



Al-Attiyah Foundation Research Series

Expert energy opinion and insight

China: stop-start path to gas powerhouse

For global gas suppliers, no market over the past decade has been as vexing as China's. The country has all the makings of a natural gas powerhouse. It holds vast conventional and unconventional reserves that have scarcely been touched by the nation's producers. And gas's tiny slice of China's overall energy mix leaves a huge untapped market of consumers. Yet optimism over China's seemingly boundless natural gas potential has given way to disappointment over lower-than-expected growth rates in recent years. China's gas markets — and imports — will of course rise along with its energy consumption and as the country pursues cleaner alternatives to coal. But fundamental pricing and competition reforms are needed for the country to realise its full potential — and the government's ambitious targets. For now, the outlook for those reforms is mixed. Exporters targeting the country must watch the reform process carefully, but cannot be despondent: China's consumption potential remains huge and its domestic supplies will not meet all its needs.

Grand plans

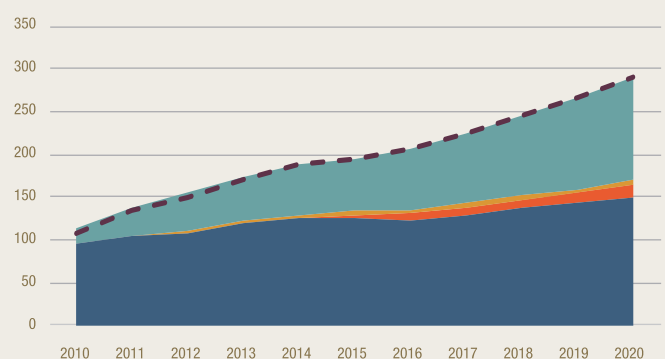
Through sheer size, China has become a decisive force in global gas markets. Even though gas makes up just 6% of China's energy mix, it is the world's third-largest consumer, behind the US and Russia, at around 206 billion cubic metres (bcm) in 2016. It is the world's sixth-largest producer at around 140bcm in 2016, and has added 100bcm in output in just 12 years, making it the fastest-growing producer aside from the US and Qatar. As demand has outstripped supply, it has gone from self-sufficiency a decade ago to being a major international buyer today. It imports around 70bcm of gas, split roughly evenly between liquefied natural gas (LNG) and pipelines from Central Asia and Myanmar.

Beijing has ambitious plans to expand its natural gas market, built largely around a long-held top-down target of raising the share of gas in the energy mix to as much 10% by 2020 (see Figure 01). That position was reaffirmed in January, when the National Energy Administration released the 13th five-year energy plan, covering 2016 through 2020. However, in recognition that the 10% target is becoming an increasingly remote possibility after several years of slower growth, the plan for the first time set out a range of 8.3% to 10% — effectively a cut to the target.

Beijing has faced a growing public backlash in recent years over the chronic haze that hangs over much of the country

— punctuated by periodic episodes of extreme pollution that have come to be known as “airpocalypse”. The pollution has been blamed for millions of premature deaths. Beijing's answer has been a broad campaign to cut reliance on coal to fuel its industry and power generation, and replace it with cleaner natural gas and renewables. The 13th five-year energy plan calls for cutting coal's share of the energy mix from around 64% in 2016 to 58% by 2020.

FIGURE 01: CHINA GAS DEMAND 2010-20 (BCM)

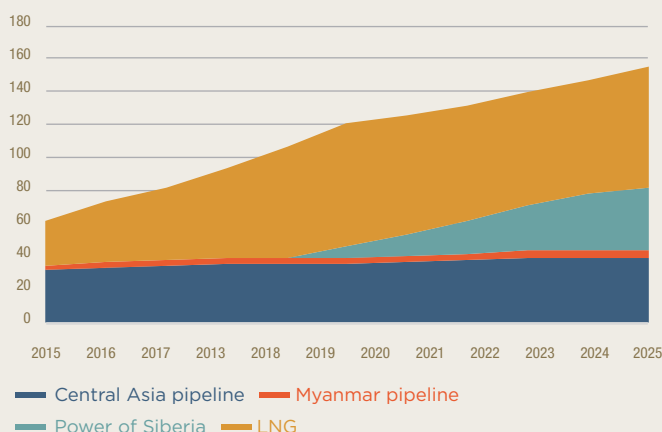


— Conventional production — Shale production
— Coal-bed methane — Imports — Gas demand
Source: Petroleum Policy Intelligence

The 2020 plan implies tremendous growth in natural gas consumption. Beijing says it wants to expand the domestic natural gas pipeline network from 64,000 km to between 100,000 km and 120,000 km to connect more than 100m new consumers to the grid in just a few years. It also wants to double gas-fired power generation to around 85GW. At 10% of the energy mix, natural gas demand would rise from around 206bcm in 2016 to around 360bcm by 2020, implying more than 15% annual growth, a pace not seen since the early 2000s. Even hitting the lower end of the target — 8.3% — would see demand rise around 100bcm by 2020 to 304bcm, implying around 10% growth.

The plan sees strong domestic growth meeting some of the new demand. Overall production would rise 70bcm by 2020, though this relies on a sharp increase in shale-gas output from 7bcm in 2016 to 30bcm by 2020. The rest comes from a mix of conventional, tight and coal-bed methane output. Even with this relatively strong production growth, imports would need to rise by 20% a year, more than doubling from 72bcm in 2016 to 153bcm, if consumption hits the 10% target. At the lower end of the energy-mix target, imports would rise at around 8% a year to 97bcm by 2020 (see Figure O2).

FIGURE O2: CHINA PROJECTED GAS IMPORTS BY SOURCE 2015-25 (BCM)



Source: Author estimate

Reality differs

In reality, there are reasons to believe that China's gas market will fall short on both fronts. Consumption growth has disappointed of late, rising just 3.7% in 2015 and around 8% in 2016. Early 2017 hasn't been encouraging for those hoping for an acceleration, with demand up just 4% in January and February compared with a year earlier.

The reasons for this slowdown are complex, but come down to a few main factors: a slowing economy, complex and opaque pricing, making gas less competitive, and oligopolistic control over the gas sector.

China's economic growth has slowed to around 6.5% according to official figures (many international economists believe it to be somewhat lower than this), and economic growth is shifting away from energy-intensive industry towards more service-oriented sectors. That has had a broadly negative effect on overall energy demand.

Beijing's interventionist natural gas pricing policies have hampered efforts to expand the market. Policy makers have sought to strike an impossible balance. They have taken a top-down approach to setting prices in a way that tries to keep prices low enough to encourage demand growth, while still ensuring profitability for the state-owned enterprises (SOEs) that dominate production. At the same time, it has also sought to set rates at different levels for different types of consumers, hoping this will shield residential consumers from higher prices (by charging industrial users more). The result has been an opaque, confusing and inefficient market.

There have been small steps towards unifying rates for different consumers and the 2020 energy plan calls for letting markets determine prices. But taking their hand off the tiller has been difficult for Beijing's central planners. The policy whiplash, with policy makers trying to boost margins for producers one year and distributors the next, has been stifling. Last year's move to cut natural gas prices, for instance, helped support stronger demand growth after a lacklustre 2015, but has distorted the market in ways that will require more countermeasures down the line. A more liberalised pricing system is the best path to create a sustainably growing gas market, but it looks to be far off, with President Xi Jinping's market reform agenda largely stalled.

Also key to fostering a more robust gas market is breaking the oligopoly China National Petroleum Corporation (CNPC), Sinopec and China National Offshore Oil Corporation (CNOOC) hold over the country's gas supply chain. The three companies control nearly all the country's production, gas pipelines and import facilities. CNPC on its own says it produces 80% of China's gas and controls around 80% of the country's gas pipeline network. It has jealously guarded this dominant position, resisting efforts to sell off the pipeline business or significantly open its infrastructure to third parties in ways that would encourage more production and more efficient gas distribution throughout the country. Sinopec and CNOOC have been similarly guarded about opening their pipeline and LNG infrastructure to third parties.

This oligopoly has choked off badly needed private investment in the upstream and midstream gas sectors. This has been seen in shale and coal-bed methane production in particular, where the government has recognised it needs private investment to maximise output. Yet the efforts have been mostly unsuccessful. This is partly due to difficult geology. But it's also because private investors worry they will be muscled out of the market by the state-owned enterprises. For instance, private coal-bed methane producers, which have been active in the country since the late 1990s, have consistently run into problems accessing pipeline infrastructure, raising financing and getting their drilling plans approved. The government has also sought to open gas infrastructure to private investors, but these efforts have been rebuffed by the politically and economically powerful state-owned companies. The SOEs will continue to be major players for many years, but until the government can create a more level playing field that draws more private investment into the sector, the gas market's growth will be stunted.

FIGURE 03: CHINA LNG RECEIVING TERMINALS, EXISTING AND PLANNED

Name/site	Capacity (bcm)	Operator	Start up
Behiai, Guangxi	4.1	Sinopec	2016
Dalian	7.8	PetroChina	2011
Shenzhen	9.2	GDLNG	2006
Dongguan	1.4	Jovo Group	2013
Fujian	6.9	CNOOC	2008
Hainan	4.1	CNOOC	2014
Qingdao	4.2	Sinopec	2014
Jiangsu	8.5	PetroChina	2011
Shanghai, Meng-tougou	0.2	Shanghai Gas Group	2008
Shanghai LNG	4.1	CNOOC	2009
Tangshan	4.8	PetroChina	2013
Tianjin	3	Hoegh LNG	2013
Ningbo	4.1	CNOOC	2012
Zhuhai	4.8	CNOOC	2013
Total Capacity	67.2		
Shenzhen (Diefu)	5.4	CNOOC	2017
Tianjin (CNOOC)	4.8	CNOOC	2017
Tianjin (Sinopec)	3.9	Sinopec	2017
Yuedong LNG	2.7	Shenergy	2017
Shenzhen (CNPC)	4.1	PetroChina	2017
Fujian	4.1	CNOOC	2018
Zhoushan	4.1	ENN Energy	2018
2018 Total	96.3		

Source: Company reports, International Gas Union, PPI

With the prospects for deep reforms dim, a more likely scenario is for the gas market to grow as coal-to-gas switching continues, but at a slower pace than the government might hope. The International Energy Agency (IEA) assumes around 9% annual growth in gas demand, a slight rebound from recent years, which is a more likely scenario. The low single-digit growth seen in 2015 was brought about by the collapse in international oil prices, while Chinese gas prices remained relatively high, prompting widespread switching from gas to liquid petroleum gas and fuel oil, which is unlikely to be repeated. The IEA's 9% growth rate would translate into demand of 291bcm by 2020, well short of the 360bcm envisioned under the 10% energy mix target. It would put gas at around 8% of the energy mix in 2020.

While gas demand is likely to disappoint, so too is production. Conventional output looks set to keep rising at a fairly strong clip of around 5% a year. CNPC has a deep portfolio of existing

reserves and prospects in which it is investing, especially in the gas-rich far western province of Xinjiang. CNOOC, meanwhile, is developing several offshore gas fields that will deliver production growth over the next few years.

However, shale-gas production is likely to fall well short of the government's target, which has already been reduced from 100bcm by 2020 to 30bcm. Shale-gas output stood at around 7bcm in 2016, up from zero in 2013 as Sinopec has continued to develop its Fuling shale-gas field in Sichuan province. The company plans to raise its output capacity at the field to 10bcm in 2017 and continued expansion can be expected. But there has been little progress outside the Fuling project, and there are unlikely to be any major production breakthroughs by the end of the decade. Shale blocks auctioned in 2013 to private investors have seen little investment. A host of shale-gas joint ventures between international majors and Chinese state oil companies have stalled. And while CNPC has publically talked up its shale investments, it is more focused on developing its more economic conventional and tight-gas projects. In short, it looks highly unlikely that Chinese shale gas will be repeat the US experience, when surging shale supplies flipped the nation from the world's most important LNG buyer into a gas exporter in about a decade.

With shale-gas and coal-bed methane output likely to come in at less than half the government's 40bcm combined target, total domestic production is likely to rise to around 170bcm by 2020, compared with the 207bcm target in the 2020 energy plan.

Under this scenario, there would be a growing gap between demand and domestic supply, requiring an increasing amount of imports — growing at around 15% a year. Total import demand could rise by around 50bcm from 2016 to 2020 to around 120bcm, though that figure could be even higher if coal-to-gas switching accelerates. This is smaller than the import level implied by the 13th five-year plan targets, but it will still make China an increasingly important force on global gas markets.

Import strategy

What kind of import strategy can China be expected to employ? The country has prioritised diversity of supply and flexibility. It has built significant capacity for LNG shipments, signing supply deals with countries around the world, and built pipeline connections with Myanmar to the south, Central Asia to the west, and eventually Russia to the north. Since 2011, pipeline imports have run slightly ahead of LNG imports, though in 2016 that flipped, despite pipeline imports typically being cheaper than LNG supplies. This was primarily due to technical problems on the West-East pipeline system from Central Asia.

In fact, China's import capacity has raced ahead of its import needs, leaving a significant amount of spare capacity in the system. In 2016, China imported around 34.2bcm from Central Asia, utilising around 60% of the three-line West-East capacity. It imported around 3bcm from Myanmar, well short of the pipeline's 10bcm capacity. And it brought in 37.2bcm of LNG, just 55% of installed regasification capacity. It is due to add a further 29bcm of LNG capacity in 2017 and 2018, bringing the total to around 96bcm, exacerbating overcapacity in the short run (see Figure 03).

This overcapacity has been recognised by China's gas importers, which have hit the brakes on some costly import projects. A fourth pipeline on the West-East system from Central Asia, known as Line D, which would add 30bcm to the route's capacity, has been delayed indefinitely and is unlikely to materialise before the end of the decade. There is also little new LNG import capacity in the pipeline after 2018, following a nearly decade-long regasification construction boom. PetroChina warned in November last year that the Chinese market could be oversupplied by 50bcm by 2020 if demand doesn't accelerate.

This would, in theory, allow China to adjust the source of its gas imports in response to market conditions. However, in practice, it appears that Central Asian pipeline imports have plateaued, with Turkmenistan, China's largest single gas supplier, struggling to raise output to meet higher supply commitments. Myanmar's exports appear to have plateaued for now as well, as investment lags in new projects.

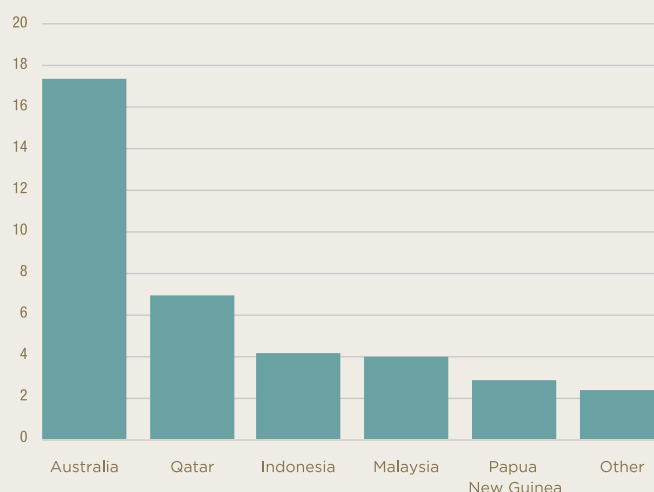
That will leave LNG imports to pick up the lion's share of new incremental import demand. This was seen in 2016, when Chinese LNG demand jumped more than a third while pipeline imports remained roughly flat. However, developments in Turkmenistan will remain a major uncertainty for China's LNG demand. The countries have discussed bringing as much as 65bcm through the West-East pipeline system, though that now looks like a distant prospect. Given that supplies from Central Asia are cheaper, and CNPC has major investments in the region's gasfields, new volumes from Central Asia — should they become available — would be favoured over higher LNG imports.

In 2016, Australia was by far China's largest supplier of LNG as new projects in which Chinese companies hold equity stakes came on stream. Imports from Australia more than doubled from 7.2bcm in 2015 to 17.3bcm in 2016, accounting for roughly half of China's 2016 incremental imports (see Figure 04). Qatar is China's second-largest supplier, and it saw a 7% rise from 6.5bcm in 2015 to 6.95bcm in 2016. Indonesia is the country's third-largest supplier and increased exports slightly from 3.9bcm in 2015 to 4bcm in 2016.

Assuming pipeline imports remain relatively stable, 2017 should be another year of strong LNG demand growth — reaching around 20%, or potentially another 7bcm of incremental demand. Australian supply is likely to account for most of this growth again this year as Gorgon LNG, where PetroChina has a supply deal with Shell, and APLNG, where Sinopec has an equity stake, ramp up. PetroChina is committed to buying 3bcm a year from Gorgon while Sinopec is due to offtake 5.8bcm from APLNG. Some of this is likely to be sold on the spot market, but much of it will go to Chinese import terminals. That could leave little room for growth from other suppliers in the short run, though China appears keen to increase imports of US Henry Hub-priced supply, which remains much cheaper than oil-linked LNG.

Beyond that, and assuming flat pipeline imports and weak unconventional gas growth at home, China's LNG import demand is likely to see several years of strong growth. Demand for LNG could reach around 80bcm a year by 2020. This will provide a significant opportunity for a number of LNG suppliers with new capacity coming on in that time frame, including US Gulf Coast facilities, Russia's Yamal LNG project and potentially new Qatari capacity after the country lifted its moratorium on new developments in the North Field.

FIGURE 04: CHINA LNG IMPORTS BY COUNTRY 2016 (BCM)



Source: GIIGNL

Post-2020, though, LNG suppliers will likely face new competition from the Power of Russia pipeline, which is contracted to supply China with 38bcm a year from fields in eastern Siberia. Many questions still hang over the project, including the financial terms of the deal, the economic viability of developing remote eastern Siberian gas fields at \$50 oil and the timing of construction, among other matters. However, Gazprom is pressing ahead. In April, it said it had built 650 km of the 3,000 km pipeline.

Assuming Power of Siberia starts up around 2020, it would likely stunt China's LNG consumption growth, after several years of strong demand. The effect will be especially felt in northern China, for instance at import terminals around Tianjin and Beijing, where Power of Siberia will deliver gas. The line is likely to ramp up at a pace of around 7bcm a year, before reaching full capacity in the middle of the decade. China's LNG demand has only risen by more than 7bcm a year once (in 2016), so the Power of Siberia alone could have the effect of stalling China's LNG demand growth again, as it did in the early 2010s as pipeline imports from Central Asia entered the picture.

Conclusion

Given the high degrees of uncertainty surrounding future demand growth and the levels of future pipeline supply, Chinese LNG buyers are likely to shift to medium- and shorter-term portfolio contracts and more spot purchases in the coming years, maximising flexibility. For instance, China's ENN signed a series of five-year and 10-year portfolio deals last year with Chevron, Total and Australia's Origin Energy for a total of 1.94bcm per annum. Such deals, and increasing spot sales by Chinese companies, are likely to make the Asia Pacific LNG trade more flexible over the coming years. China remains a great hope for natural gas exporters seeking an outlet for their product — but producers will need to be flexible and patient, accounting for Beijing's strategic needs and the specific timings of rival pipeline developments.