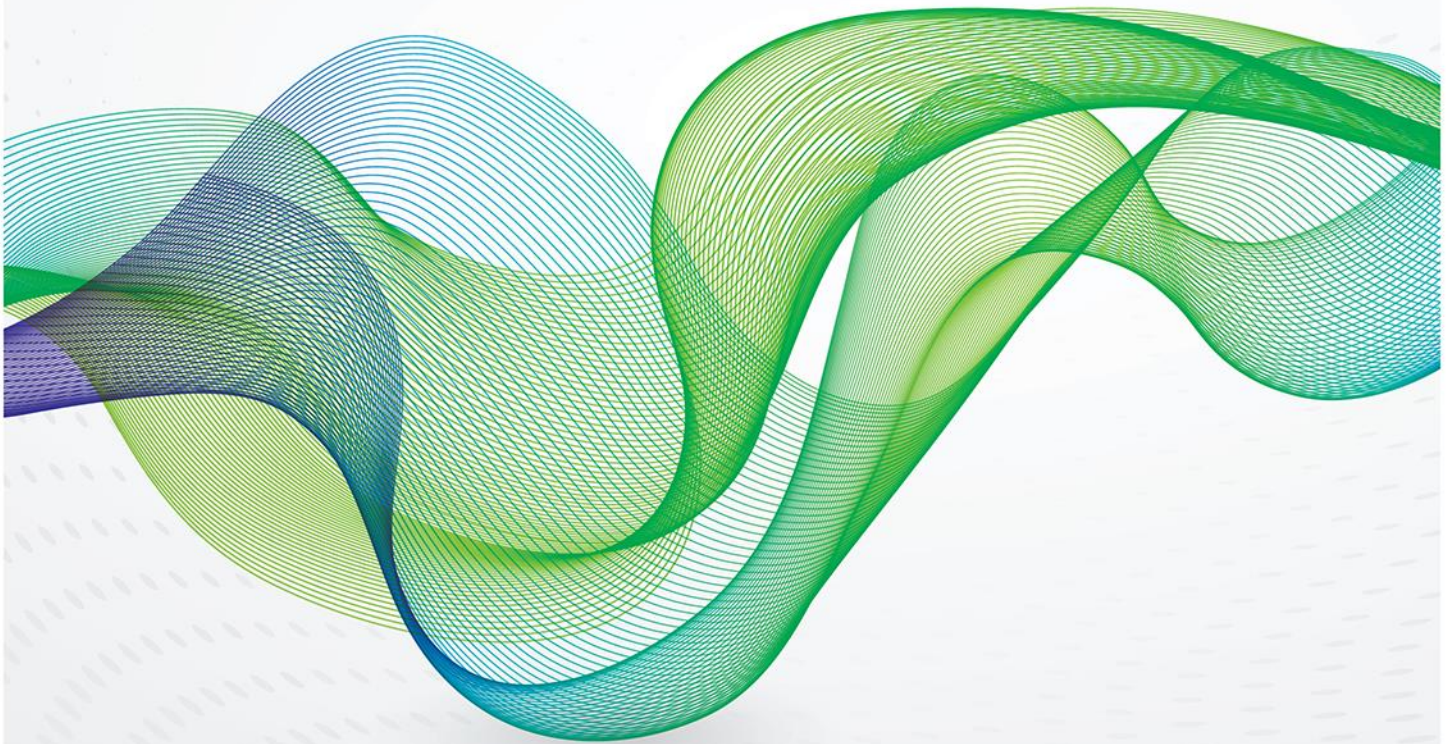
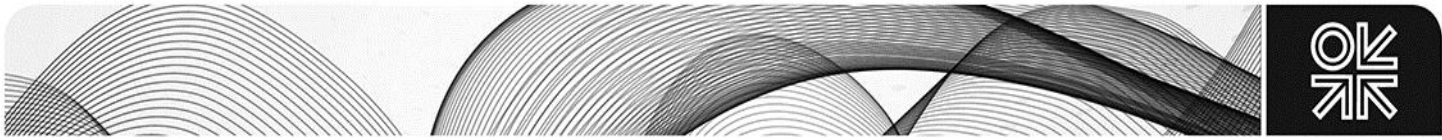


June 2019

China: Growing import volumes of LNG highlight China's rising energy import dependency





China's gas demand growth looks set to be strong over the next several years, driven by government environmental policies. Since Chinese national oil companies are trying with only limited success to raise domestic production, a greater dependence on imports of gas is almost inevitable – whether by pipeline from neighbouring countries or as LNG from more distant suppliers. Either way, China's rising dependence on seaborne energy imports at a time of increasing geopolitical tension with the US is likely to cause growing concern in Beijing. While China has few short-term options to mitigate the strategic vulnerabilities associated with rising seaborne supplies, it may increasingly turn to Russia as a source of imported gas.

Rising demand outstrips China's ability to meet it from domestic production

China's gas demand has risen more than three-fold over the past decade as its economy has grown and the government has focused on increased gas use as a route to a cleaner environment in China. Domestic production has not kept pace with gas demand; as a result, the shortfall has increasingly been met by imports from overseas suppliers.

Imports of LNG began in 2006 and pipeline gas in 2010

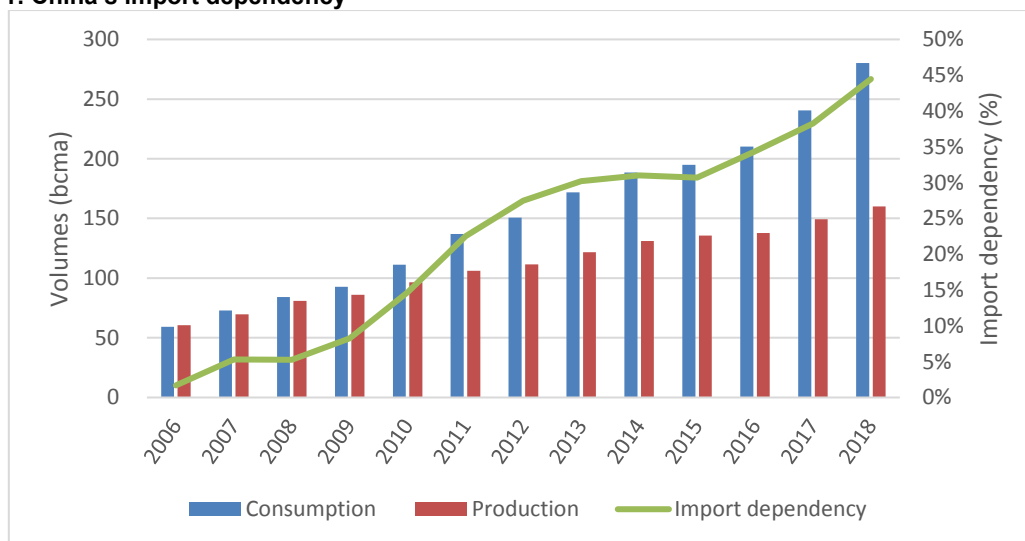
Liquefied natural gas (LNG) imports did not begin until 2006, when volumes of LNG started to arrive at new import terminals on China's coast. These were joined by imports of pipeline gas in 2010, when the pipeline from Central Asia was completed to bring gas into western China, after which it travelled through the domestic pipeline network to the major cities in the east of the country.

It is well known that overall import dependency has risen steadily since gas imports began. In 2018 it reached 43%, compared with just 5% a decade earlier. What is less well known is that LNG now represents almost 60% of China's gas imports, considerably ahead of the volume of pipeline imports, a trend that started in 2017 when LNG inflows exceeded pipeline supplies for the first time.

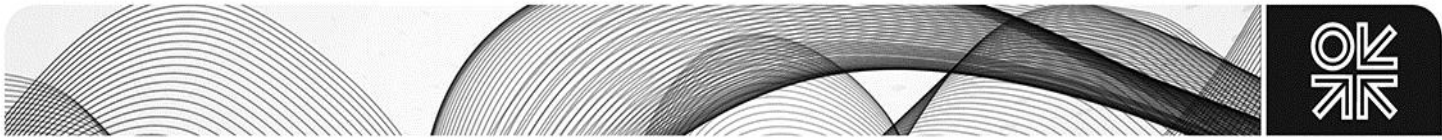
Concerns about China's growing energy import dependency

There is undoubtedly a debate inside the Chinese government about what level of overall import dependency for natural gas is acceptable. Given that gas has been playing a growing role in China's plans to clean up its environment, rising import dependency may have been a necessary evil given that it helps tackle the socially contentious issue of deteriorating air quality. The government is certainly keen that the national oil companies (NOCs) increase their gas production – both conventional and unconventional – in order to reduce import dependency; Xi Jinping has said as much in the past. However, even as production growth increased, it continues to fall short of the demand requirements.

Figure 1: China's import dependency



Source: BP Statistical Review, China Customs



Oil imports represent 70 per cent of consumption – seaborne dependency reduced by Russia's ESPO pipeline plus strategic reserves

China's oil import dependency is currently around 70%, up from 50% a decade ago, and despite the government's targets of capping it at around 62%. This high and growing level of dependency does not seem to have evinced significant government or public concern. Oil may be viewed as a more fungible commodity than gas, since it arrives almost exclusively by seaborne tankers from a variety of exporters. Only in relatively recent times has oil been delivered by rail and pipeline – principally from Russia to northern China through the Eastern Siberia-Pacific Ocean Pipeline (ESPO¹). However, China has also developed a significant strategic reserve of oil, estimated to contain forty days' supply.

Rising pipeline volumes from Russia have therefore reduced China's seaborne oil dependency below where it would have been otherwise. However, Russian oil imports by pipeline represented just 11.3% of the country's total oil import volumes in 2018, although that figure was up from 9.8% in 2017. It is interesting that on a December to December basis, imports of Russian crude oil were 40% higher in December 2018 than one year before (largely because of the expansion of the ESPO line from 300 kbd to 600 kbd). This increase mirrored increases seen from other suppliers - imports of Saudi crude were 58% higher, Iraqi crude 92% higher and Angolan crude 37% higher (albeit with Venezuelan deliveries down sharply). The point is: China appears to have accepted a high degree of dependence on imported energy – certainly imported oil – and even seaborne imports since Russian overland pipeline volumes still account for a relatively small share of overall Chinese oil imports. Even if this is not an ideal situation, China has learned to live with it while at the same time developing its strategic oil reserves.

Gas import dependency may be more contentious because of the current external environment

The difference between rising oil import dependency and rising gas import dependency may relate, above all, to a contrast between the global political environment when China's oil imports were initially rising strongly 10 years ago and the current political environment when the same volume growth has been true of gas. Clearly the situation is more fraught than a decade ago. A trade war with the US, a more difficult relationship with Taiwan and generally less forbearance on the part of many Western counterparts means that the risks of being over dependent on imported energy may well be seen by Beijing as greater today than they were a decade ago.

There are a number of potential solutions to this challenge:

- Increasing domestic production of conventional gas
- Increasing unconventional gas production
- Restraining gas demand growth
- Increasing pipeline volumes at the expense of LNG imports

Increasing domestic output significantly has proved challenging

Increasing domestic production of gas (and indeed oil) is an obvious part of any solution. This is something that Xi Jinping has ordered as a way of improving China's national energy security. Only in March did we see CNPC's announcement that it would increase its 2019 exploration budget by 25%, with particular focus on gas. The below shows how, in contrast with many Western majors, which continue to keep capex under tight control, Chinese NOCs plan to step up spending levels to levels close to those of the very strong year of 2014. That said, those companies have to contend with expensive wells and aging domestic fields, which means a likely lower return on the upstream investments that they have announced.

¹ <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/12/Chinas-loans-for-oil-WPM-70.pdf>

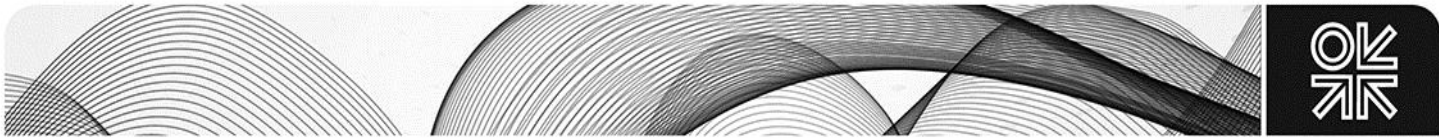
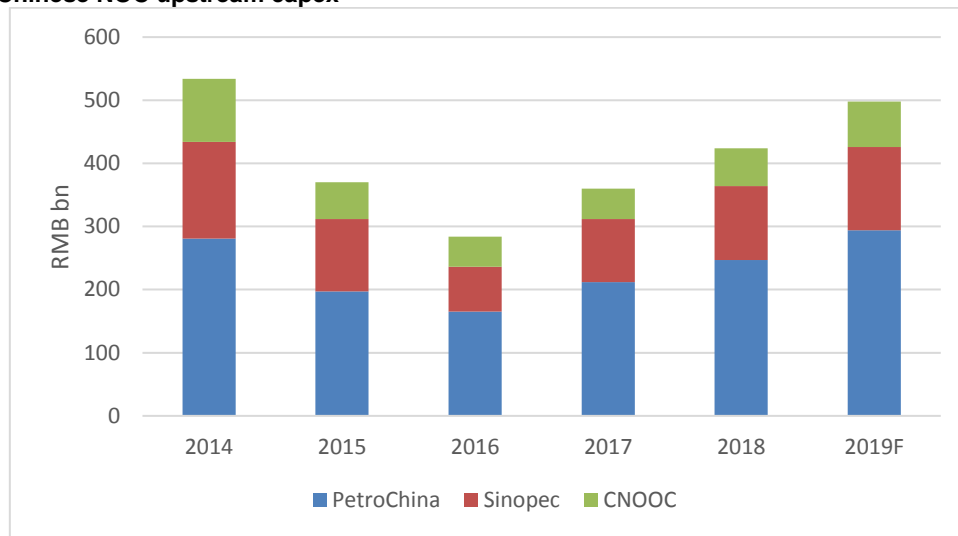


Figure 2: Chinese NOC upstream capex



Source: Company accounts, Bloomberg

Natural gas production in China has certainly risen. When imports began in 2006, domestic production was just 60 bcma. By 2018 it had reached 160 bcma, having risen steadily during the previous 12 years. However, the 166% increase in domestic gas production was more than outweighed by the almost fourfold increase in gas demand – from just under 60 bcma in 2006 (when it was limited by domestic supply) to 282 bcma in 2018, and last year imports supplied 45% of demand. Increasing domestic production alone will not solve China’s energy security challenges.

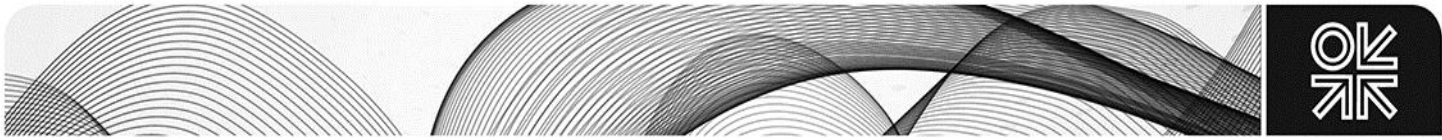
High hopes for unconventional production have not been fulfilled

Furthermore, unconventional production faces some unique problems. Shale gas, synthetic natural gas and other forms of unconventional production have generally not achieved the ambitious production targets that were set for them. In the case of shale gas, the government had high hopes of rapid increases in domestic output based on China’s large reserves of shale gas. The original targets of 60 bcma of shale production by 2020 and 100 bcma by 2030 were abandoned some years ago and the 2020 target halved to 30 bcma. But even that now looks unrealistic, with 2018 output reaching only 10-11 bcma and industry forecasts for 2020 ranging between 13-15 bcma. BP recently announced that it was pulling out of shale gas exploration in China, a move that reflects the difficult economics of the sector.

It appears that synthetic natural gas is not faring much better. China’s National Energy Administration set an output target in 2014 (when output was 0.75 bcma) of 50 bcma – 2017 output was just over 2 bcma. Three of the four pilot projects for converting coal to synthetic natural gas (SNG) are heavily lossmaking and the only one that makes money does so because it is able to sell into the LNG market, where prices have been liberalized, rather than the price-controlled market for pipeline gas. New projects are planned, but SNG is not going to solve the energy security problem on its own either.

Gas demand looks set to continue rising

On the demand side, restraining gas demand growth seems to run counter to the Chinese government’s energy and environmental policies, which see coal being replaced by industrial, commercial and residential use, and – to a more limited degree – in power. As the economy has grown, energy demand has risen with it; and now, even as economic growth slows down, the government’s drive to switch out coal and replace it with gas is boosting gas use at increasingly rapid rates – from 15% in 2017, demand growth accelerated in 2018 to almost 18% and is expected to still be 10-14% this year. China is, in fact, focused on reducing costs and prices in the domestic gas sector as a route to stimulating increased use of gas in power generation and industry; hence restraining the use of gas would run counter to current Chinese government policy.



There are cautionary voices which can be heard these days suggesting that the ongoing trade war will hit demand because companies affected by tariffs face shutting down plants, the government has tightened safety policies after a series of explosions and there are occasional rumours that the second phase of coal-to-gas switching may be delayed. Other reports suggest that southern and southwest China will be the focus of efforts to increase gas demand this year and that growth will therefore remain robust.

Nevertheless, given that gas demand growth is likely to outpace domestic production and likely to remain relatively robust (even if in single-digit figures because of the limited room for gas to take market share in the power sector) going forward it seems unlikely that in the short-to-medium term the absolute level of China's dependency on gas imports will fall. Rather, that dependency is set to rise at a time when international tensions are higher than they have been for some time and when supply security is likely to be a growing concern among members of the Chinese government and policymakers.

The final element of the solution to China's likely growing concerns about gas supply security is to diversify both the sources of energy imports and the delivery methods. For a long time China has been buying oil from a variety of sources that arrived by sea. In recent years the country has diversified those sources to include pipeline deliveries of oil from Russia, which arrive overland.

Diversifying LNG suppliers is helpful . . .

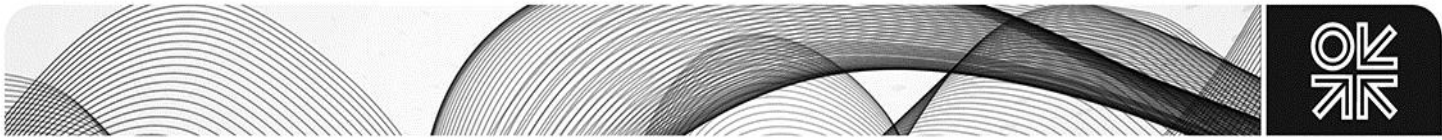
This diversification template has already been deployed in the gas sector. Since imports began in 2006, China has steadily expanded its gas supply portfolio. In 2006 there was just one LNG supplier to China – Australia, which had signed a deal in 2002 to supply gas to China's first LNG receiving terminal in Guangdong province. Imports that year totalled just under 1 bcm. Since then both the volume and the diversity of Chinese LNG supplies has grown dramatically. In 2018 LNG imports totalled 74.2 bcma; and, while consistent data for 2018 are not yet available, in 2017 there were 19 different LNG suppliers. Some of these go back to the beginning of Chinese LNG imports (including Australian LNG), but other suppliers are more recent, such as the US, which has been looking at new export markets for its growing domestic gas production and is the world's fastest-growing LNG exporter. China, the world's fastest-growing LNG importer, should therefore be a natural partner for the US in terms of gas.

. . . just not from the US

However, the escalating trade war between China and the US has meant that sales of US LNG to China have steadily been curtailed. Imports from the US began in 2016, when volumes were 0.5 bcma. They picked up in 2017, when 30 vessels delivered 2.9 bcma of US LNG to China (worth US\$447mn, representing 15% of US LNG exports). The first half of last year showed even stronger growth, when 18 US LNG shipments arrived. However, as the trade war escalated, volumes declined significantly. Only nine US vessels arrived in China during the second half of 2018 and total volumes were just 2.6 bcma – lower than the 2017 total of 2.9 bcma. So far, 2019 has seen more of the same: just two US LNG shipments have arrived in China to date and volumes have totalled just 0.3 bcma.

The reasons are not hard to fathom. In September 2018 China imposed a 10% import tariff on US LNG deliveries (among other products) in retaliation for US tariffs imposed on exports of Chinese goods to the US market. Following the Trump administration's decision in early May 2019 to increase tariffs on US\$200bn of Chinese exports, China retaliated further and imposed increased tariffs of 25% on a range of US goods – including LNG. These tariffs went into effect on 1 June.

More broadly, while the US and China might appear to be natural partners when it comes to exports of US LNG to China, the current political environment militates against that no matter how economically attractive an energy transaction might look on the surface. If China were to become a large buyer of US LNG as part of a deal to end or defuse a trade war, that large dependence on any one supplier may be unwelcome to Beijing since any future reduction in US supplies mandated by Washington could cause a sharp dislocation in China's economy.



Faced with a rising import requirement, a serious economic and trade challenge from a, potentially, large energy supplier like the US and given what may be a desire to avoid overdependence on seaborne energy supplies, pipeline gas – particularly across China’s northern border with Russia – look increasingly attractive as a reasonably secure source of energy to meet China’s burgeoning demand.

There are already significant volumes of pipeline gas reaching China from Central Asia and Myanmar. In 2018 these are estimated to have totalled some 47 bcma from Central Asia with small volumes (3-4 bcma) from Myanmar. Maximum pipeline capacity from Central Asia is around 55 bcma, although there are talks about expanding this to 65 bcma.

If we look at the broader picture and make some realistic assumptions about how the gas balance could develop over the next five to six years, we can see that the challenge of China’s growing dependency on imported LNG is not going away – indeed it appears it could become only more severe in the years ahead.

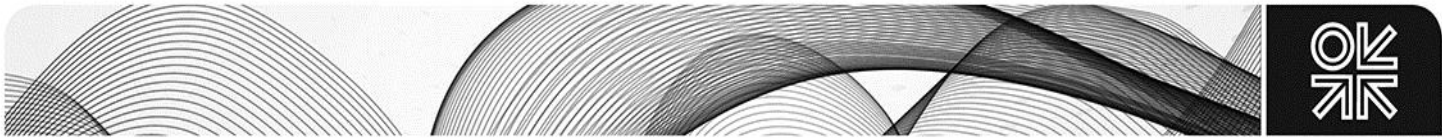
Looking out to 2025, the IEA’s forecast for Chinese gas demand in that year is 464 bcma and its production forecast 222 bcma. The IEA’s demand forecast is near the high end of expectations and, hence, may be revised down. However, even reaching demand of 464 bcma in 2025 implies just a 7% annual increase in gas demand over the next five to six years – around half the annual increase seen in recent years. If accurate, this forecast would imply a deficit to be met by imports of 242 bcma – which translates into an import dependency of 52%. Imports (both through pipelines and as LNG) accounted for 43% of consumption in 2018 and totalled some 120 bcma. So, China’s import dependency certainly looks set to rise.

We could assume that Central Asian gas exports to China will rise to some degree over the same period (although there are signs that Russia might want to buy some of the surplus Central Asian gas, which could reduce the volumes available for China). But we could also – realistically – assume that Central Asian volumes could reach 50 bcma and Myanmar volumes 5 bcma, which would mean that future pipeline volumes from existing suppliers could reach 55 bcma compared with the current 50 bcma.

The one major confirmed addition to China’s supply portfolio is Russian gas through the Power of Siberia pipeline, which is expected to begin arriving around the end of this year, although it will take some time to build up to the expected plateau volumes of 38 bcma. Realistically, we could assume that by 2025 that plateau would have been reached. There have been discussions about an additional pipeline taking 30 bcma of gas from Russia to China (Power of Siberia 2), but no decision has yet been taken.

Summarizing these changes we conclude the following:

- Import dependency and import volumes both look set to grow over the next six years
- Existing pipeline suppliers are unlikely to be able to increase exports sufficiently to avert the need for new suppliers
- Russia will be the most important new supplier with the Power of Siberia pipeline with its expected 38 bcma plateau volume – and potentially the western route from Siberia, which could deliver an additional 30 bcma - although 2025 might be an optimistic timescale for its full commissioning given that talks about this route have been sporadic and have yet to yield any concrete deals. At the same time, the announcement in late April that Chinese buyers will take a 20% stake in Novatek’s 20 mtpa (27 bcma) Arctic LNG project was in part aimed at sending a message to the US that China has alternative supply options, as well as other investment options. Novatek did not disclose the value of the deal, signed on the sidelines of the Belt and Road Forum in Beijing but it will make China National Oil & Gas Exploration and Development Company (CNODC) and CNOOC the second- and third-largest foreign shareholders in Arctic LNG 2 after Total.
- Despite these additional pipeline volumes, by 2025 China could need an additional 49 bcma of LNG to meet its demand – or 79 bcma if Russia’s western route is not forthcoming



- A fundamental question is whether there will be sufficient LNG import terminal capacity to receive all the LNG required by China. The 2018 LNG import volume of 73 bcma is expected to rise to 95 bcma by 2020, but the LNG import capacity needed by 2025 in this simple analysis is 119 bcma (separately CNPC have recently suggested that 110 bcma of LNG imports will be required in 2025). Estimates of China's existing LNG regas capacity are around 97 bcma with an additional 30 bcma due on stream between 2020-2021. If these projects run to schedule, there ought to be sufficient regas capacity to cope with China's rising LNG demand – and particularly so if plants can operate beyond their nameplate capacity
- China's import dependency is undoubtedly going to remain an ongoing – and growing – challenge for the country in the years to come
- This rising dependency also has implications for global LNG suppliers. If the US is not going to be a significant supplier of LNG to China, other countries have the opportunity to step in to fill the LNG gap – Qatar, Australia, perhaps Mozambique etc. Similarly, China might look more favourably on additional pipeline deals with Russia or Central Asia – with Russia the more likely supplier given its resource base and desire to reach agreement on a potential Power of Siberia 2 line from West Siberia. China for its part will want to maintain diversity in both suppliers and supply routes to ensure it retains maximum operational and commercial flexibility in its gas supplies.