Two key elements of China’s national energy strategy are energy security, driven by aggressive resource acquisition abroad and development at home, and pollution control, driven by a shift away from coal to cleaner fuels. For both elements, natural gas is set to play an increasing role. In China, natural gas currently produces less than 1% of the total power output, compared with 23% in the United States and 48% in Russia. However, natural gas is expected to grow in significance over the next decade, fuelled by the expansion of global supply, as well as the domestic discoveries of potentially significant shale gas reserves. In recent years, the Chinese government and national oil companies have moved aggressively to increase access to natural gas supply. Their efforts have involved increasing China’s LNG access, through the rapid expansion of LNG regasification infrastructure, the acquisition of ownership interest in LNG liquefaction projects, and the securing of offtake contracts. Additionally, China has signed pipeline agreements with Russia, Turkmenistan and Myanmar that will substantially increase the country’s import of natural gas through pipelines.

It now looks possible that these efforts may have been “too successful”. China’s determined approach seems to have tentatively secured the country’s access to such quantities of gas that it could result in an oversupply in the next decade. The potential oversupply could, in fact, be significant if China’s shale gas reserves are as large as expected, and the country is able to fully exploit them. The purpose of this article is to explore the sources of the potential oversupply and review its implications.

**Rapid anticipated demand growth**

Projections of China’s gas demand can vary greatly depending on the source. However, most authoritative sources predict a significant increase in demand. As stated in China’s 12th five-year plan (FYP), the Chinese government anticipates gas usage to increase to 170 bcm in 2015 and 200-250 bcm in 2020 (figure 1, below), potentially more than double 2010’s usage levels. Other projections are even more aggressive; for example, one China-based source expects domestic demand for gas to reach 450 bcm by 2020.

**Domestic production – growth of unconventional resources plays key role**

At the same time, domestic production is set to expand. In 2010, China produced approximately 97 bcm of domestic gas, mostly from conventional and tight reserves. The Chinese government expects gas production to reach 170 bcm in 2015 and 200 bcm in 2020 (figure 2, opposite), driven mainly by the development of unconventional gas.

Over the past five years, the discovery of unconventional resources, particularly shale gas, has resulted in optimistic revisions of reserve estimates, and ambitious unconventional gas production targets have been set in the 12th FYP. China currently does not produce shale gas in commercial quantities, however, by 2015, shale gas output is expected to reach 6.5 bcm. Total unconventional gas production could contribute 30% or more of China’s natural gas supply by 2020.

**Domestic supply and demand comparison**

The US Energy Information Administration (EIA) estimates that China holds the world’s largest technically recoverable shale gas resource of 36 tcm, almost twice as much as that of the US. Encouraged by the impact shale gas has made on the US and global gas markets, China’s leadership is eager to replicate this “shale gas revolution” at home. The country has been promoting its shale industry through international M&A and co-operation between NOCs and foreign companies, which has given the nascent domestic shale industry access to essential technologies such as horizontal drilling and hydraulic fracturing.
However, development of shale gas in China is still in its earliest stage with many uncertainties. The industry in China lacks many of the key elements that supported the rapid shale gas growth in the US. For one, technologies utilised in the US may not be suitable for Chinese shale gas production because of geological differences. Costs for shale drilling also remain high, at approximately $6.3m-$7.8m per well or higher, making shale uncompetitive with imported gas. Other concerns include lack of pipeline infrastructure, absence of policy support such as tariff subsidies and tax benefits, regulatory uncertainty, and emerging environmental issues, especially concerning water usage related to hydraulic fracturing.

Overall, China appears to possess significant domestic unconventional gas reserves. If these prove to be recoverable, China's gas demand could conceivably be met entirely by domestic production. However, the likelihood and extent of recoverability of these resources is uncertain at this time, and it could take at least five to 10 years for meaningful production levels to materialise.

**LNG imports**

China's current LNG imports are modest, accounting for only about 11% of the country's total natural gas usage, but are expected to grow rapidly over the next decade. LNG imports in 2011 were expected to reach more than 18 bcm in 2011, and grow to 35 bcm in 2015 and 80 bcm in 2020. China currently has five LNG regasification terminals on stream, six under construction and another 13 planned (figure 3, above).

Of the LNG imported by China, 90% is estimated to be imported under long-term contracts, with only 10% bought on the spot market. Because of its long-term purchase obligations, it might be difficult for China to significantly reduce LNG imports.

**Pipeline imports**

China imported a modest 3.55 bcm of natural gas through pipelines in 2010, all through the Central Asia-China Pipeline from Turkmenistan. However, China is expanding its cross-border gas pipeline network. China and Turkmenistan have announced an increase in the planned capacity of their pipeline to up to 60 bcm, and the Myanmar-China Natural Gas Pipeline, currently under construction, is expected to add 12 bcm in 2013. Further, a planned pipeline from Russia is expected to provide up to 68 bcm of gas as early as 2015.

There are substantial hurdles to these deals – for example, China and Russia have yet to agree on the pricing regime. Nonetheless, it is almost certain that China will increase its pipeline gas imports over the near and medium term. China's total pipeline gas import capacity could reach 140 bcm per annum by 2020, assuming all three pipelines come on line at full capacity, supplying close to half of the estimated natural gas demand in China.

**Potential Oversupply**

Comparing the projected demand with China's ambitious plan to increase domestic gas production, as well as gas imports, reveals a potential oversupply of gas for China in the 2015-2020 timeframe. To illustrate the potential oversupply, two supply scenarios are presented overleaf, for both 2015 and 2020 – a conservative supply scenario and an aggressive supply scenario. The projected supply-and-demand values are outlined in the table (figure 4) overleaf.

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**Fig.2**

Chinese domestic supply-and-demand comparison

**Fig.3** Chinese LNG regasification terminals as of 15.05.12

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Estimated China natural gas supply and demand scenarios

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<td>Oversupply/</td>
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Fig.4

Source: IEA, China 12th FYP, TDJ Research

Based on estimations from various sources, a range of supply volumes were determined for both 2015 and 2020, respectively. Conservative supply numbers take into consideration the uncertainties related to unconventional gas development, pipeline deals with Myanmar, Turkmenistan and Russia, and LNG imports. Conversely, aggressive supply numbers adopt a more optimistic view of the realisation of these developments. For estimated demand levels, the government’s demand projections, as outlined in the 12th FYP, are used.

Readers should note that the Chinese government’s demand projections are relatively aggressive, with other sources, such as the EIA, projecting lower levels of natural gas use in both 2015 and 2020 – and thus a higher potential oversupply than the scenarios presented above.

The figures above show that in the conservative supply scenario, China faces a supply gap of approximately 38 bcm in 2015, and an oversupply of approximately 12 bcm by 2020. The aggressive supply scenario, however, suggests an oversupply of approximately 27 bcm in 2015, and 119 bcm in 2020, equivalent to 40% of the total demand for that year, and higher than the total gas demand in 2010.

Implications of oversupply and long-term trends

The recent reduction in global prices of gas, potentially significant shale finds at home, and greater focus on pollution control have contributed to the Chinese government’s plan to increase the utilisation of natural gas. The projected supply-and-demand trends suggest that China could face a potentially significant oversupply of natural gas by 2020, especially if the country manages to achieve large-scale production of shale gas. Such a development could have a big impact on the regional and global energy markets.

One of the most obvious potential implications of the oversupply is the reduction in China’s pipeline and LNG imports. A substantial portion of China’s future LNG imports is based on long-term contracts. However, China could reduce its participation in the spot market. Even more likely is the reduction of pipeline imports, such as the potential scrapping of the Russia pipeline.

Another possible implication of the oversupply is for China to re-export natural gas to its neighbors, possibly Japan. Re-export could be an attractive option, as Japanese appetite has caused gas price to exceed those in China by almost 25% over the past few years. China could potentially become a regional supply hub, playing a role similar to that of Russia today. The Chinese government might pursue such a course of action even if shale gas commercialisation is achieved, as being a major regional gas re-exporter would be a valuable tool in the service of China’s strategic and geopolitical interests.

Yet another possibility is a more aggressive shift toward replacement of coal with gas in China’s energy mix – essentially growth in demand even beyond the government’s ambitious targets. As China’s population becomes richer, quality-of-life issues will grow in importance, and a reduction in pollution – especially in the wealthier industrial hubs – would be a significant improvement.

Whether China ever faces a significant oversupply of natural gas, and how the country uses that position, is uncertain. However, it is certain that China’s increased consumption and production of natural gas will have a profound impact on the global gas and overall energy markets over the next decade.

Zarko Arsov is senior associate, and Yi-Chun (Lydia) Liu is marketing and research associate at Taylor DeJongh