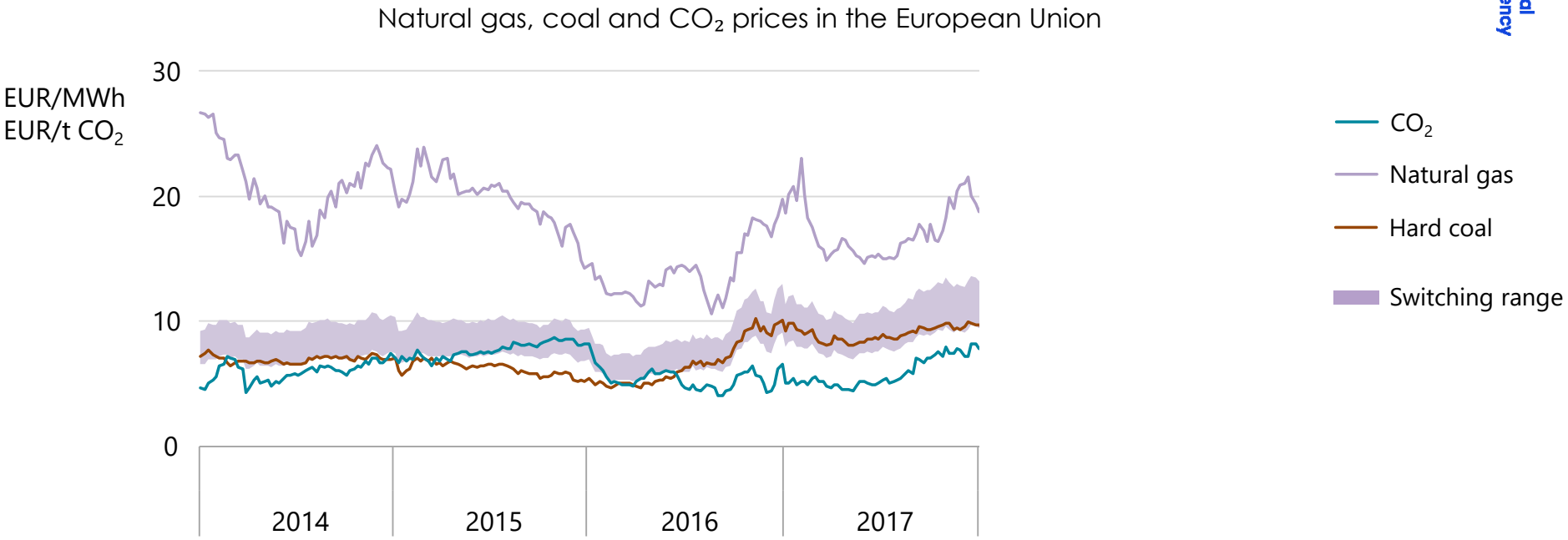
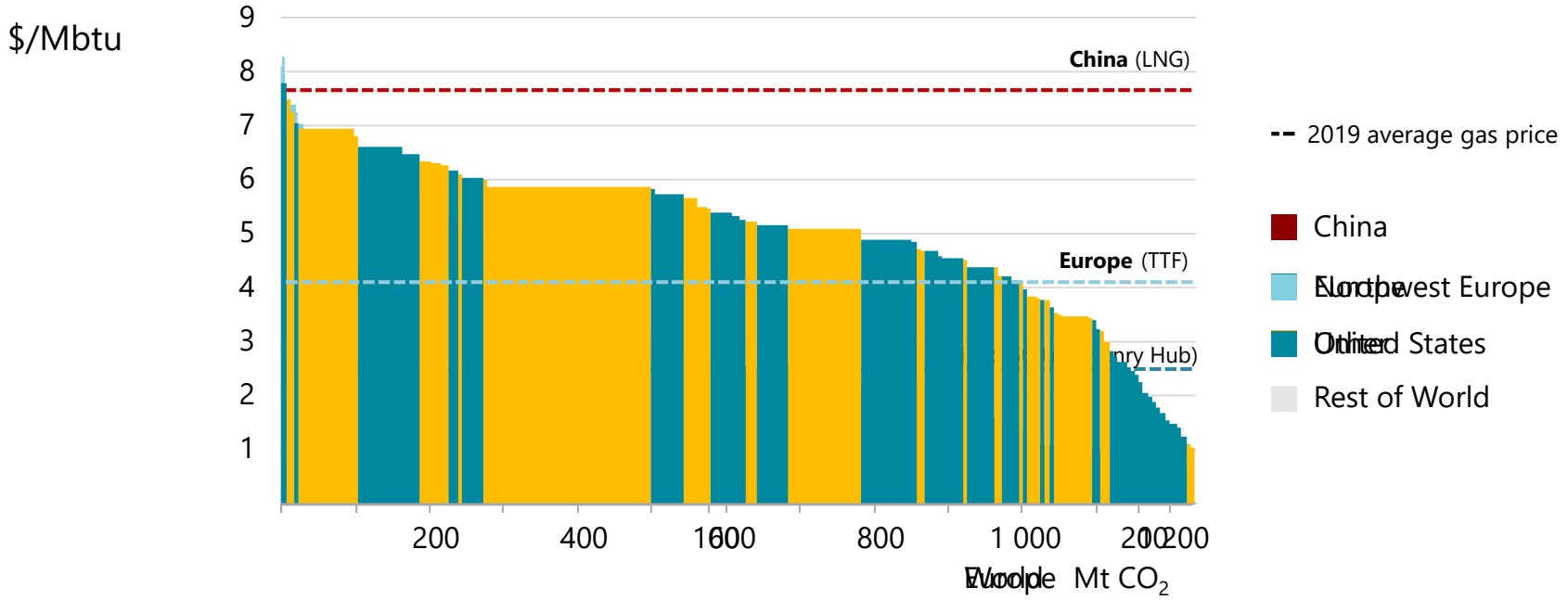
Higher carbon prices and rising LNG supply can support switching



From 2014-17, gas prices were not low enough to beat coal.
With the rise in the carbon price in 2018…
followed by growing international supply of LNG, gas plants in Europe are now cheaper than coal

The switching potential in power is large, if the price is right

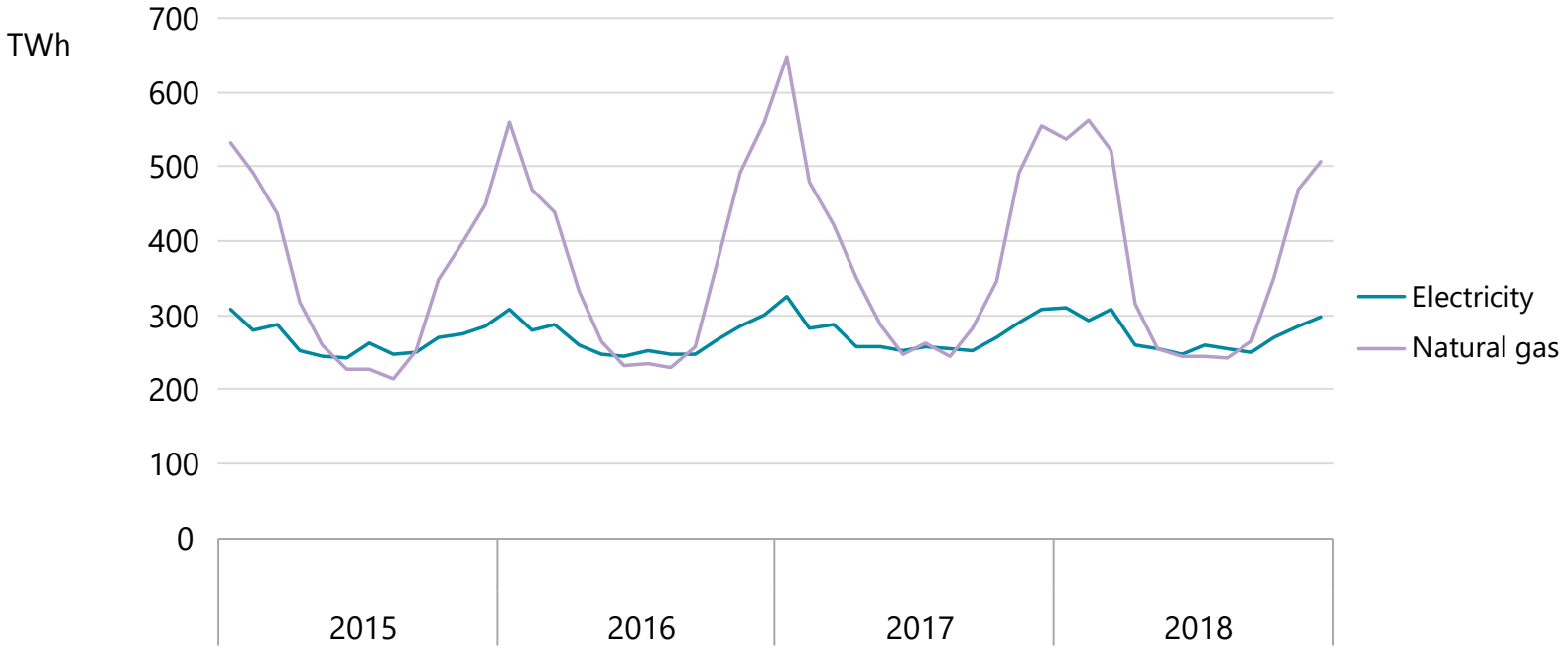
Potential CO_2 savings from coal-to-gas switching in the power sector at different gas prices, 2019



Up to 1 200 Mt CO_2 could be abated worldwide by switching from coal to gas; ageing coal plants and spare gas capacity give the US and Europe an edge, whereas younger, modern coal plants in Asia are harder to beat

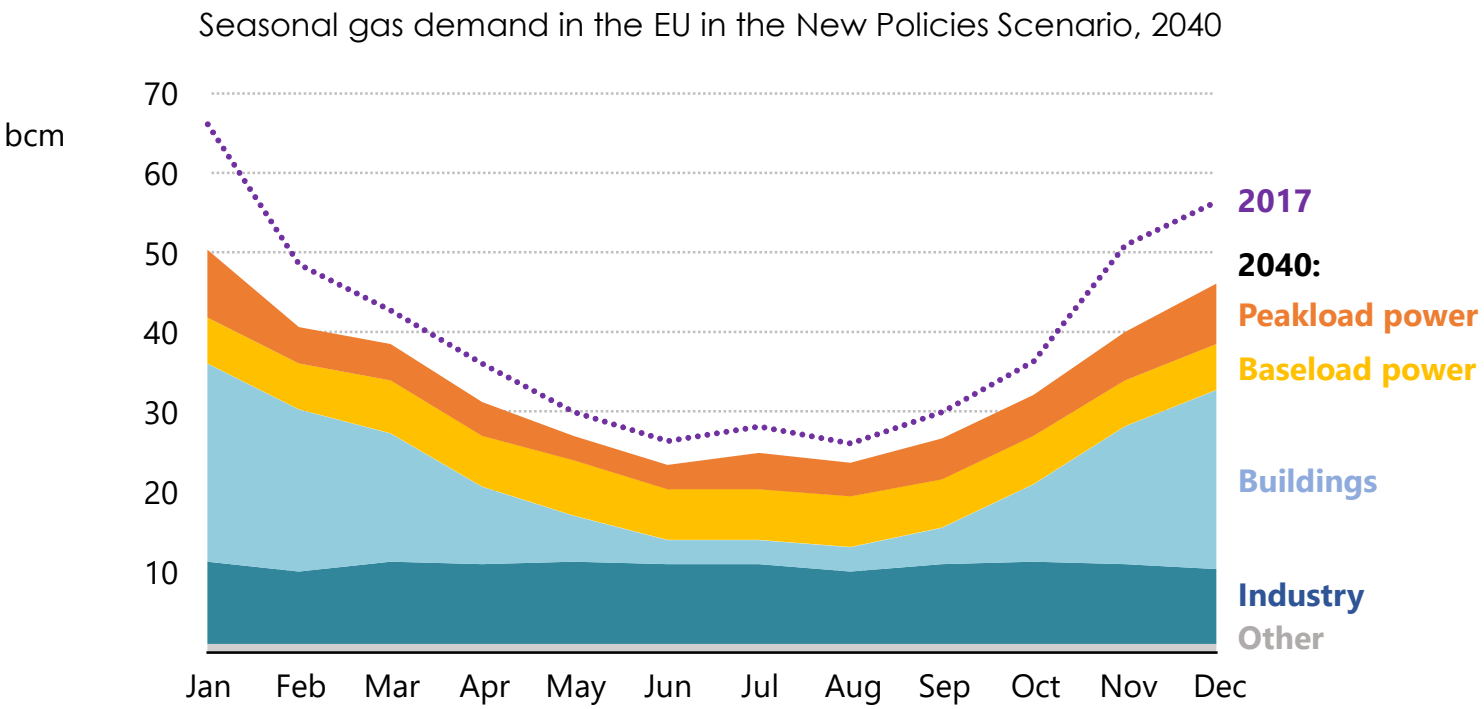
Gas infrastructure is sized to meet significant peaks in demand

Comparing the monthly consumption of electricity and gas in the European Union



Significant demand for heat in buildings means gas plays a crucial seasonal balancing role that is difficult to replicate using electricity.

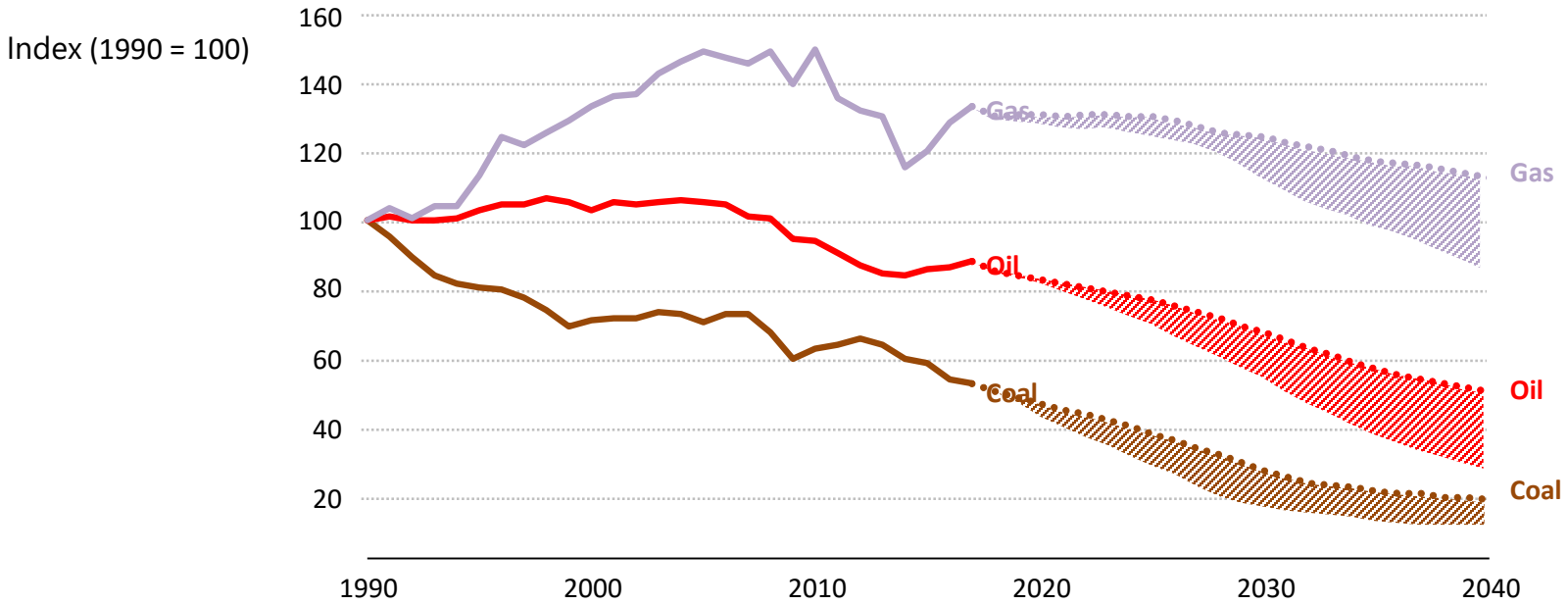
How high is the peak?



Peak demand in the EU is set to decline due to efficiency policies and the electrification of household heat demand; this raises questions for infrastructure operators

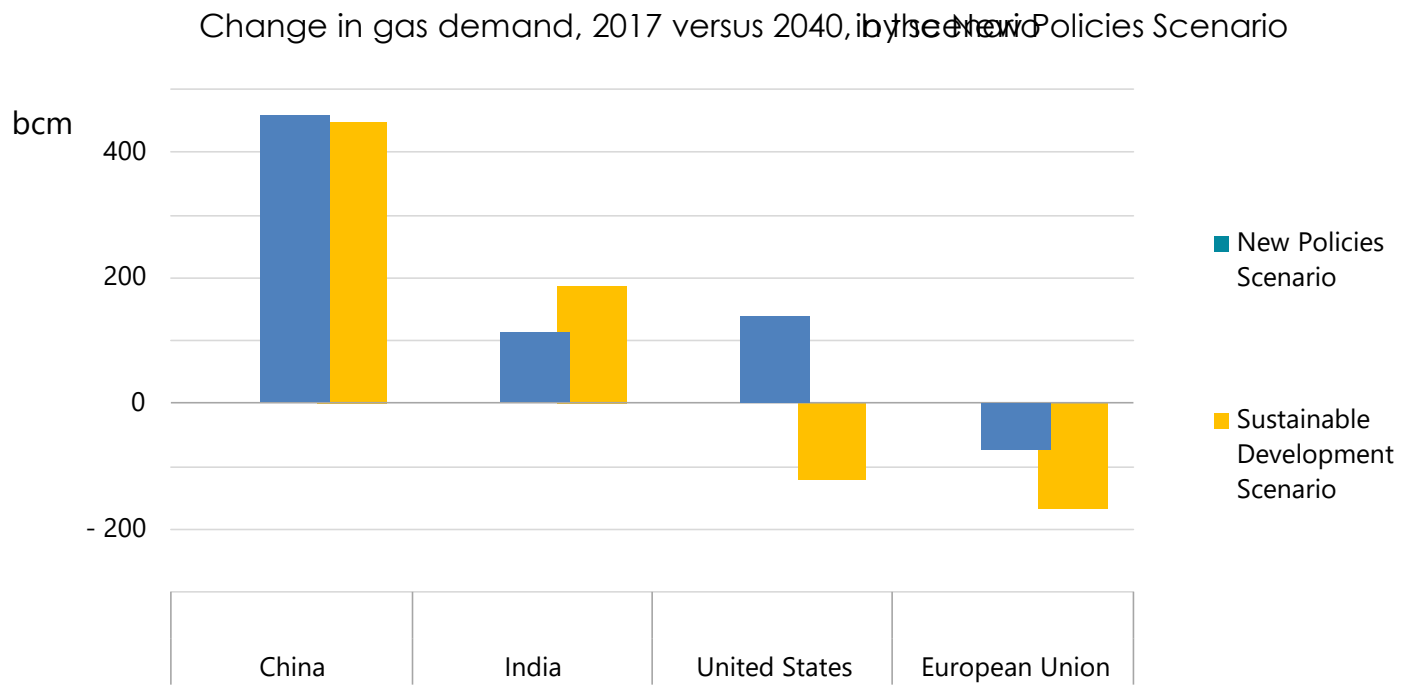
The outlook for European Union gas demand

Demand for gas, oil and coal in the European Union in the New Policies Scenario and Sustainable Development Scenario



For the next decade, the prospects for gas demand in the European Union look relatively upbeat compared with other fossil fuels;
its role is less certain in the Sustainable Development Scenario

The contribution of gas to further emissions reductions differs by region



In the US and EU, the long-term role of gas is challenged by renewables and efficiency. Gas plays a more prolonged role in China and India, helping to push more polluting fuels out of the system

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