



SHELL LNG OUTLOOK 2019



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Content



01

Growing recognition of the role of gas and LNG as the world tackles poor air quality and climate change

02

Asian LNG imports exceed expectations again in 2018 absorbing continued supply growth

03

Near term supply growth expected to be absorbed by Europe and Asia – continued need for investment in supply to meet long-term demand growth



Bunkering of world's first LNG fuelled cruise ship, AIDAnova

Growing recognition of the role of gas and LNG as the world tackles poor air quality and climate change

The energy challenge

Growing population

According to United Nations estimates, the current world population of 7.6 billion is expected to reach 8.6 billion in 2030, 9.7 billion in 2050 and 11.2 billion in 2100. Nearly a billion people still live without electricity while another billion struggle with unreliable supplies of electricity.

Rising demand

By 2070 the world is likely to be using at least 50% more energy than it does today as population grows and people seek to improve their quality of life.

Need for energy solutions

According to the International Energy Agency (IEA), renewable generation is expected to underpin the growth of electricity from 18% to 50% of energy supply by 2050. The remaining energy demand that is difficult to electrify will still require cleaner solutions.

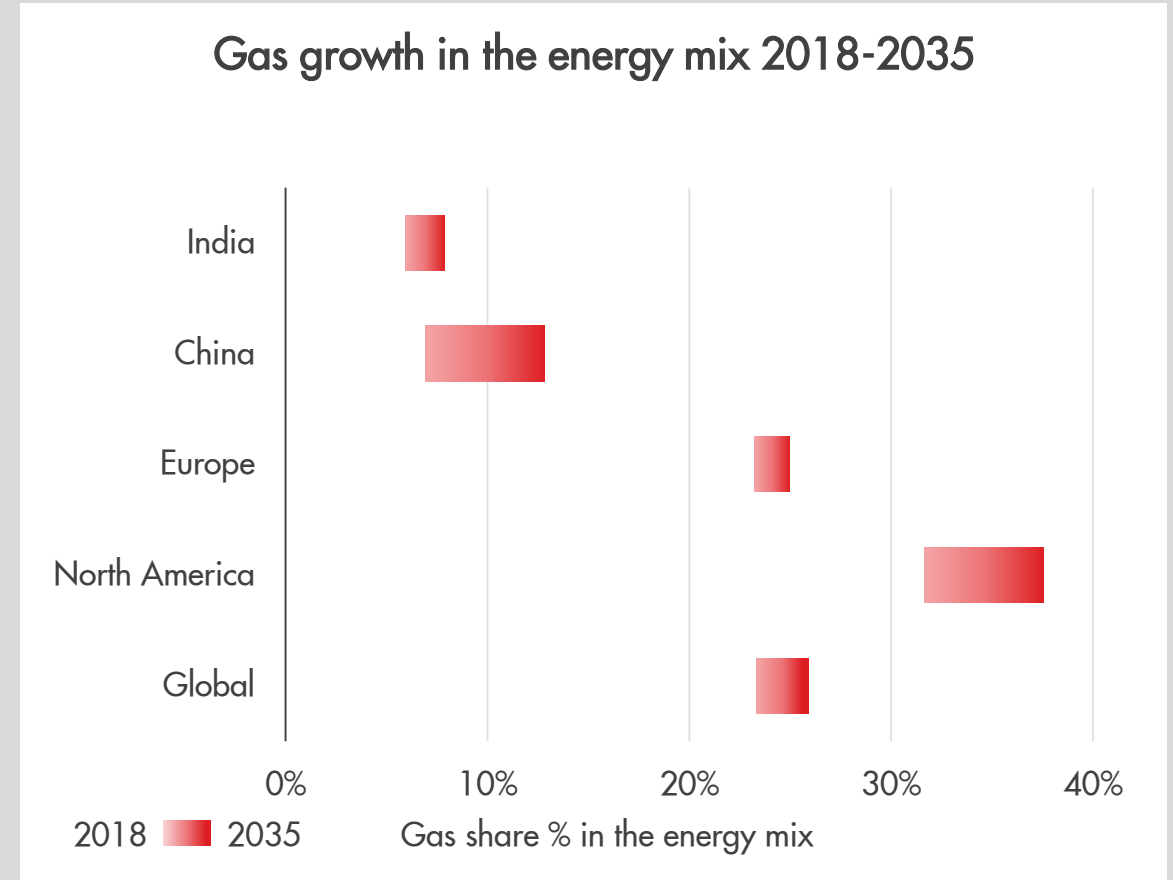
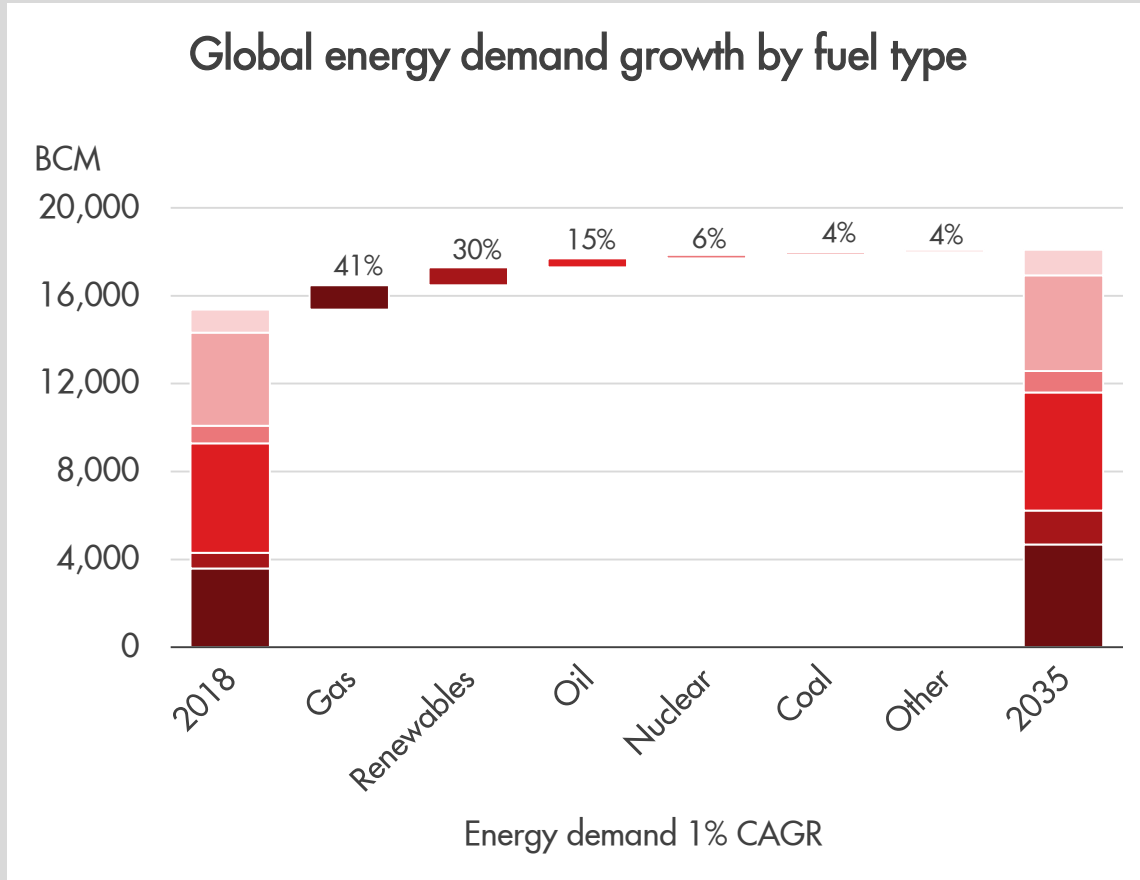
Mitigating climate change

The world currently emits 33 billion tonnes of energy-related CO₂ each year. To limit the rise in global temperature to 2°C, the IEA has calculated that energy related CO₂ emissions need to fall to around 18 billion tonnes a year by 2040. The challenge is not just to reduce emissions, but to do this while providing more reliable energy supplies.

Improving air quality

Updated World Health Organization (WHO) estimates reveal an alarming death toll of 7 million people every year caused by outdoor and household air pollution. According to WHO, global air pollution is linked to inefficient energy use in every sector of human activity including coal-fired power plants, industry, agriculture and transport.

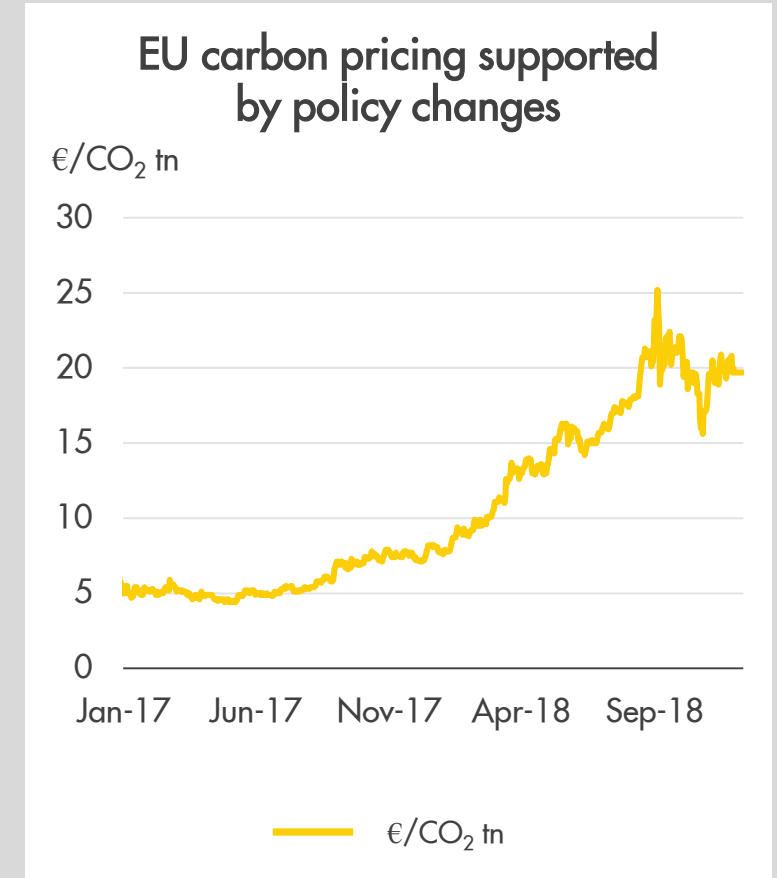
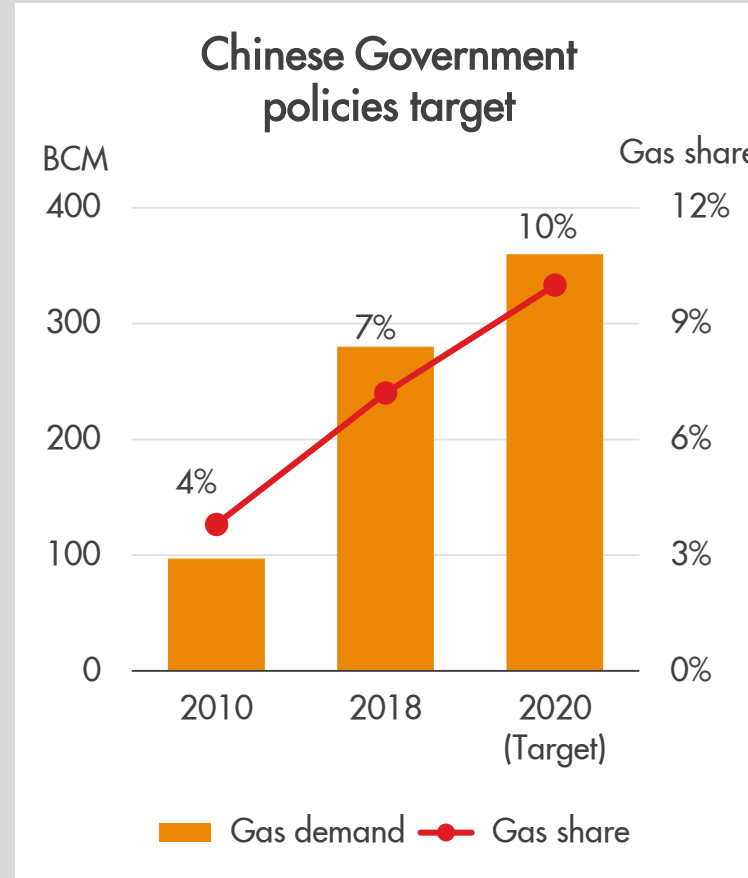
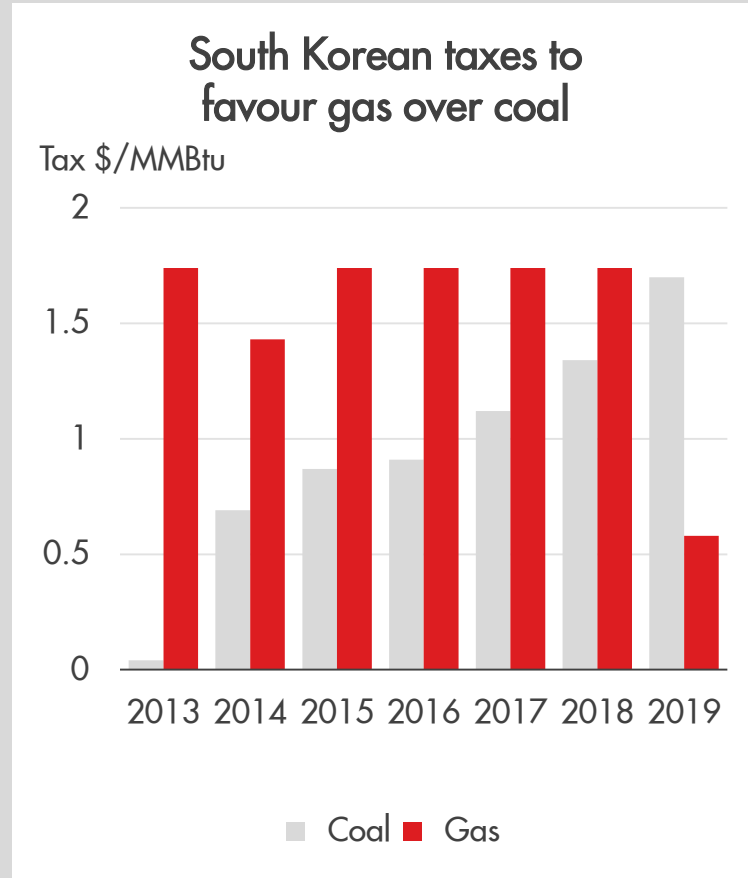
Gas and renewables to play a critical role in meeting the energy challenge



Source: Shell interpretation of Wood Mackenzie Q4 2018 data

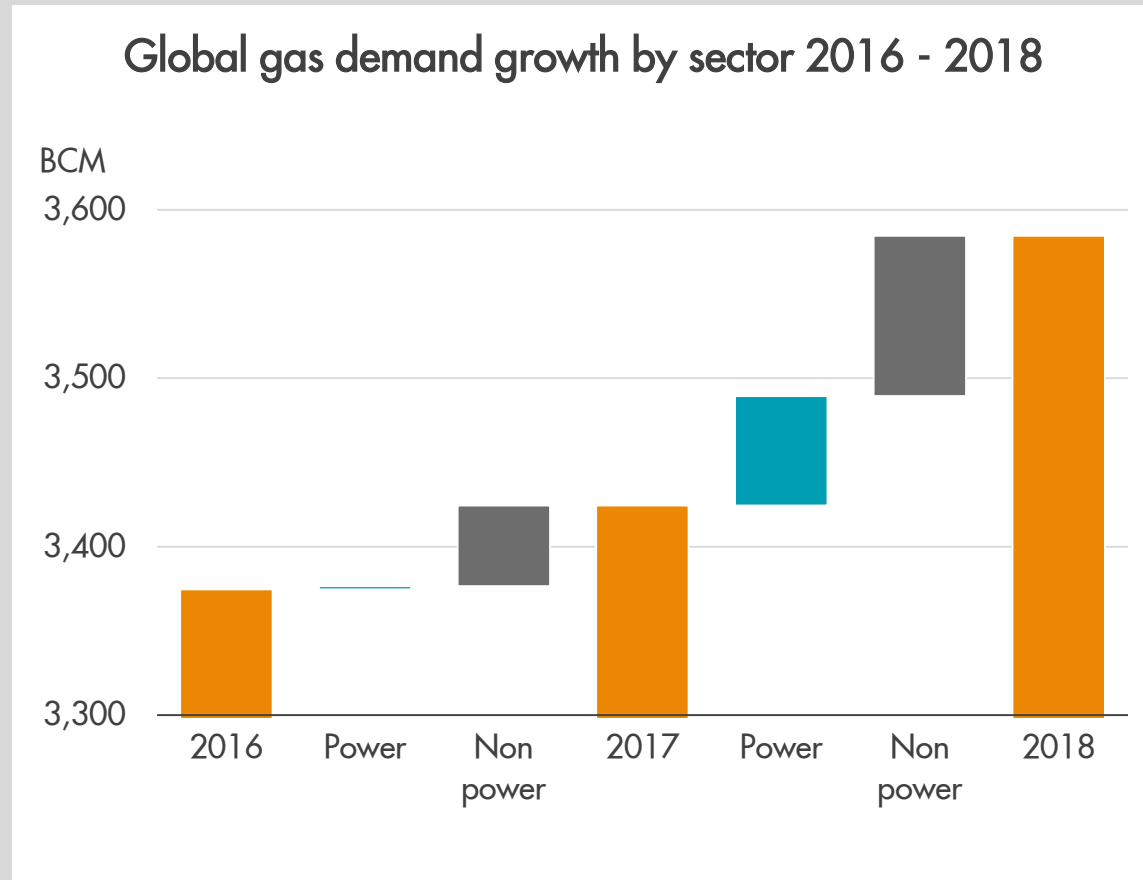
CAGR - Compound annual growth rate

Government policies being implemented encouraging a cleaner energy mix

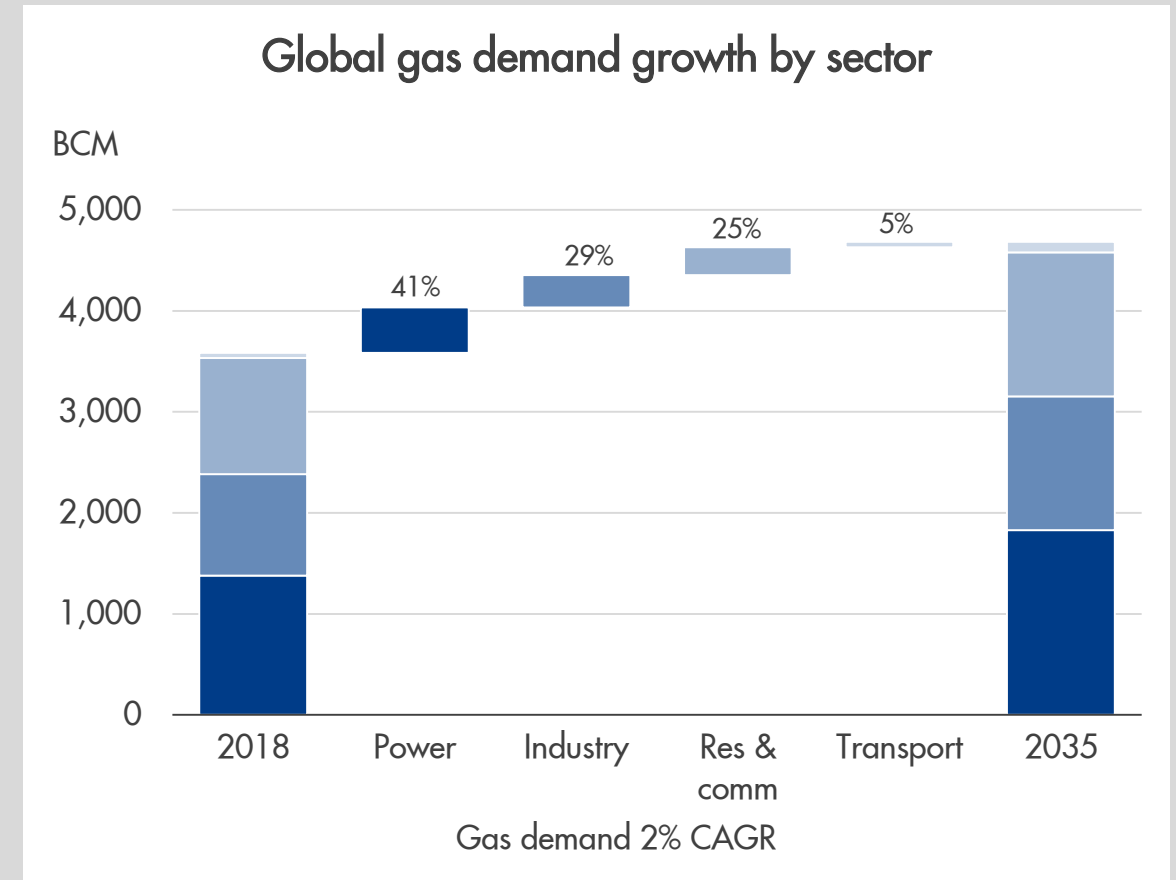


Source: Shell interpretation of IHS Markit and ICE Q4 2018 data and announced public policy

Gas demand growth not reliant on the power sector



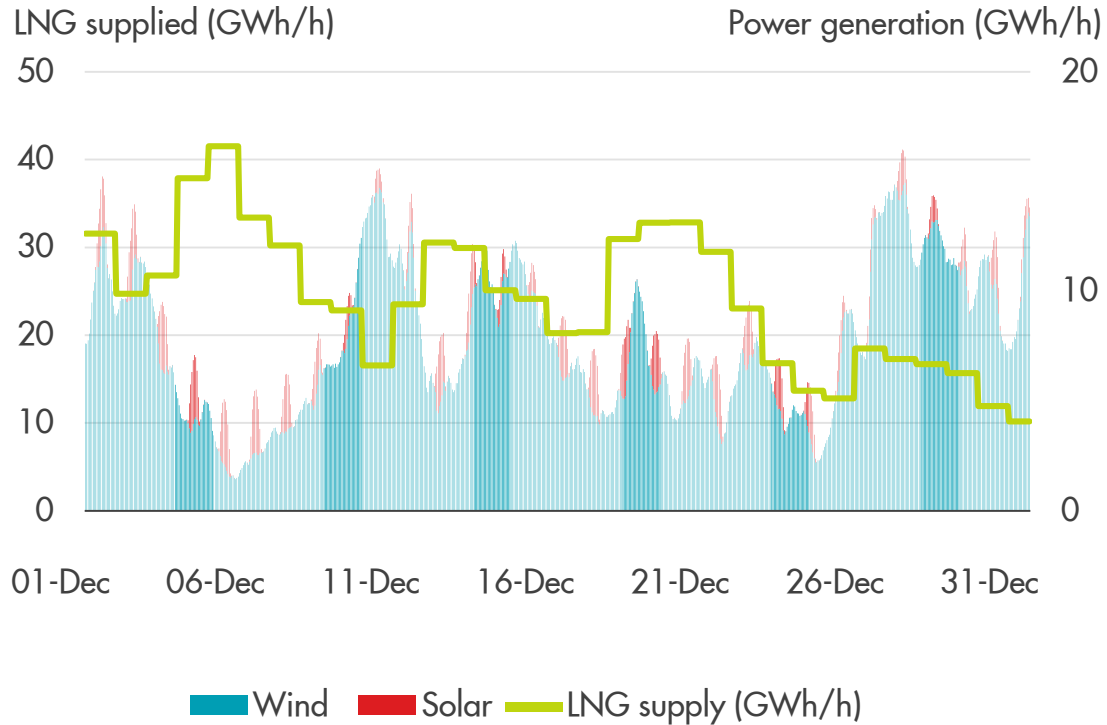
Source: Shell interpretation of Wood Mackenzie Q4 2018 data



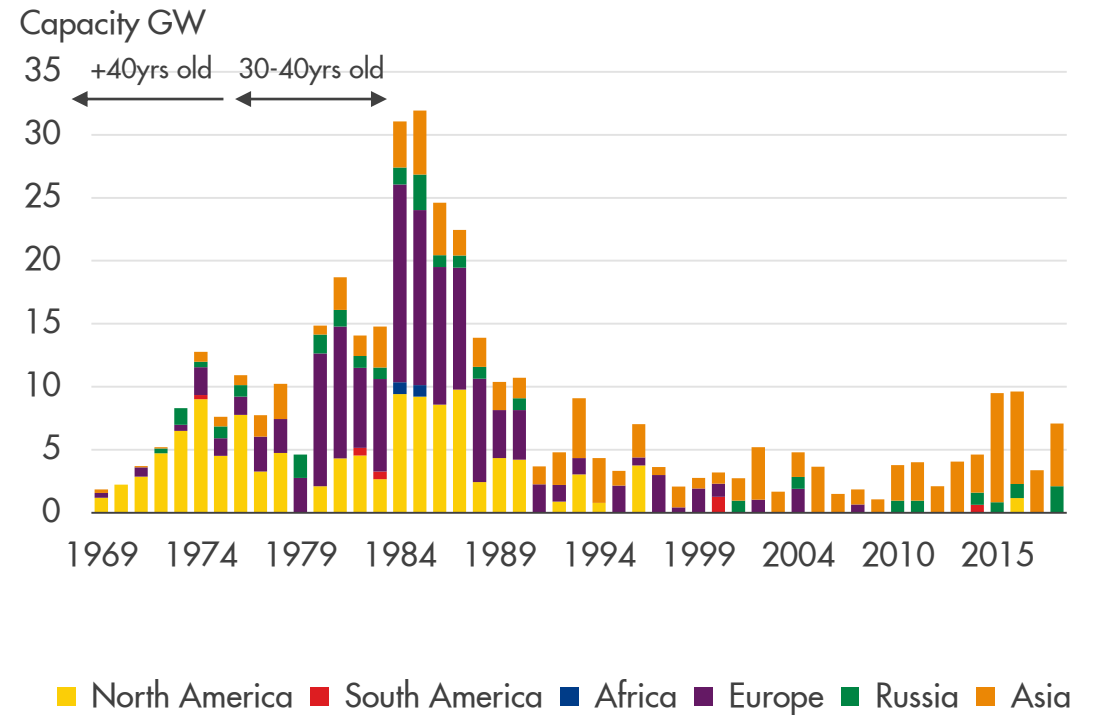
Res & Comm – Residential and Commercial

Gas provides required flexibility for power generation

LNG complements wind and solar
Spain (Dec-2017)



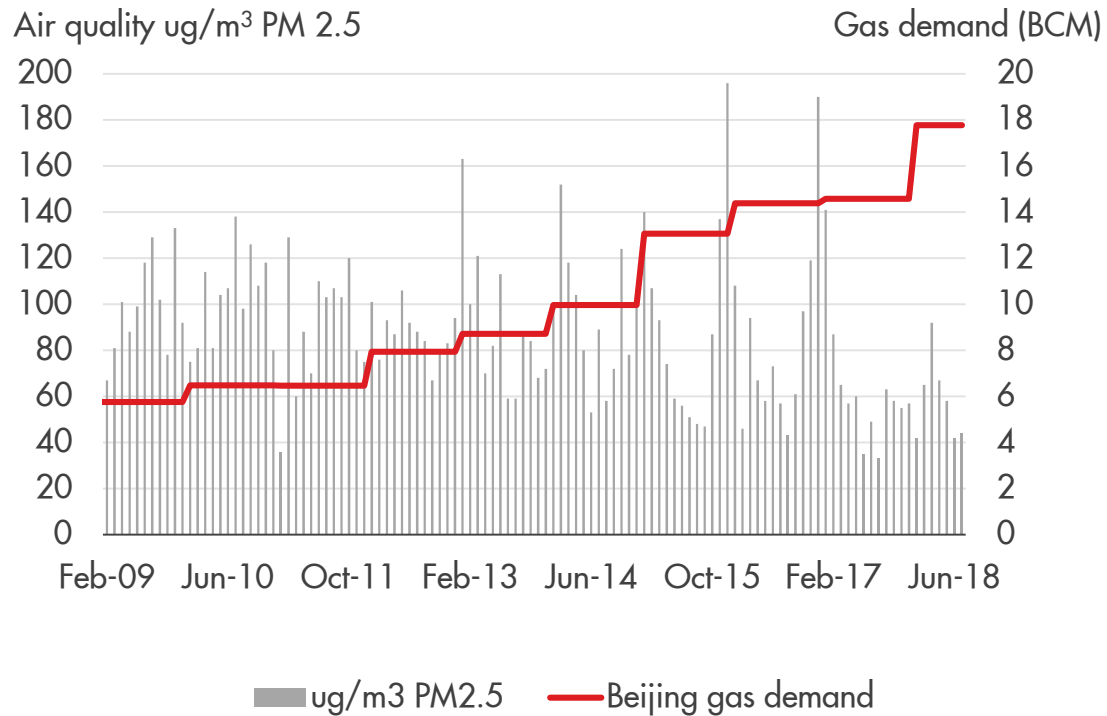
New power generation needed to replace ageing plants
Nuclear capacity online by start date



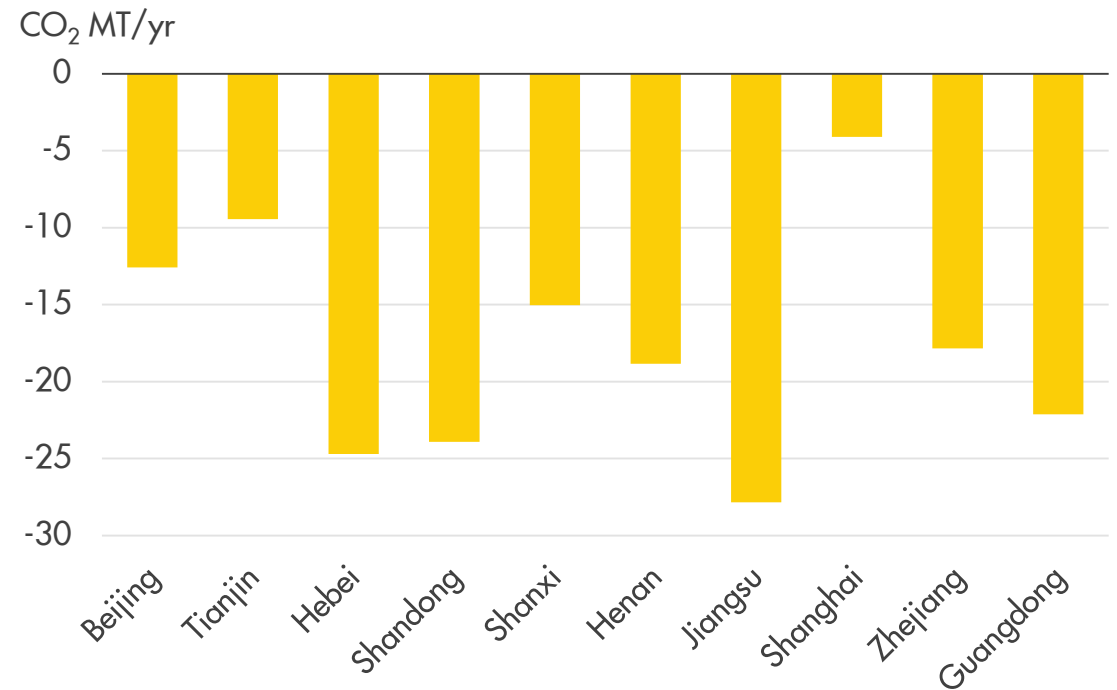
Source: Shell interpretation ENTSOG, REE, World Nuclear Association 2017 and 2018

Coal-to-gas switching in China achieves blue skies and reduces CO₂ emissions

Air quality improvements in Beijing



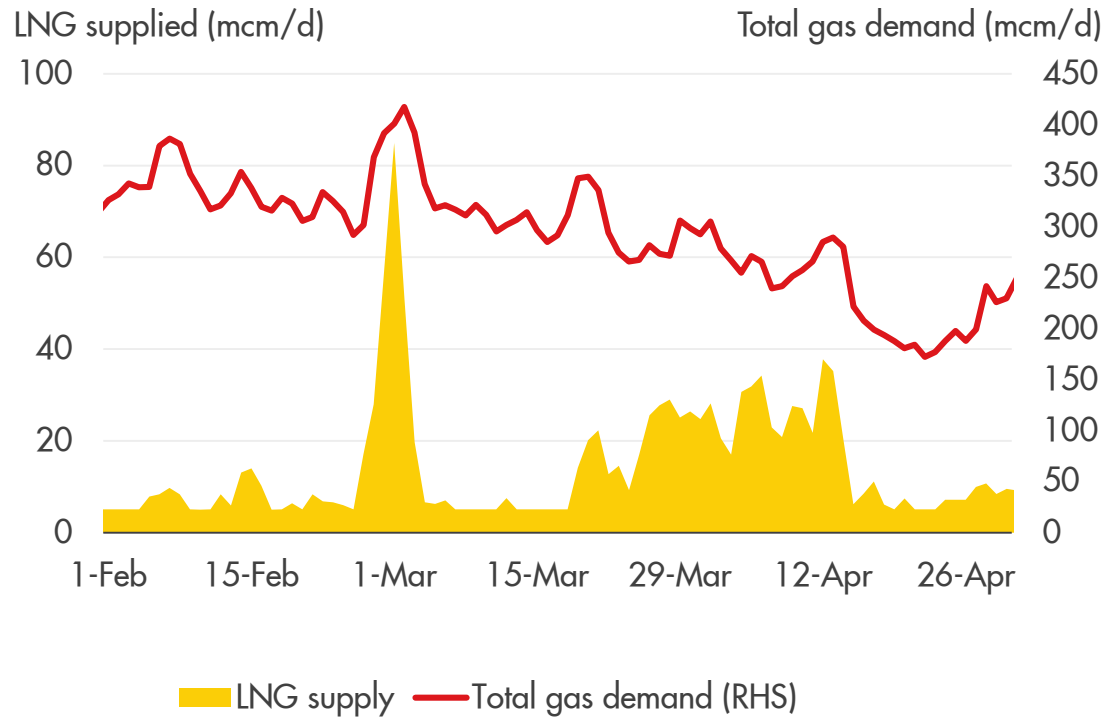
176 MT CO₂ saving from China's air quality programme in 2018



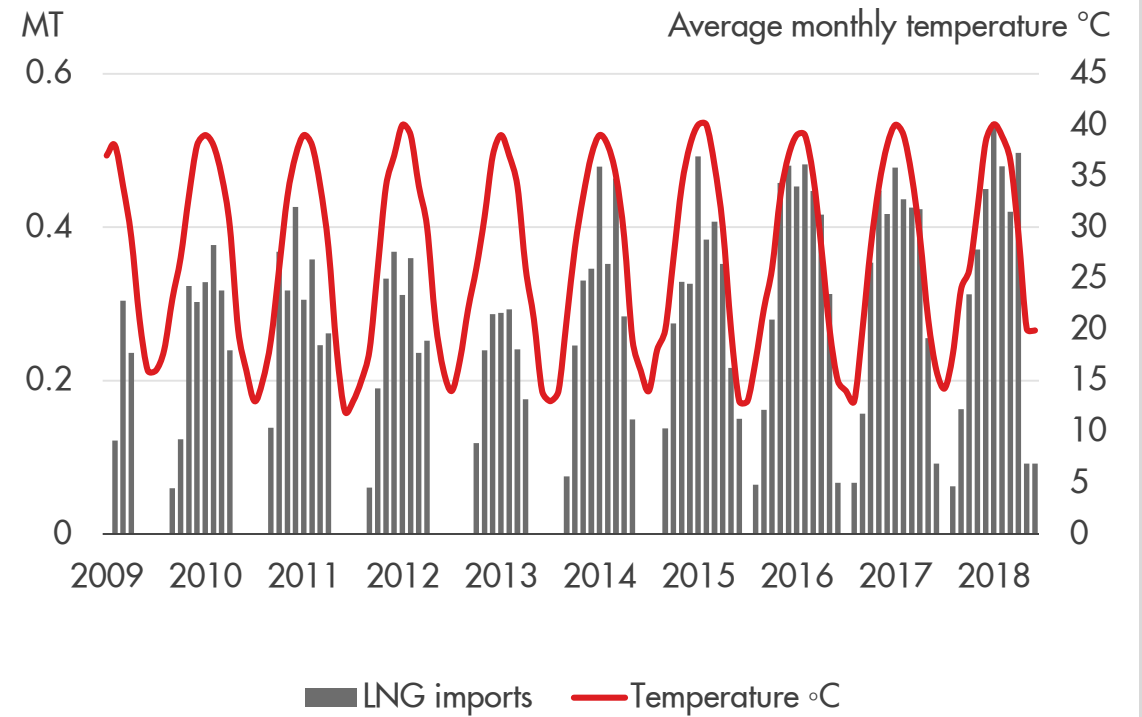
Source: Shell interpretation of IHS Markit, Beijing Gas Group and US Embassy Beijing (US State Department) 2018 data

LNG flexibility mitigates demand shocks and meets seasonal needs

Meeting heating demand in UK in 2018



Meeting seasonal cooling demand in Kuwait



Source: Shell interpretation of National Grid, IHS Markit, Weather Channel 2018 data

New countries choosing LNG for various benefits



- Natural gas meets over half of total energy demand
- Declining domestic gas production
- LNG meeting existing and new gas demand



- Replacing oil-fired power generation
- Complement renewable power generation
- Strategic location of Panama Canal offers opportunities for LNG bunkering



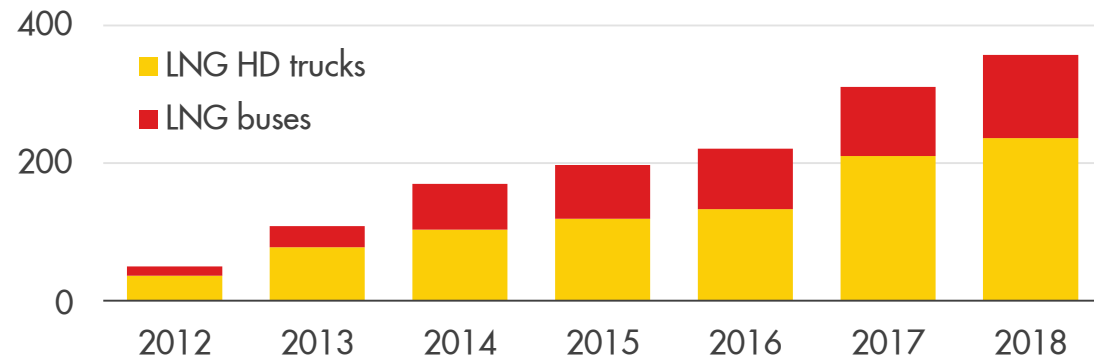
- Replacing oil-fired power generation
- Innovative small-scale LNG solution
- Increases diversity of supply

Source: Shell interpretation of Woodmac Q4 2018 Data

Economic and environmental benefits increasing the use of LNG in road transport

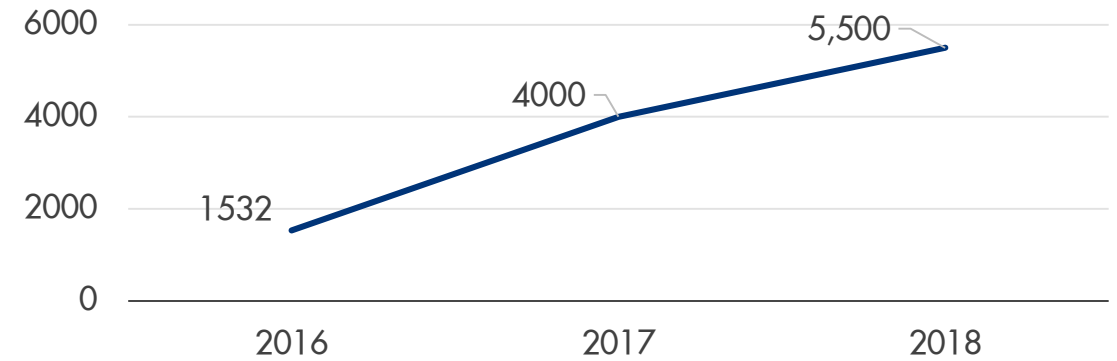
China LNG fuelled heavy-duty transport

Number of LNG trucks and buses in 1000



Europe moving to LNG fuelled heavy-duty transport

Number of LNG trucks



Source : Shell analysis of Woodmac, SCI, and NGVA data



6.7 MT of LNG consumed in China for road transport in 2018



2,552 LNG fuel stations in 2018



280,000 LNG trucks expected by 2030

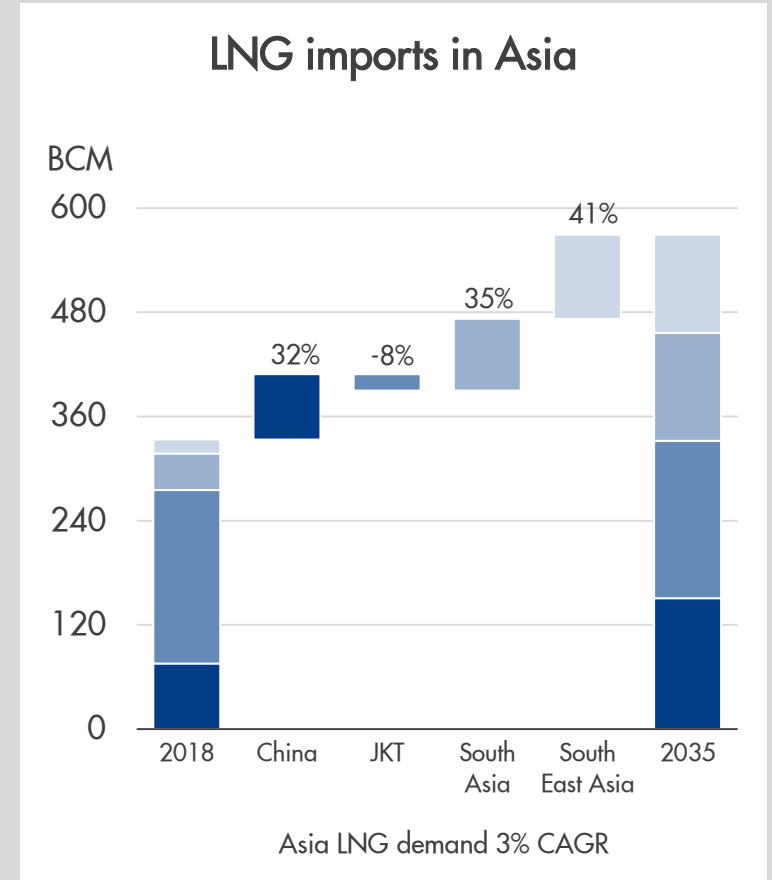
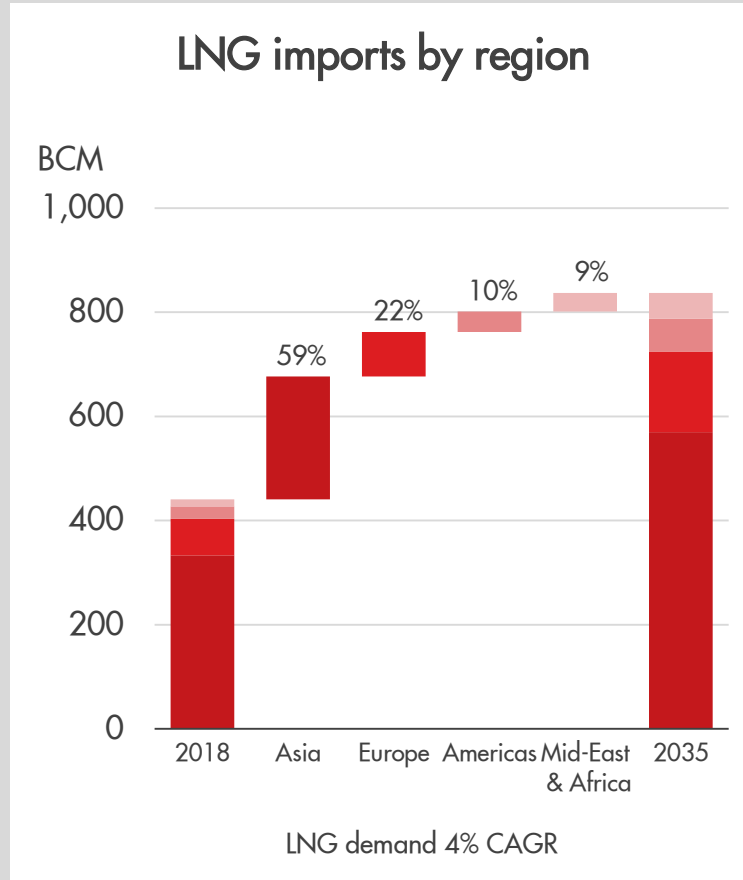
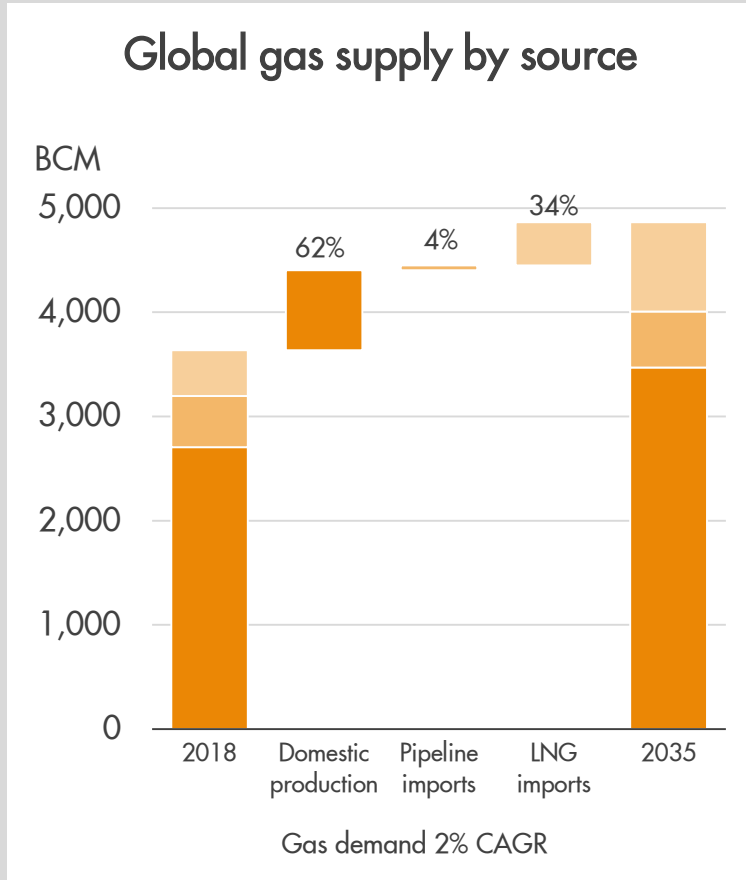


155 LNG fuel stations in 2018



Co-financed by EU, BioLNG EuroNet is building 39 LNG stations, 2000 LNG trucks and a BioLNG production plant

LNG continues to be the fastest-growing gas supply source



Source: Shell interpretation of Wood Mackenzie Q4 2018 data

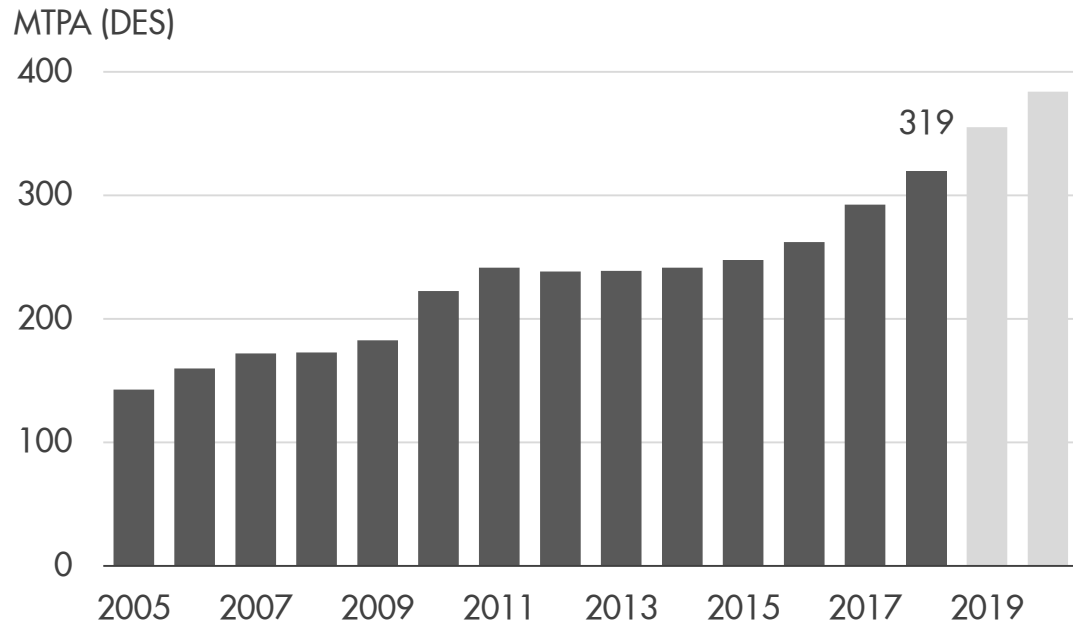


Russia's first LNG plant on Sakhalin

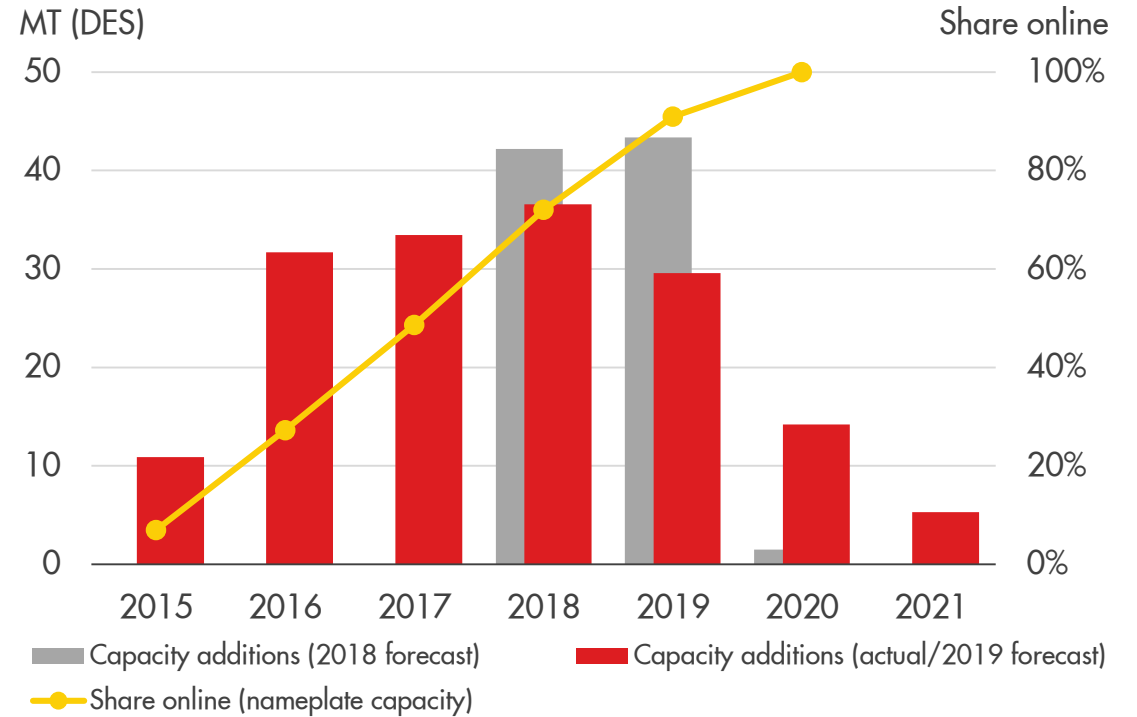
Asian LNG imports exceed expectations again in 2018 absorbing continued supply growth

More than 70% of the current wave of LNG capacity additions online

LNG trade volume

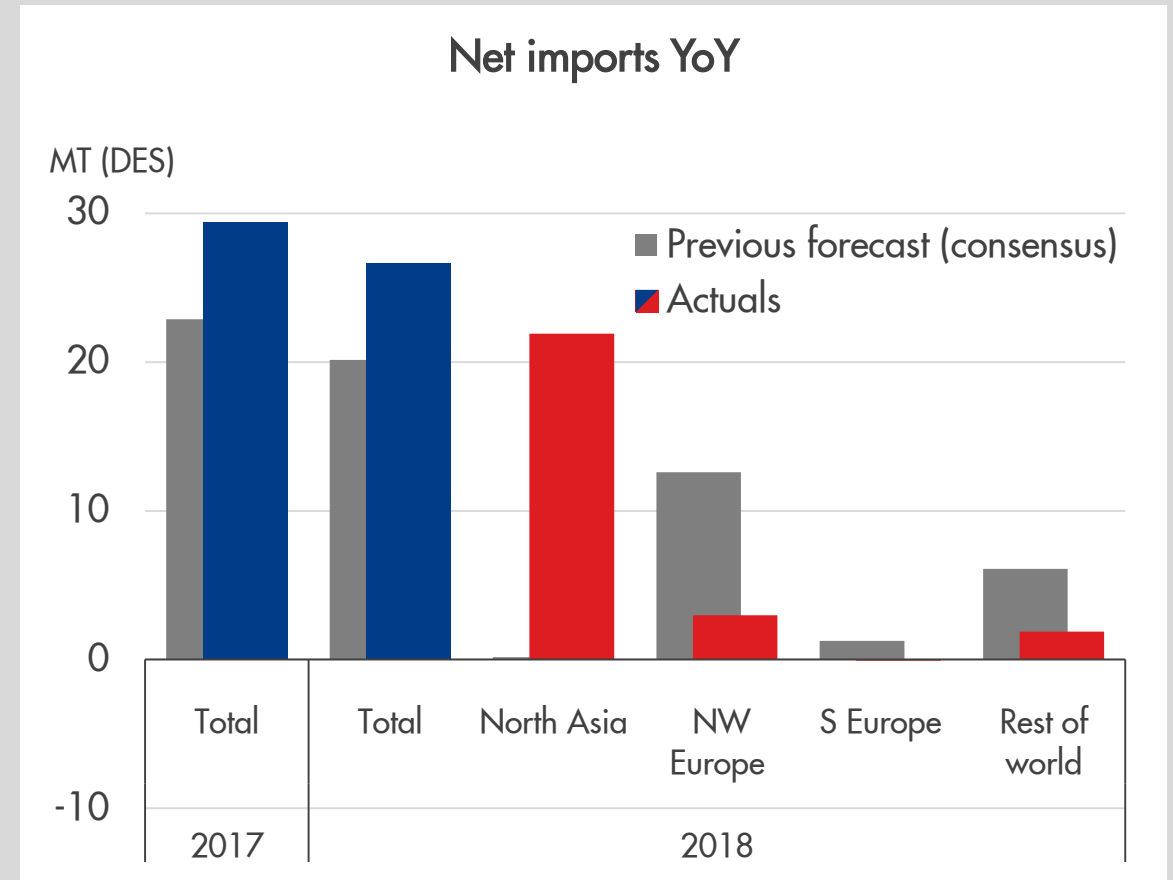
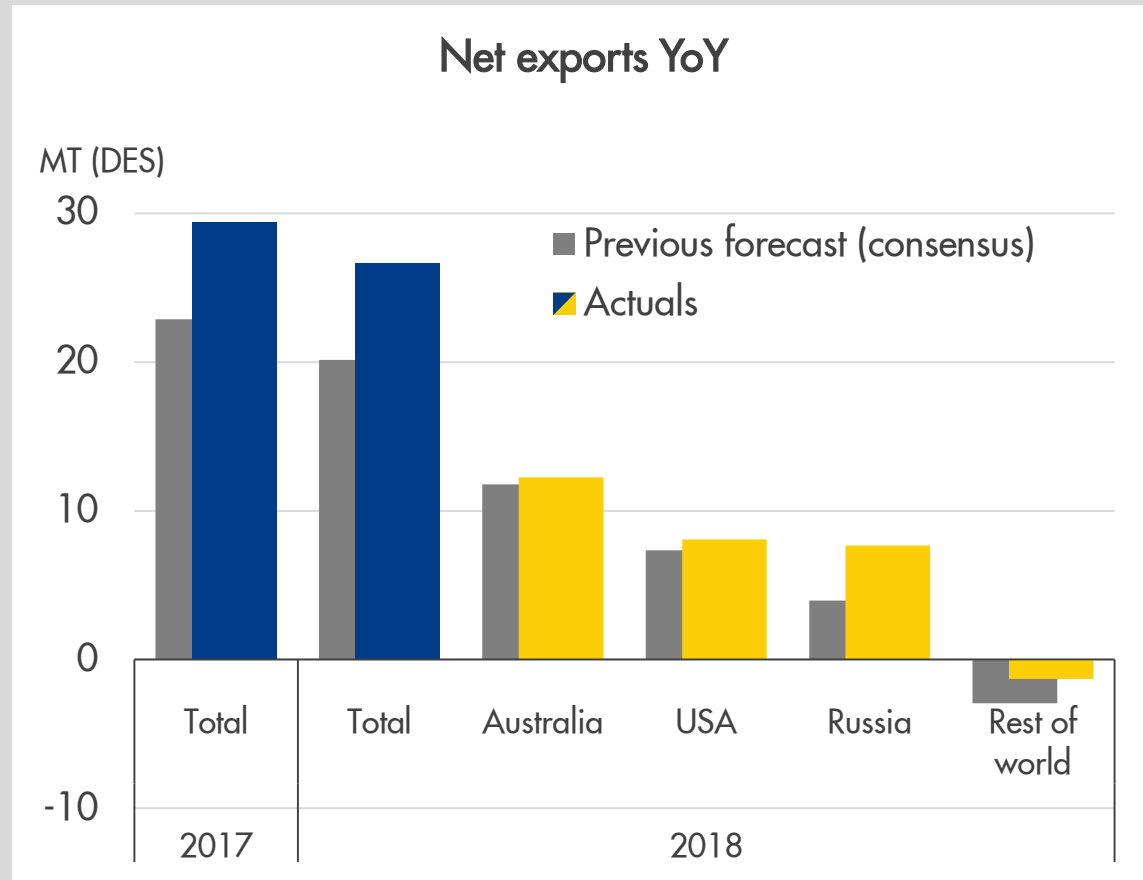


LNG liquefaction capacity additions



Source: Shell interpretation of IHS Markit Q4 2018 data

Asian LNG demand continues to exceed expectations



Source: Shell interpretation of IHS Markit, Wood Mackenzie and Poten & Partners 2017 and Q4 2018 data

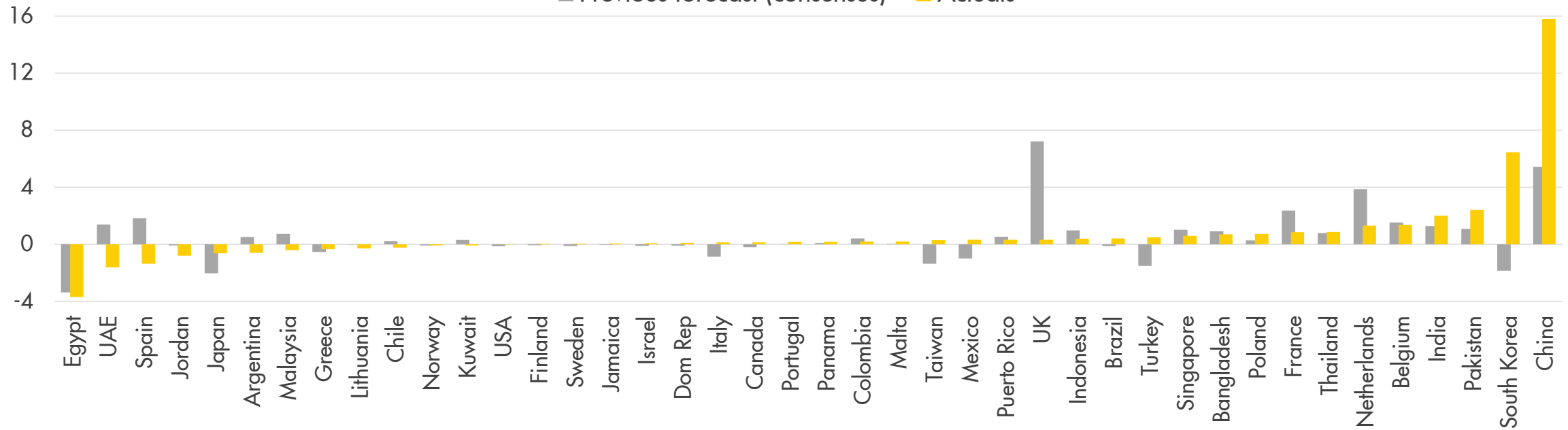
YoY: Year on Year

LNG imports increased by 27 MT in 2018

Net imports: 2018 YoY

MT (DES)

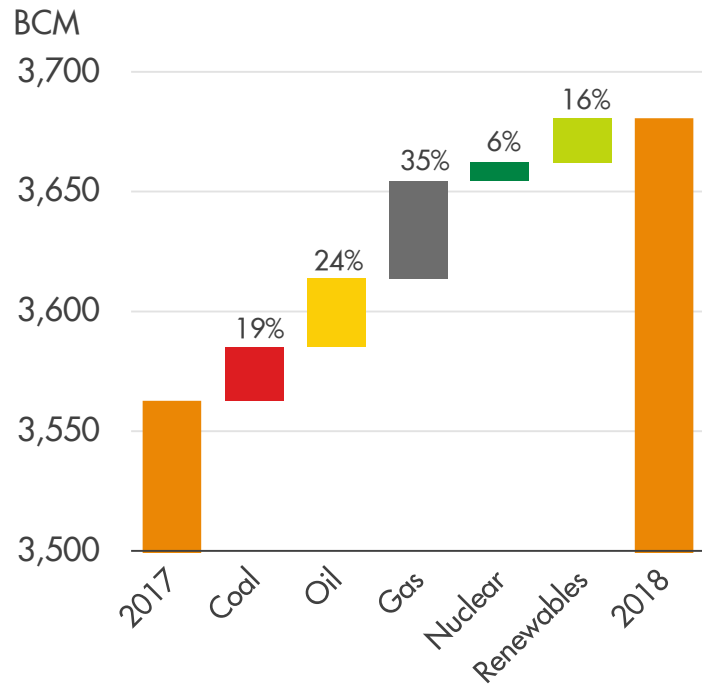
■ Previous forecast (consensus) ■ Actuals



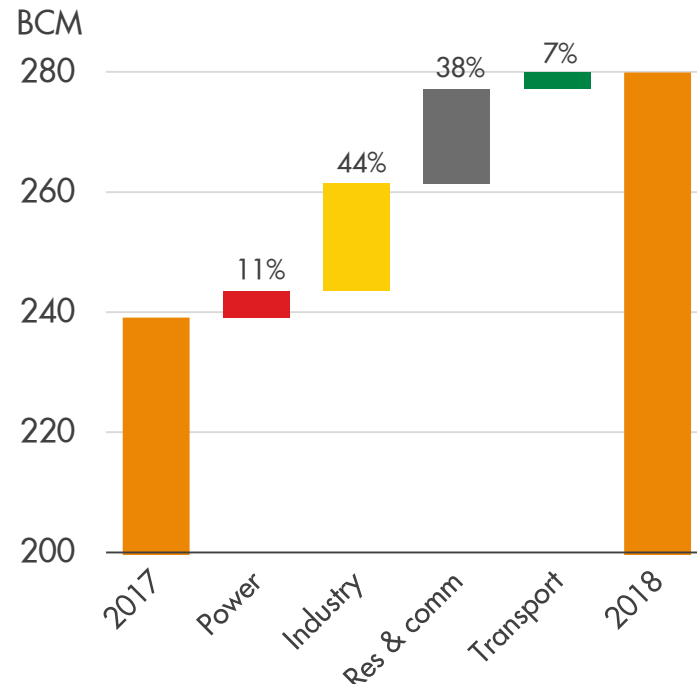
Source: Shell interpretation of IHS Markit, Wood Mackenzie and Poten & Partners 2017 and Q4 2018 data

LNG imports continued to enable China to meet its growing need for cleaner energy

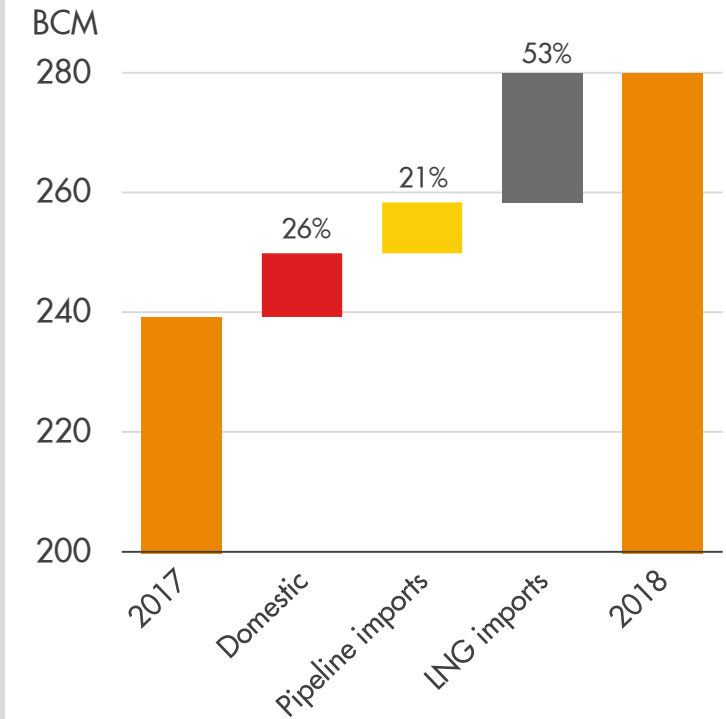
China energy demand growth by fuel



China gas demand growth by sector



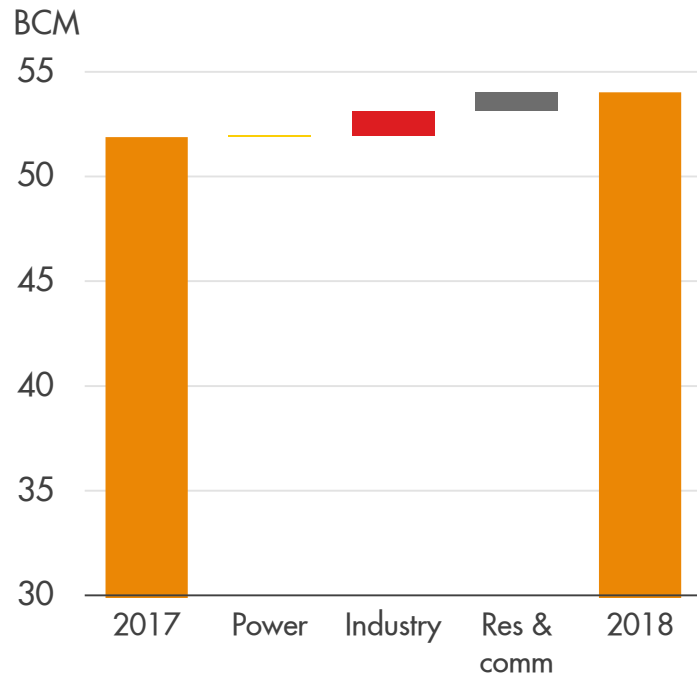
China gas supply growth by source



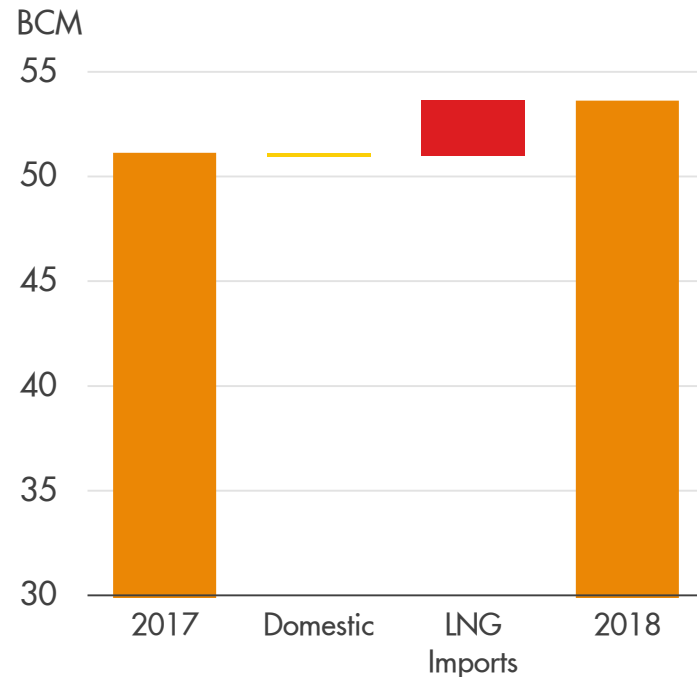
Source: Shell interpretation of IHS Markit Q4 2018 data

LNG provides energy security for India

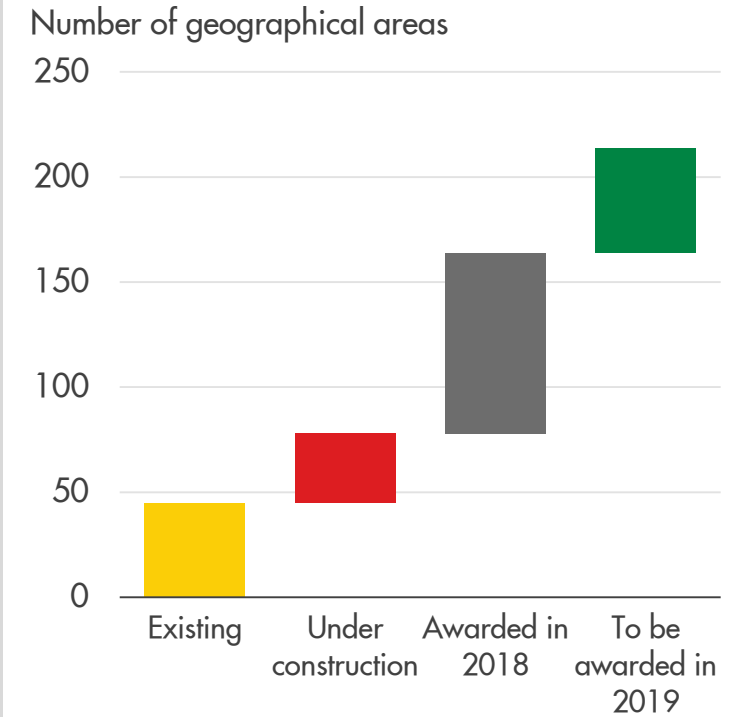
India gas demand growth by sector



India gas supply growth by source

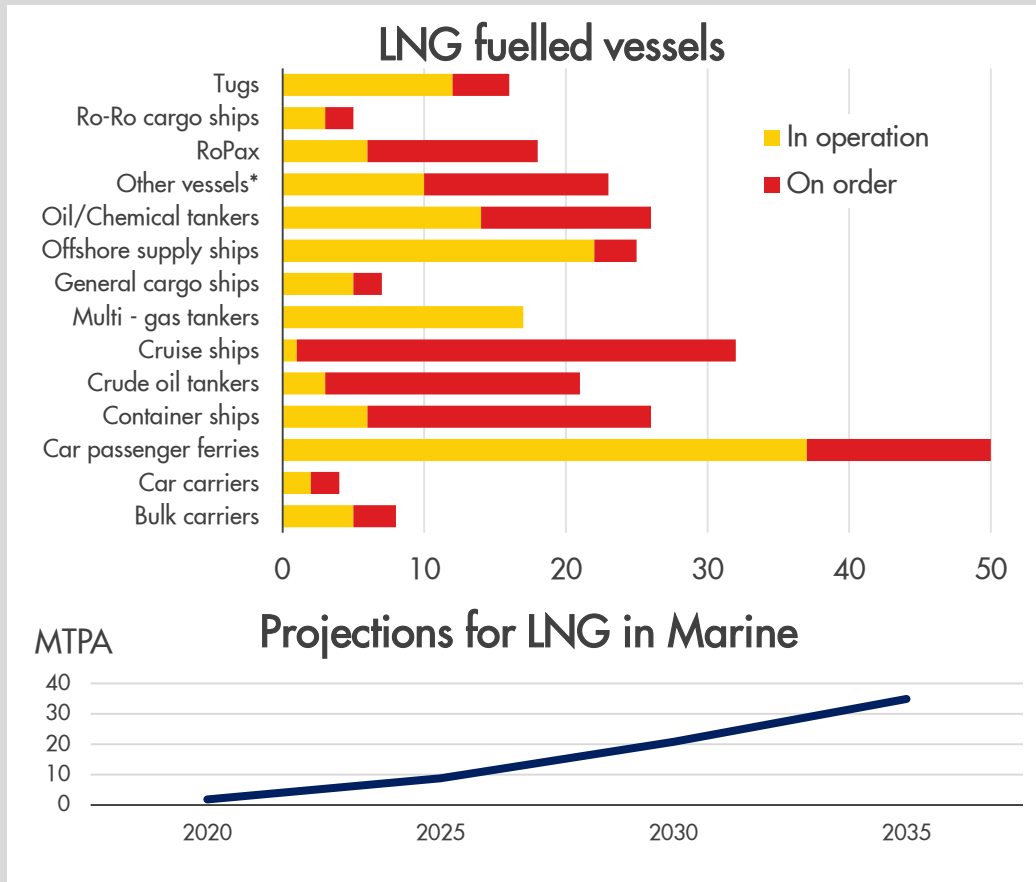


India city gas distribution areas



Source: Shell interpretation of PPAC and PNGRB Q4 2018 data

Marine LNG poised for growth



Source: Shell interpretation of DNV-GL & Woodmac *Other vessels includes fishing vessels, dredgers, etc.

2018

QUARTER 1

Mitsui OSK order LNG bunker barge to serve Total-CMA-CGM deal



World's first LNG-fuelled bulk carrier charter delivered



Carnival orders 9th LNG fuelled Cruise ship



QUARTER 2

Shell agrees to charter two LNG powered tankers from AET



MPA awards grants for two LNG bunker barges for Singapore



QUARTER 3

First Japanese LNG bunker vessel ordered



Hapag Lloyd announces it will convert a container vessel to operate on LNG



QUARTER 4

Crowley takes delivery of second LNG-powered container/roll on-roll off (ConRo) ship



Bunkering of the first LNG fuelled Aframax tanker by Shell Cardissa



H-Line Shipping ordered two LNG fuelled bulk carriers



World's first LNG powered cruise ship sets sail



Kairos, the 7,500 m³ bunker vessel started operations



Adnoc and Inpex sign agreement to explore LNG bunkering opportunities in UAE

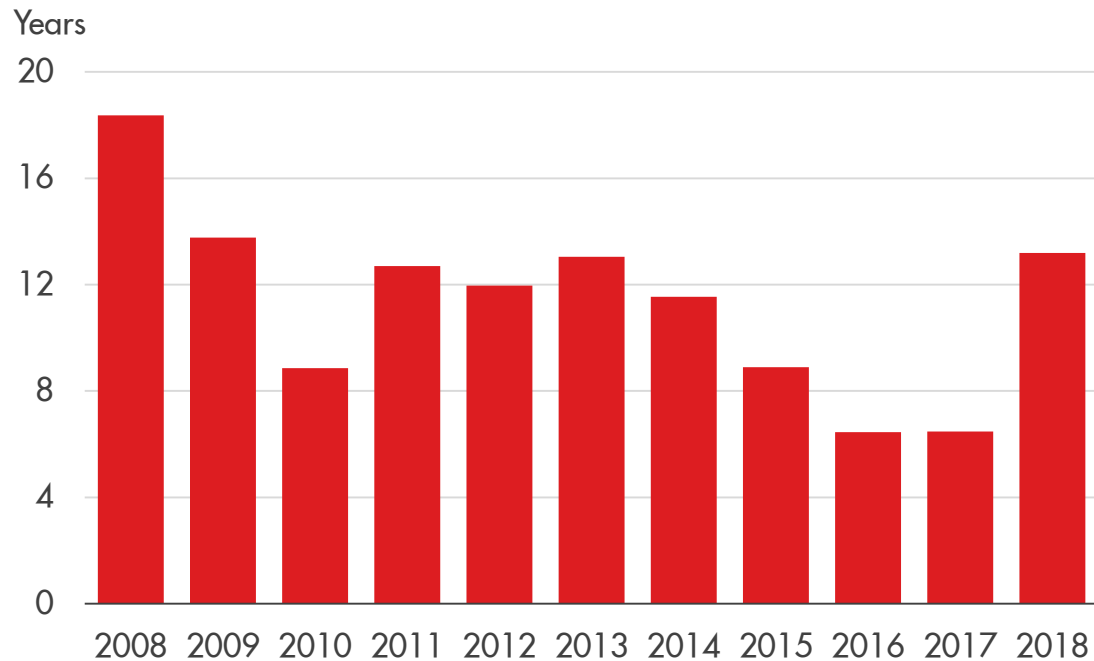


Public Gas Corp of Greece signed a grant agreement with EU for construction of the first LNG bunkering vessel

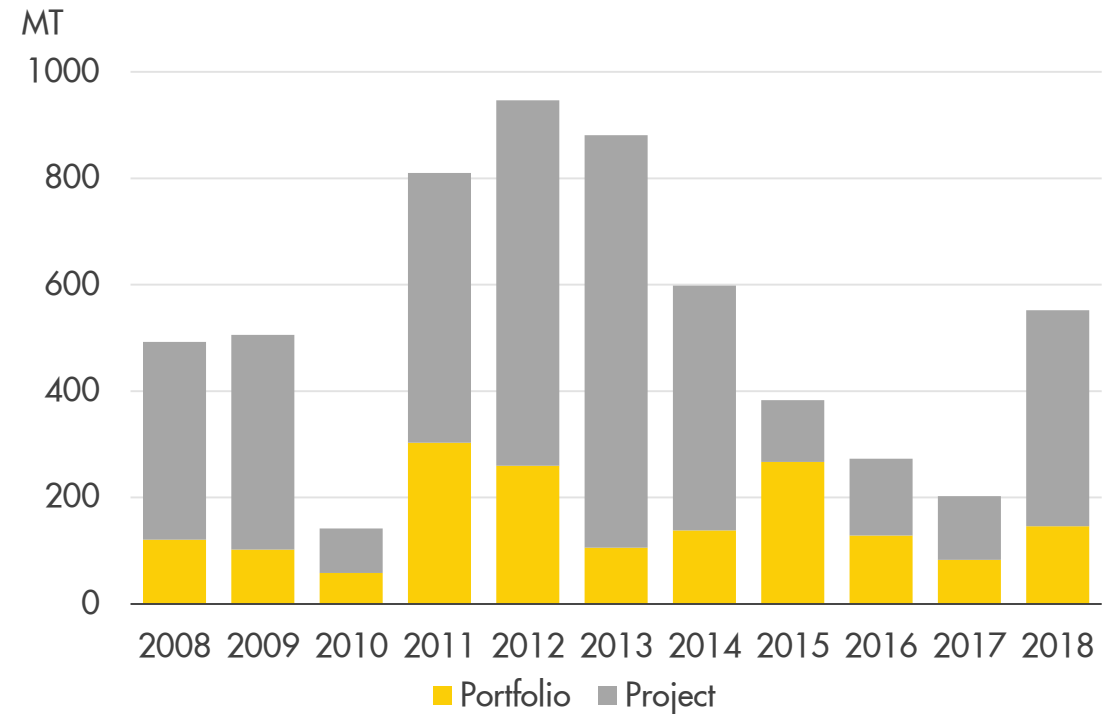


Resurgence of longer term contracts supports new supply projects

Average contract length



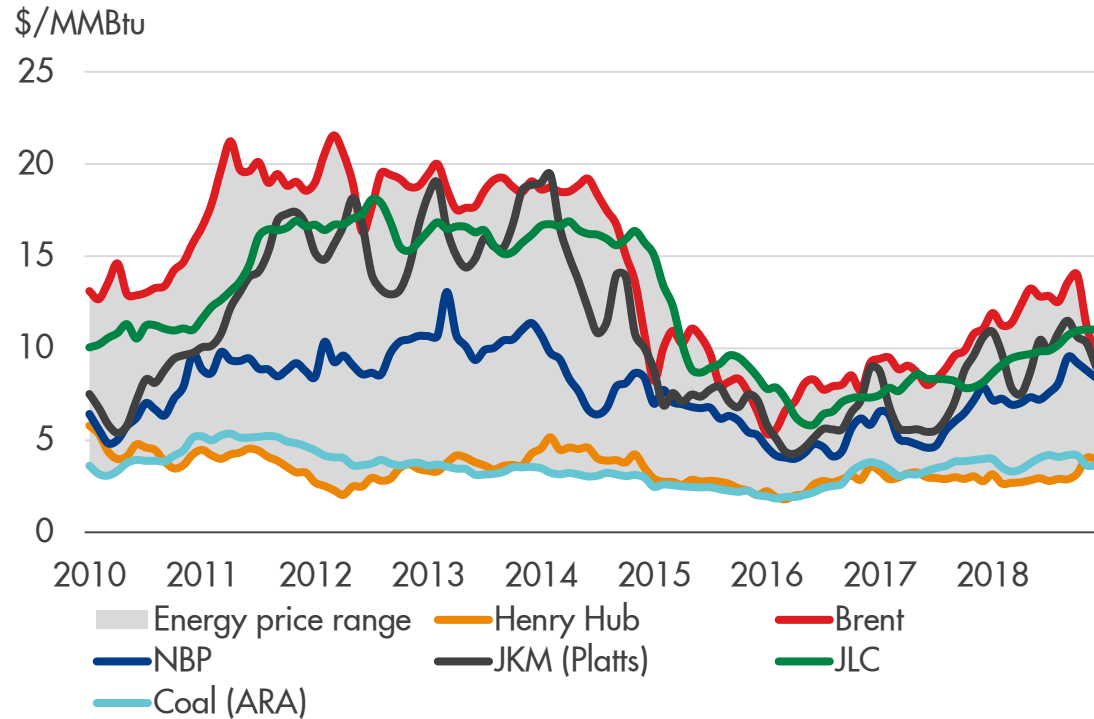
Total LNG contract volumes by seller type



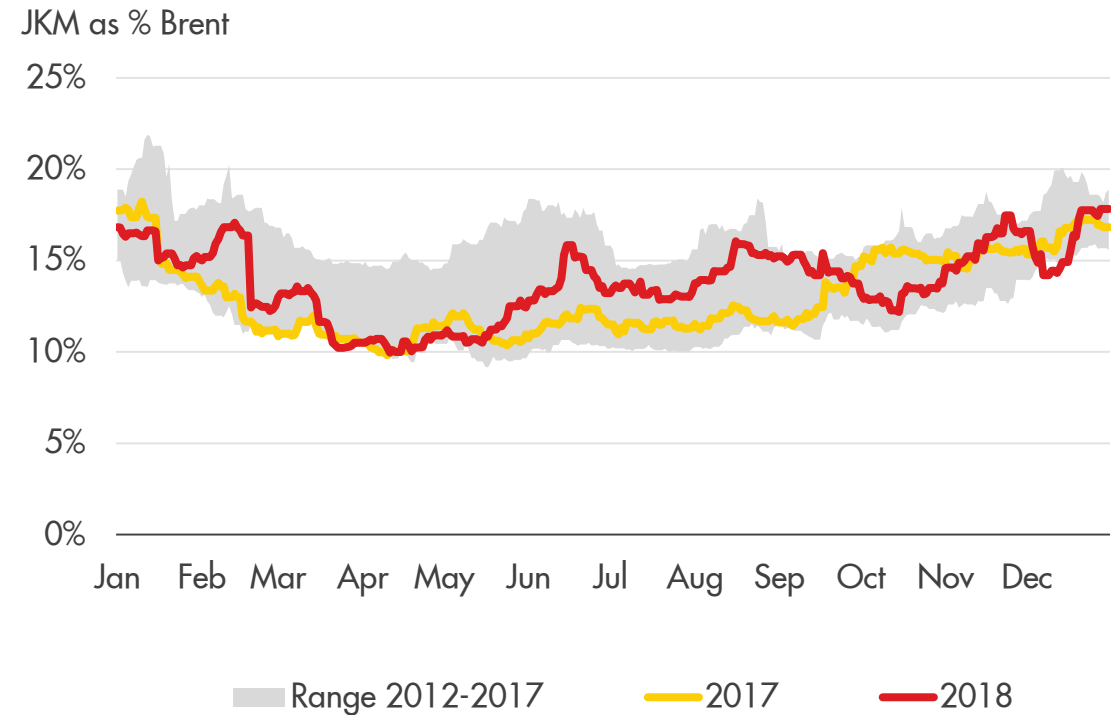
Source: Shell interpretation of IHS Markit Q4 2018 data

Spot prices remained robust

Global Energy prices



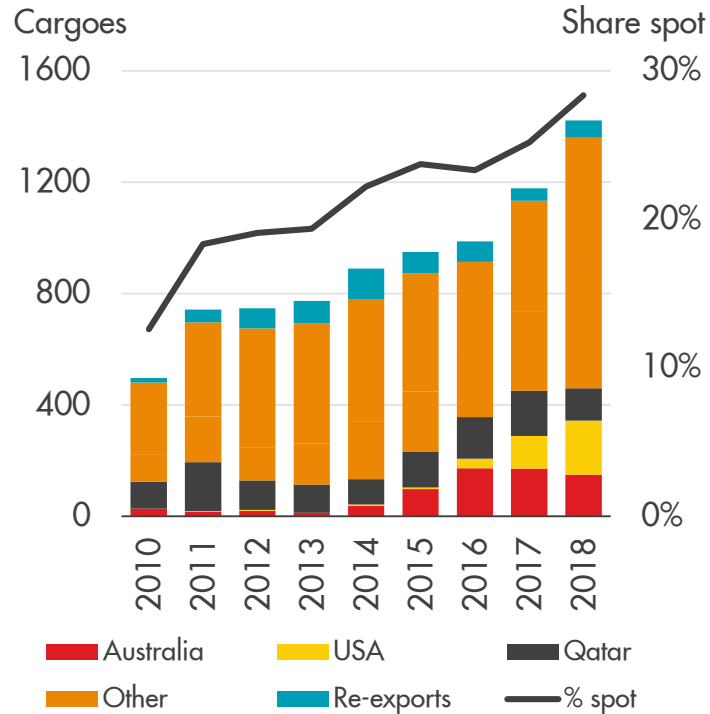
Asian spot price



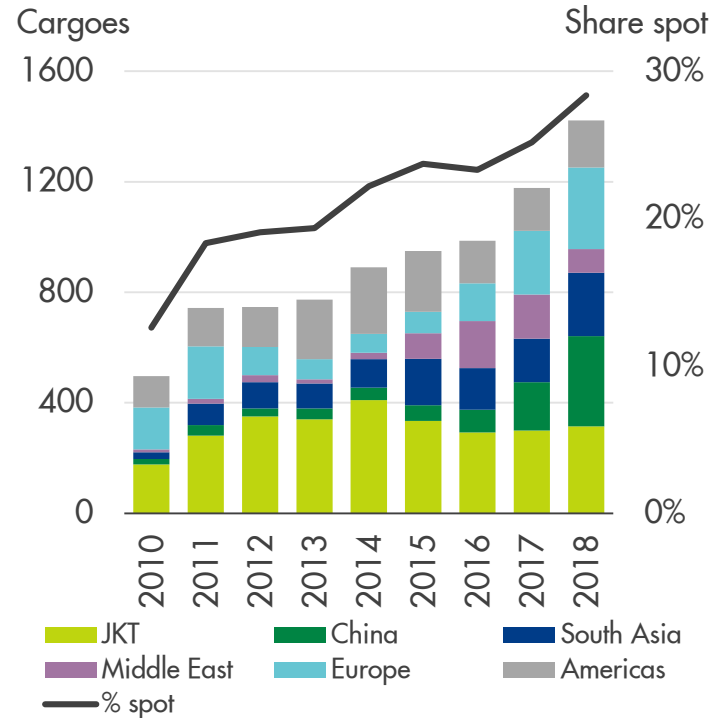
Source: Shell interpretation of Japanese customs data (Japan LNG import), S&P Global Platts (JKM), ICE (NBP, Brent, ARA coal), NYMEX (Henry Hub)

Spot market gains momentum with volume growth

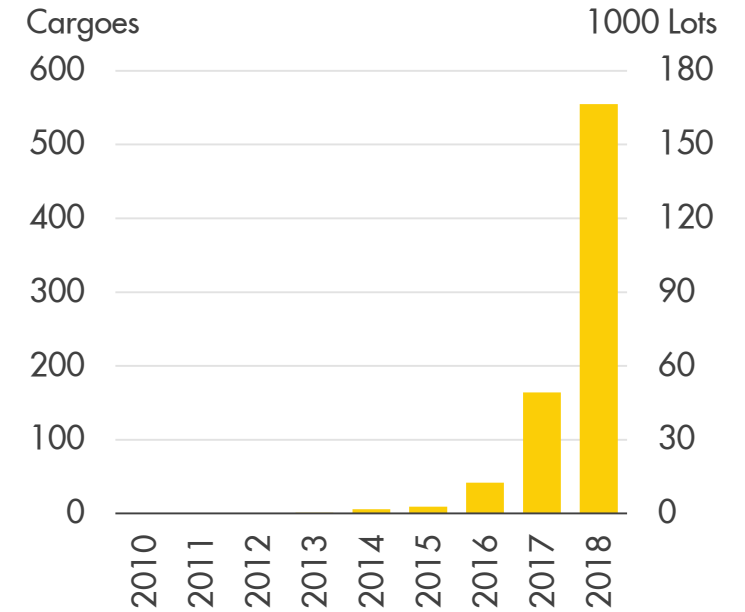
Spot LNG Supply



Spot LNG deliveries



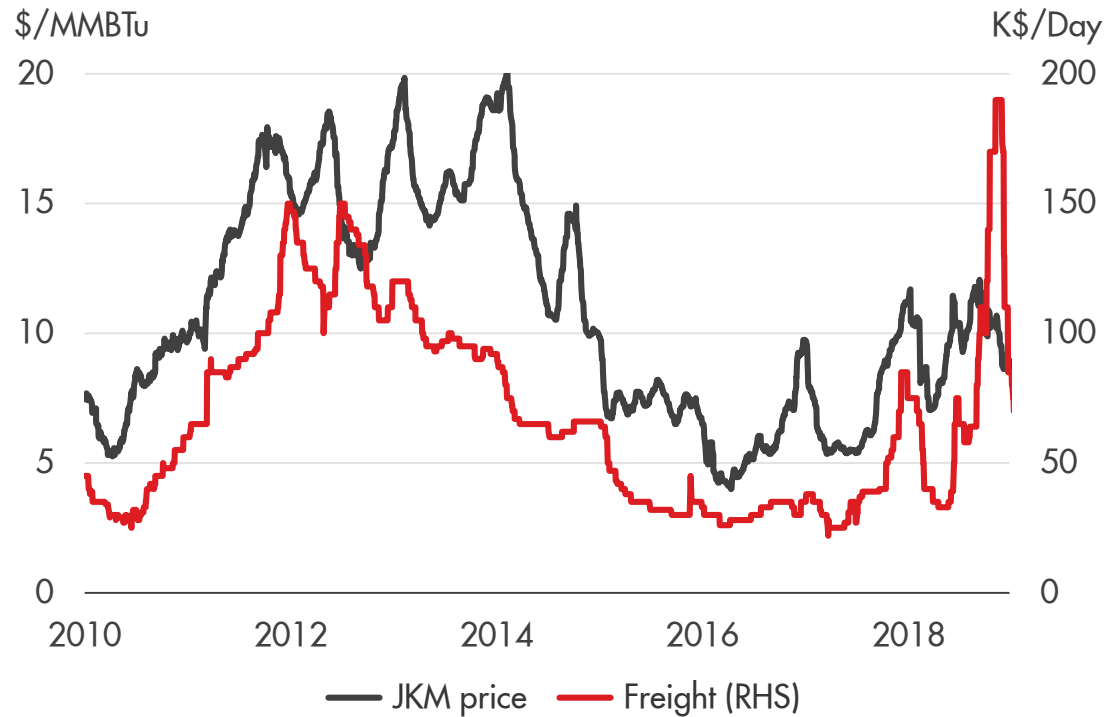
ICE JKM LNG (Platts) futures



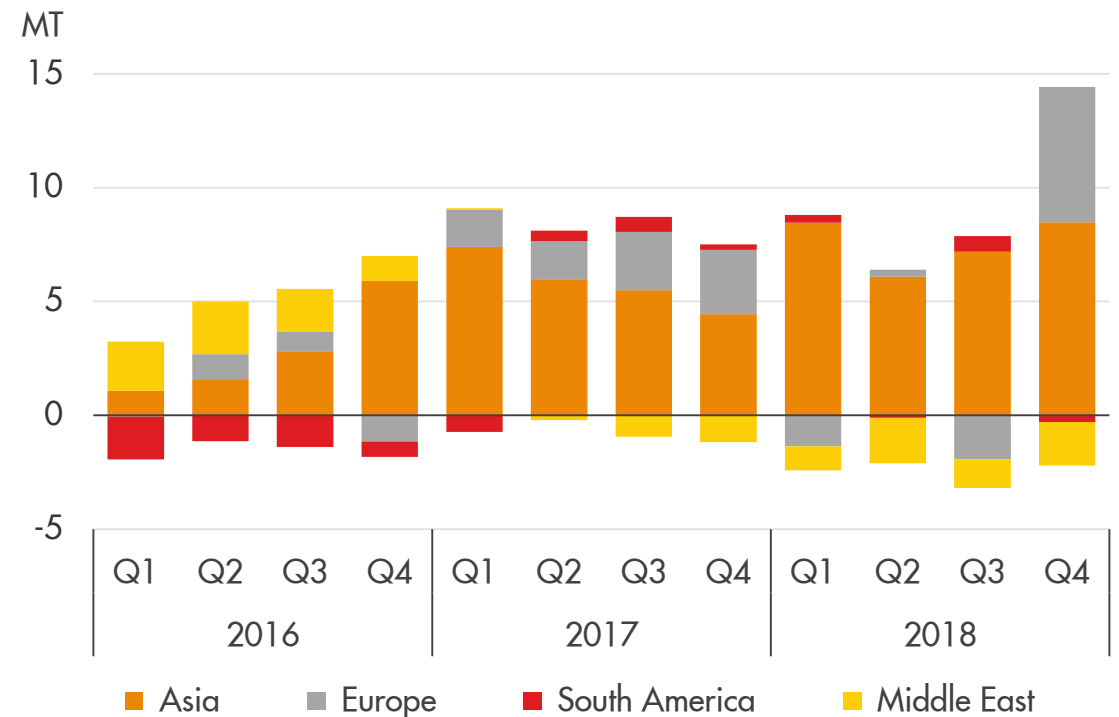
Source: Shell interpretation of IHS Markit Q4 2018, S&P Global Platts and the ICE data

An evolving global LNG market

JKM price versus freight rate



LNG demand growth by region



Source: Shell interpretation of S&P Global Platts data and IHS Markit Q4 2018 data

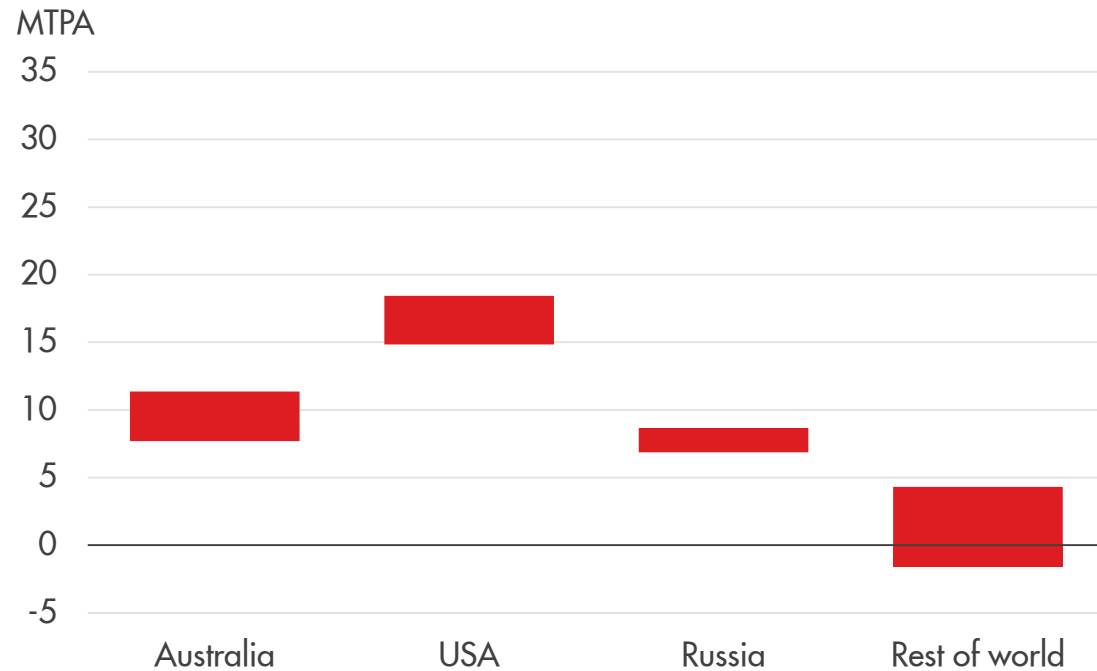


Shell Cardissa fuelling Gagarin Prospect, the world's first crude oil tanker to be powered by LNG

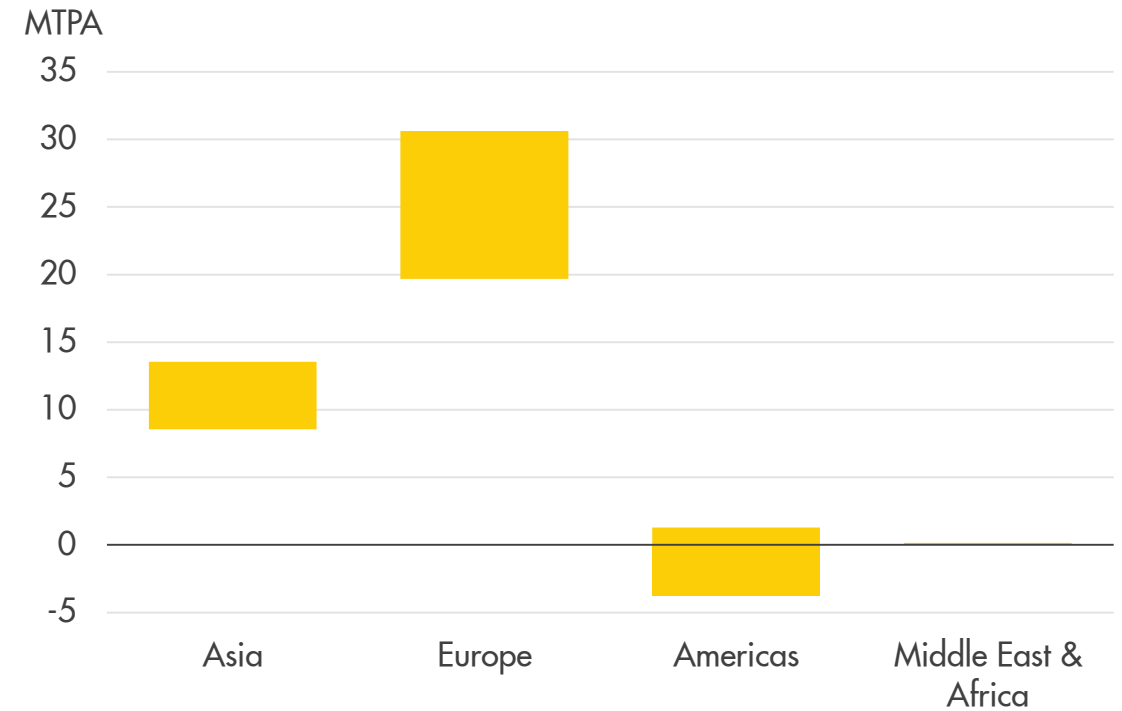
Near term supply growth expected to be absorbed by Europe and Asia – continued need for investment in supply to meet long-term demand growth

New supply expected to be absorbed by Asia as well as Europe in 2019

LNG supply growth range by country

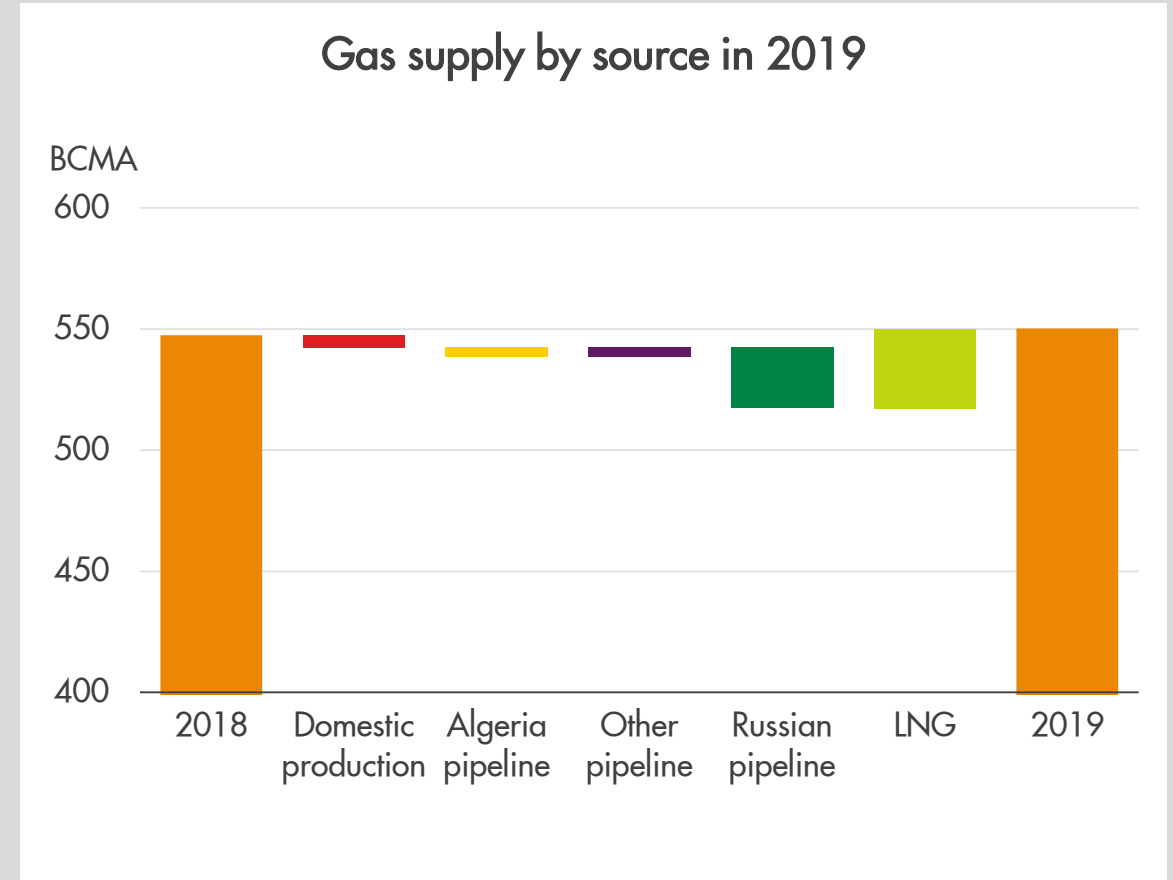
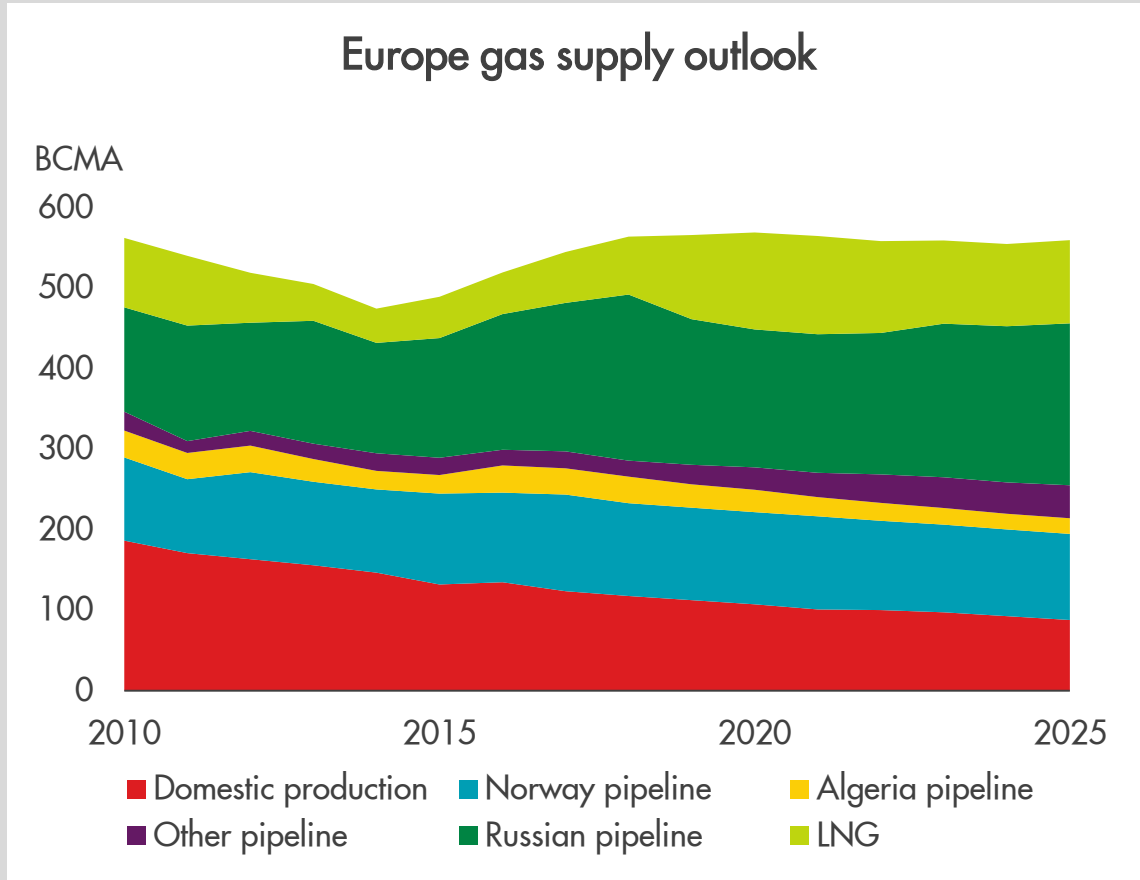


LNG demand growth range by region



Source: Shell interpretation of IHS Markit, Wood Mackenzie, Poten & Partners Q4 2018 data

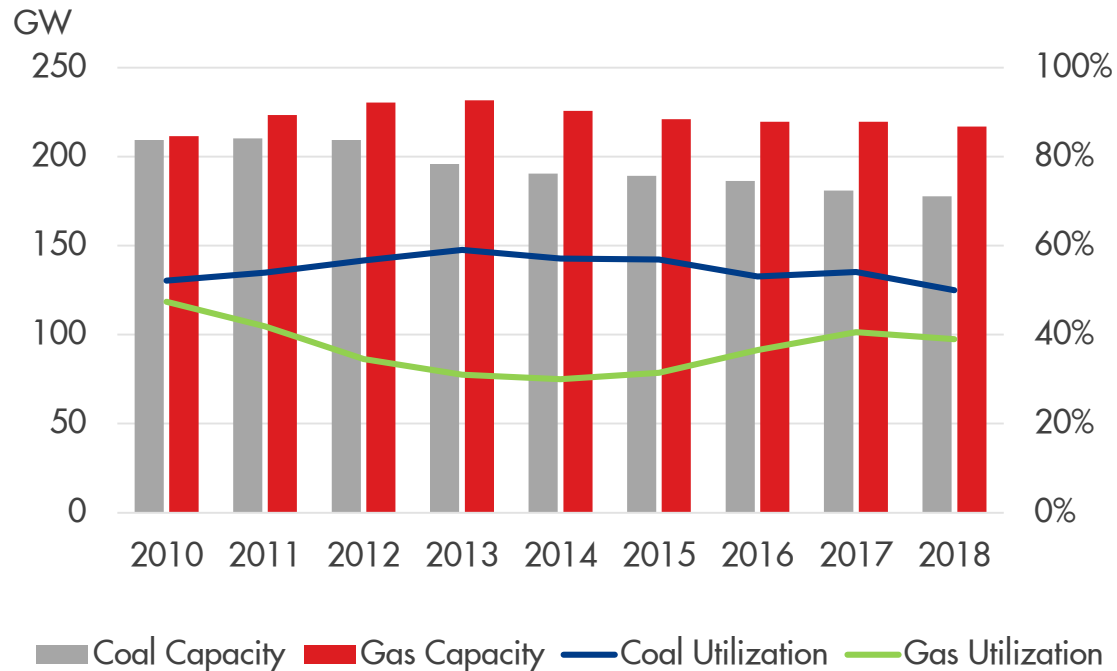
Europe needs more imports to offset declining domestic gas production



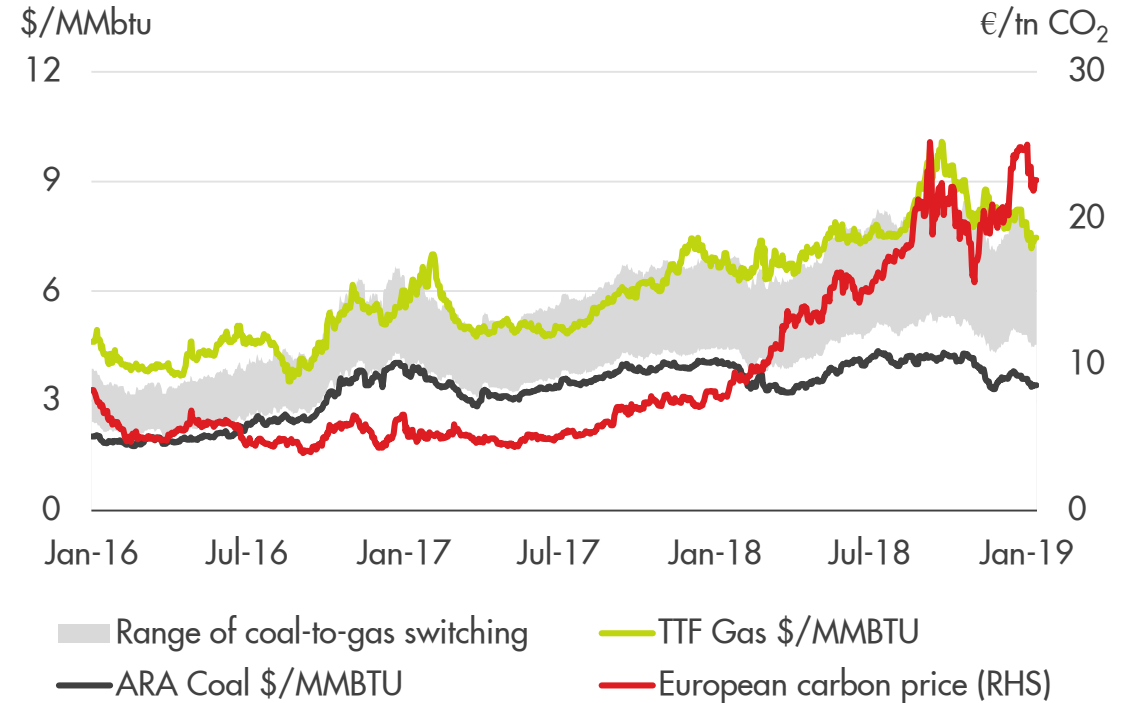
Source: Shell interpretation of IHS Markit Q4 2018 data

European power sector is also capable of absorbing more LNG

Coal and gas-fired generation capacity and utilisation



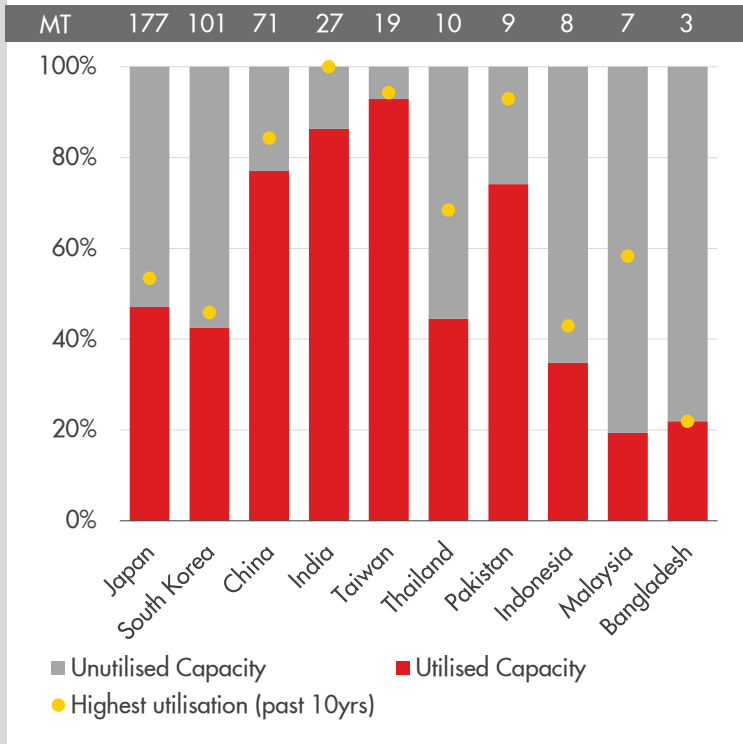
European power switching economics



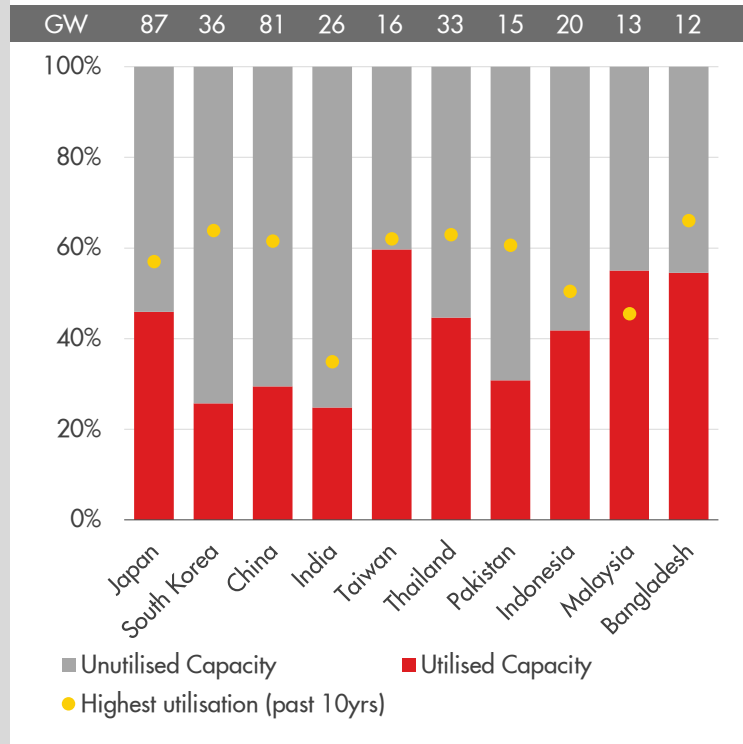
Source: Shell interpretation of IHS Markit Q4 2018 data

Asia has significant potential to take more LNG volumes

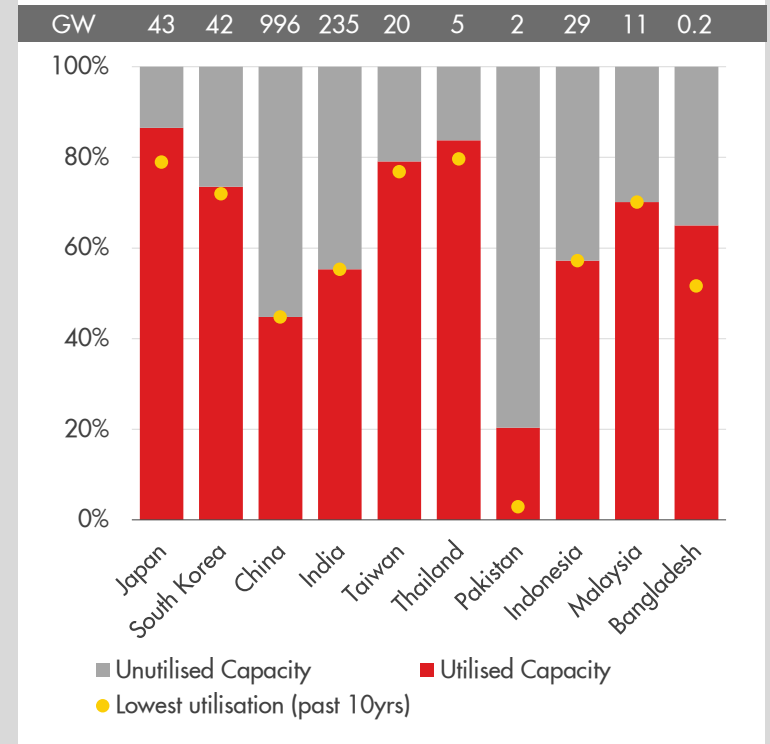
2018 Regasification capacity and utilisation



2018 Gas-fired power generation capacity and utilisation

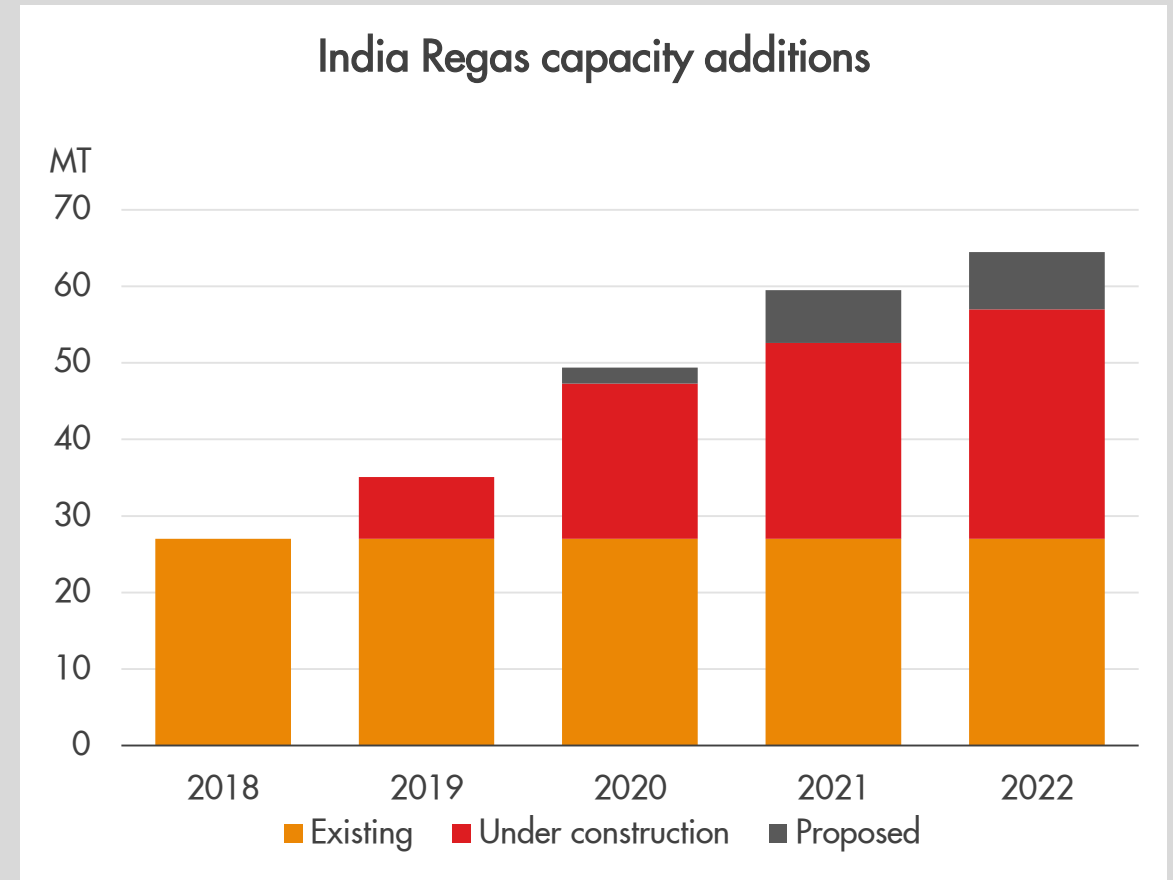
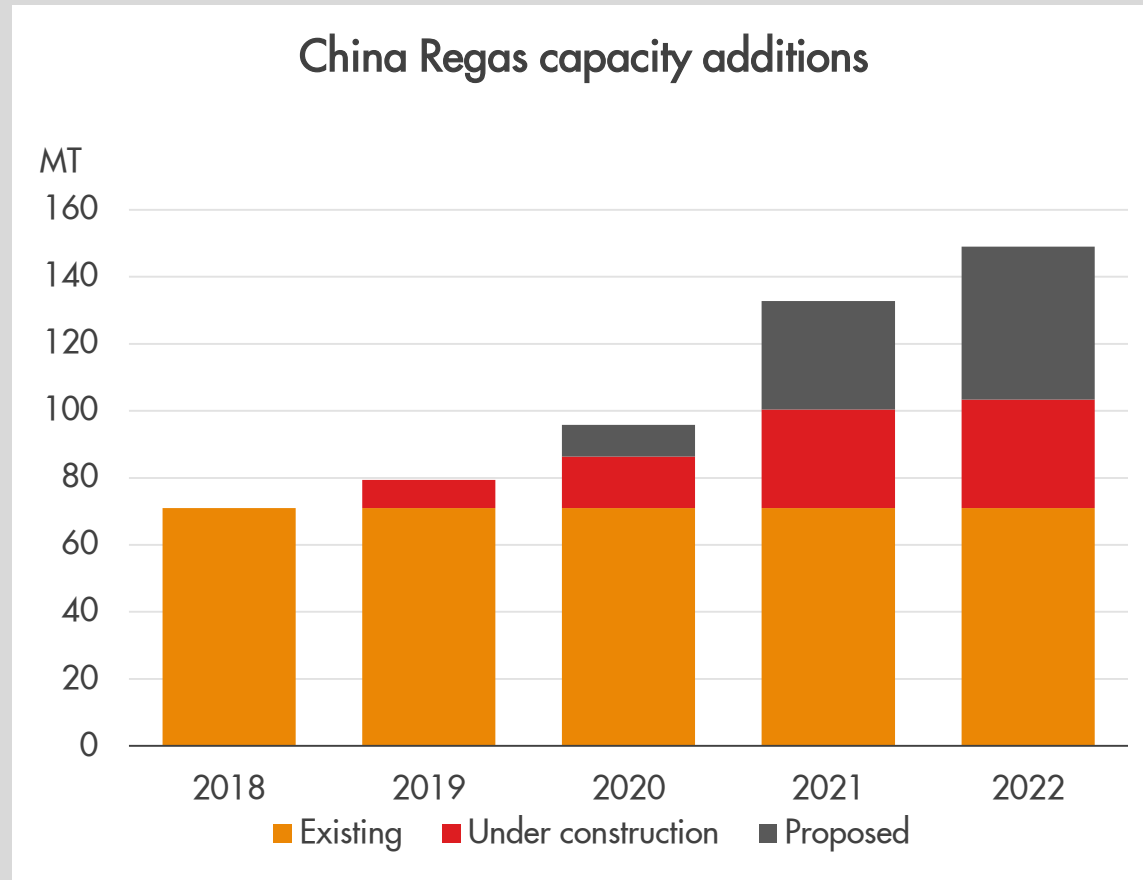


2018 Coal-fired power generation capacity and utilisation



Source: Shell interpretation of IHS Markit and Wood Mackenzie Q4 2018 data

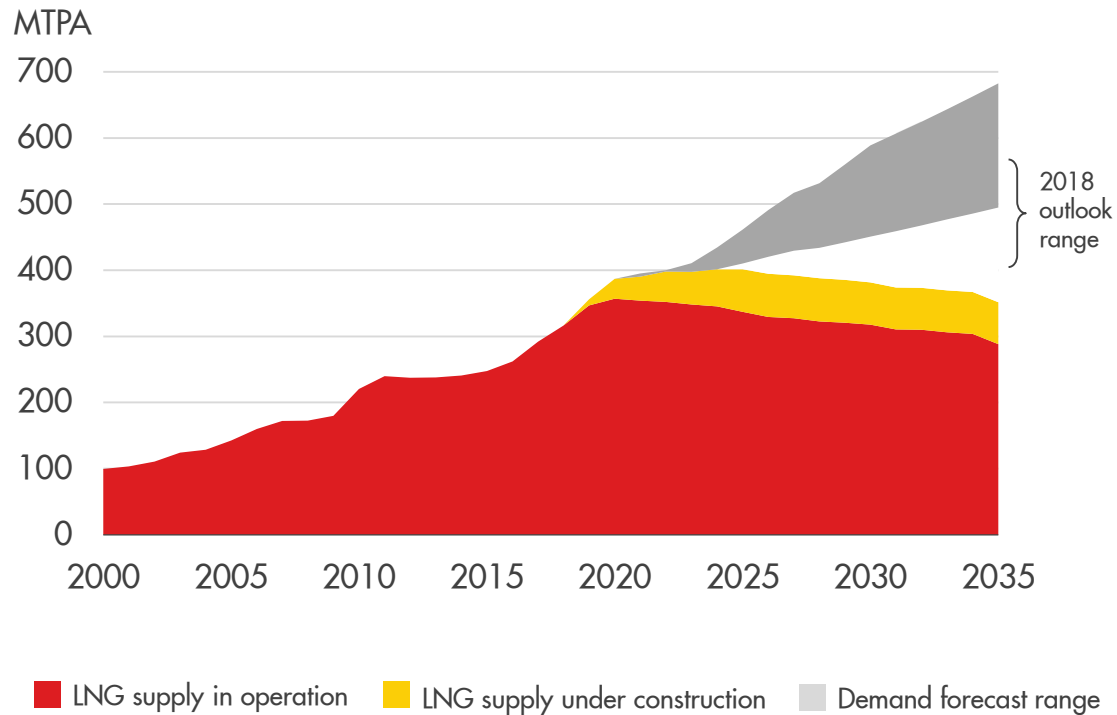
China and India can double import infrastructure in 5 years



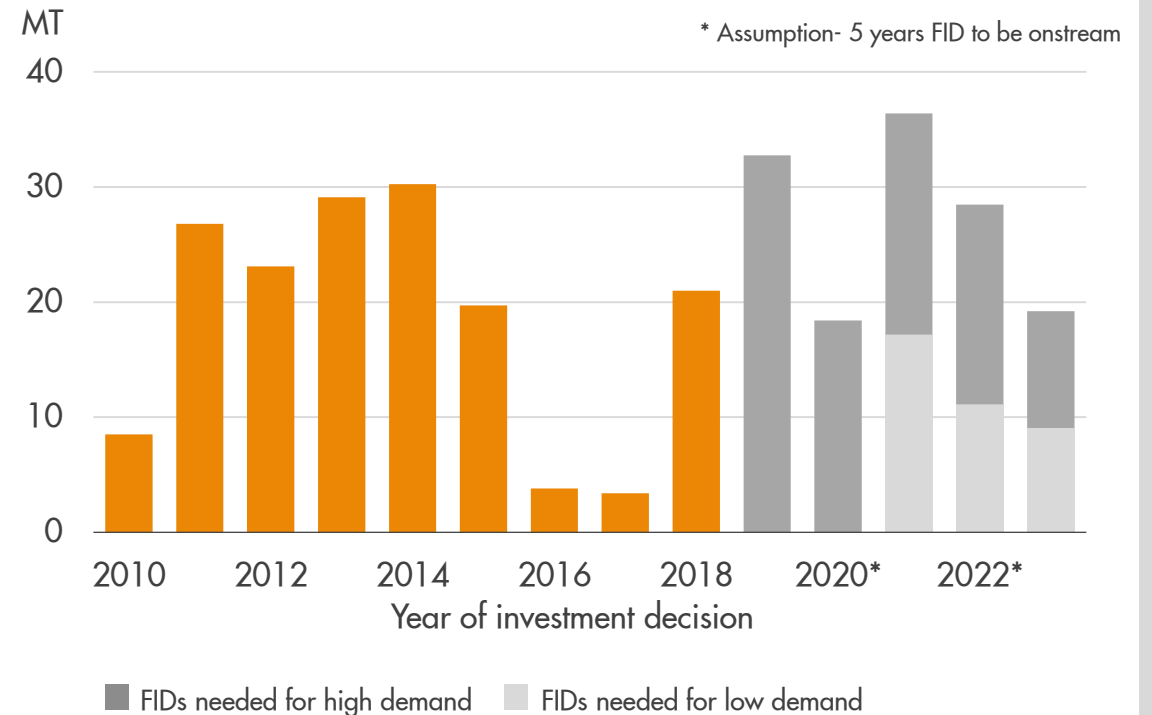
Source: Shell interpretation of IHS Markit Q4 2018 data

Supply investment still needed to meet continued LNG demand growth

Emerging LNG supply-demand gap



Investment in liquefaction capacity



Source: Shell interpretation of IHS Markit, Wood Mackenzie, FGE and Poten & Partners Q4 2018 data

Summary



Growing recognition of the role of gas and LNG as the world tackles poor air quality and climate change

- Gas to supply the largest share of energy demand growth, supplying over 40% of additional demand by 2035
- Coal-to-gas switching led to 78% improvement in Beijing winter air quality over the last five years

Asian LNG imports exceed expectations again in 2018 absorbing continued supply growth

- China became the world's largest gas importer, with LNG imports doubling over two years
- JKM futures trading volume increased ten-fold since 2016

Near term supply growth expected to be absorbed by Europe and Asia – continued need for investment in supply to meet long-term demand growth

- 35 MT additional supply expected in 2019
- 2018 saw final investment decisions on 21 MT of new capacity compared to a total of 7 MT in the last two years combined

