LNG2019 SHANGHAI 1-5 APRIL

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LNG PLAYS A MORE CRUCIAL ROLE IN CHINA'S GAS SUPPLY: LNG IMPORT OUTLOOK AND STRATEGIES

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Driven by environmental policies, China gas demand is expected to maintain strong growth momentum. Due to limited increase in domestic production and pipeline gas import in the short and mid-term, imported LNG will play a more crucial role in China gas supply mix. LNG is considered an approach of diversifying sources of supply, ensuring gas supply security and gas peak regulation during winter. First of all, this paper reviews on the latest developments and trends of China's gas industry and LNG value chain. Especially, relevant market liberalization policies and price policies, as well as their impact on the LNG sector are discussed. Secondly, the key factors that will affect China LNG import are analyzed, including industry and environment policies, infrastructure, domestic gas price, pipeline gas import etc. Based on this, an outlook of China LNG import is given, with focus on prospect of US LNG, and short-term/ spot LNG. In the third part, by studying importing strategies of key LNG importers and portfolio players, the paper puts forward several strategies for China LNG import, mainly including establishing a diversified LNG supply mix, using a flexible combination of long-term contracts and short-term/ spot purchases, and adopting proper and flexible pricing strategies.

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In the past few years, with the recovery of global natural gas demand growth, global LNG trade also experienced tremendous growth. The emergence of portfolio players and aggregators, as well as the development and prosperity LNG spot market greatly enhanced the flexibility and liquidity of global LNG market. Imported LNG is playing an increasingly important role in China's natural gas supply, accounting for an increasing proportion in the supply mix. In 2018, LNG import accounted for 59% of China's imported natural gas and 27% of total gas supply. More Chinese companies are participating or increasing presence in LNG importing and trading business.

1. Latest developments and trends of China’s gas industry and LNG value chain

1.1. China's gas demand is growing rapidly and the proportion of imported LNG continues to rise

China's natural gas market has been growing rapidly since 2000. The average annual growth of gas consumption from 2000 to 2018 is 14.4% (Figure 1). Since 2017, China's gas demand has recovered significantly due to the impact of domestic economic growth and the government’ environment protection policies. Since China began to import LNG in 2006 and import pipeline gas in 2010, gas import reliance has climbed rapidly to 39% in 2017 and jumped to 45% in 2018.

As China’s economic structure transforms and environmental constraints tighten, increasing green energy in the energy mix is becoming increasingly urgent. Improving the energy structure means that gas will account for an increasing proportion of primary energy. According to CNPC Economic and Technology Research Institute (CNPC ETRI), gas consumption in 2018 is estimated to be 276.6 bcm, increased by 39 bcm, or 16.6%. City gas, industrial gas and power generation are the main driving forces for the growth of gas consumption, with growth rates of 16%, 20% and 23% and accounting for 36%, 33% and 22% of the total gas consumption. Driven by robust economic growth and strong air pollution control policies, China's gas consumption will maintain rapid growth in the next few years. As for the supply side, domestic gas production in 2018 was around 157.3 bcm, increased by 6.7%. The total gas import in 2018 totaled 125.4 bcm, increased by 31.7%. The pipeline gas import was 52 bcm, increased by 21% and the LNG import exceeded 54 MMt, increased by 41%. As the increment of domestic gas output is expected to lag behind the growth of gas demand, it is expected that the proportion of imported gas will keep increasing. The proportion of LNG in the supply system will continue to rise and become the main source of new supply. In 2018, China has surpassed Japan to be the world's largest gas importer.

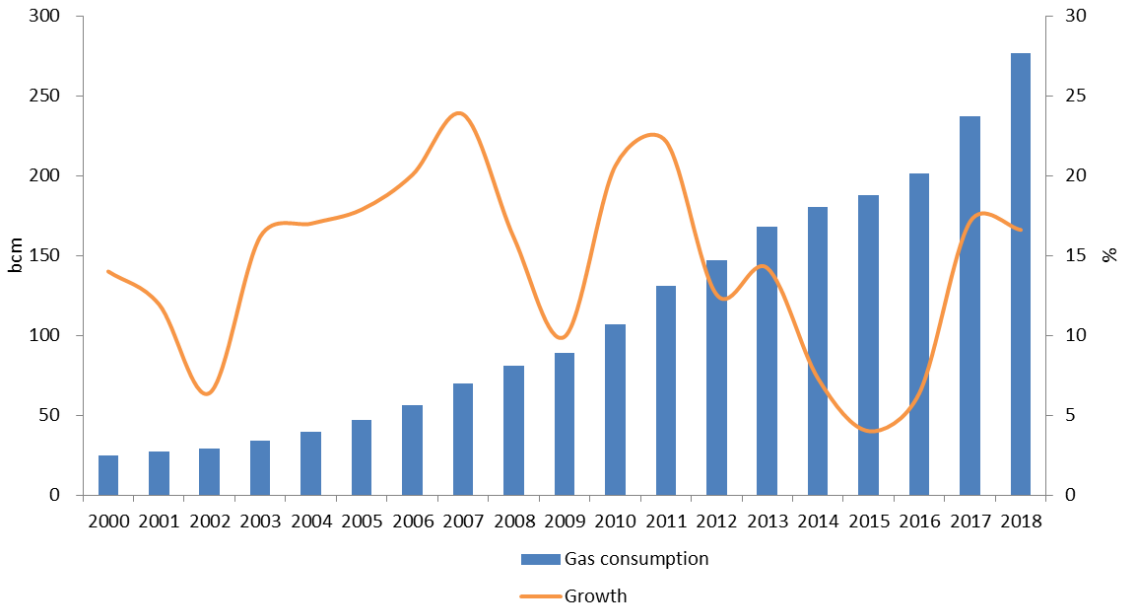

Figure 1 China gas consumption volume and growth, 2000-2018

Source: China's National Bureau of Statistics; CNPC ETRI

China's LNG imports are expanding rapidly (Figure 2). According to IHS Markit, China's LNG imports in 2018 totaled 54.8 MMt, increased by 41% over the previous year, making it the world's second largest LNG importer after Japan. Among the importers, CNOOC, PetroChina and Sinopec imported 26.6 MMt, 15.7 MMt and 9.1 MMt respectively, which accounted for 48%, 29% and 17%of total LNG import; the share of other LNG importers including Jovo Group, Xinjiang Guanghui and ENN Energy was some 6% in total (Figure 3).

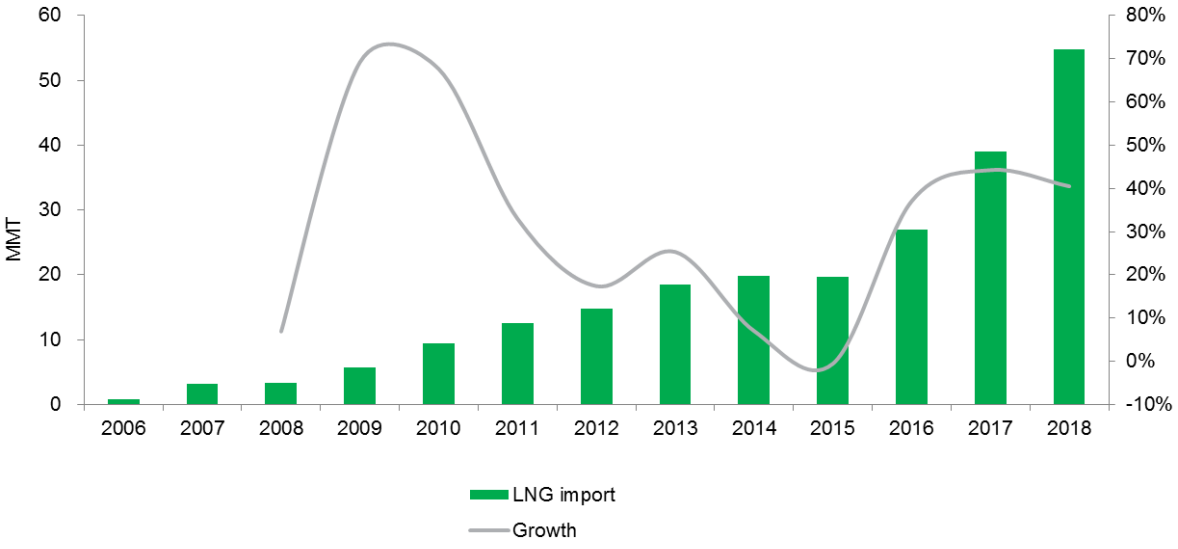

Figure 2 China LNG import volume and growth, 2006-2018

Source: IHS Markit

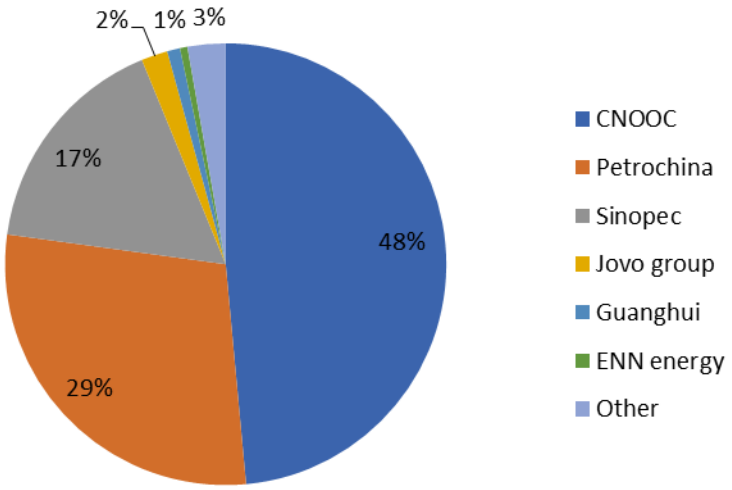

Figure 3 Major LNG importers and their shares in China, 2018

Source: IHS Markit

Lower oil prices over the past few years led to gas prices decline, especially the oil-indexed gas prices in long-term contract. Brent crude futures price in 2018 averaged $71.7/bbl, with a dramatic increase of 31%. Due to the recovery of international oil prices, from January to November 2018, the average LNG import price of China is 2.2 yuan/m3 (excluding tax) with a year-on-year growth of 19%. The rise of long-term LNG prices has contributed to rising of spot LNG prices. The rising import costs were exacerbated by depreciation of Yuan against Dollar. It is projected that due to the increasing uncertainty of international crude oil market in 2019, international oil prices will move in a wider range. Although the global LNG market is expected to remain loose until 2022 as a result of abundant new supply, the spot LNG price in northeast Asia during winter is expected to remain relatively high due to the strong seasonal demand in this area.

1.2. Market liberalization policies and impact on the LNG sector

The Chinese government continuously promotes liberalization of domestic gas industry. These efforts are mainly reflected in deregulation of wholesale gas prices and promotion of third party access of gas infrastructure. Liberalization in upstream is mainly in the LNG importing segment. All these liberalization policies and measures have direct or indirect impact on the LNG industry. Deregulation of the wholesale gas price will help LNG importers to sell gas at prices which best recover their import cost and create stronger incentives for LNG importers to increase LNG import when the domestic market is tight. In fact, according to government's gas price policies, the LNG importers and domestic buyers are allowed to negotiate the price of imported LNG as early as 2014. The third party access of LNG regasification terminals, gas pipelines and other infrastructure will introduce more market participants in LNG importing business and further promote the liberalization of China gas industry.

Downstream: deregulation of domestic wholesale gas price

Since 2013, China has accelerated the pace of natural gas wholesale price reform. In July 2013, the net-back pricing mechanism was adopted nationwide. The National Development and Reform Commission (NDRC) no longer regulate the ex-factory prices of gas, but regulate provincial citygate prices by setting price caps (linked to alternative fuel prices). At the same time, the NDRC deregulated prices of shale gas, coalbed methane and coal-to-gas. In September 2014 and April 2015, NDRC further deregulated provincial citygate price of imported LNG and gas sold to direct industrial buyers. In November 2016, NDRC relaxed the price caps by setting benchmark provincial citygate prices and allowing for a maximum of 20% higher than the benchmark prices. In the same year, the price of gas sold to chemical fertilizer plants and gas supplied from gas storages were deregulated. In September 2017, NDRC stipulated that prices of gas traded through trading platforms (including Shanghai Petroleum and Gas Exchange and Chongqing Petroleum and Gas Exchange) should be fully liberalized. In June 2018, NDRC raised the price level of residential gas to equal that of non-residential gas, merging the two types of gas price to one wholesale price, which is an essential step for the full liberalization of wholesale gas price.

In summary, about half of the gas consumed is allowed to be sold at market-based prices. From the supply side, the prices of unconventional gas, imported LNG, gas traded through trading exchanges, and gas sold by storage facilities are no longer regulated. From the demand side, gas sold to direct industrial buyers, chemical fertilizer plants, storage facilities, and gas sold in Fujian province (as a pilot province) are not regulated.

Midstream: promoting third-party access of gas infrastructure and strengthening pipeline rates regulation

China is pushing forward independent operation and third-party access of gas infrastructure. In 2014, National Energy Administration (NEA) required third-party access of gas infrastructure if surplus capacity is available, and in the same year, NDRC required independent accounting of gas infrastructure operation. As China's gas infrastructure is far from adequate compared with mature gas markets, the government encourages private capital to invest in oil and gas pipeline projects, LNG regasification terminals, gas storage facilities, etc. However, third-party access of infrastructure may discourage investments in new projects, which could hinder market development. From the perspective of encouraging investment, one possible solution might be that large infrastructure project be exempted from the third party access obligation within a certain period of time. In addition, implementing third-party access of gas infrastructure is challenging in that many managerial and operational issues need to be sorted out, including the capacity limitation of gas pipelines, measurement of surplus capacity, measurement of gas with different quality, etc.

China is also reinforcing regulation of gas pipeline rates, including national and provincial pipelines and local distribution pipelines. In 2016, NDRC issued the policy for national gas pipeline pricing, based on "permitted costs plus reasonable profits", as well as the policy for gas pipeline rates supervision. Based on this policy, NDRC has approved pipeline rates of 13 trans-provincial pipeline companies. In the same year NDRC issued a policy to regulate provincial and local gas pipeline rates, aiming to lower end-users' costs. In 2017, NDRC issued another policy to regulate distribution pipeline rates, and it is required that the rate of return of the distribution pipeline should be no more than 7%.

Upstream: opening entrance in LNG importing

China issued *Reform Plan for Mining Right Transfer System* in 2017, aiming to increase competition in upstream. However, the pace of opening entrance in domestic upstream is generally slow. Increasing competition in upstream will start from a growing number of LNG importers. There is no restriction in terms of LNG importing as long as an entity has access to a LNG regasification terminal where the cargo purchased can be unloaded. Most companies import LNG through self-built LNG regasification terminals. A LNG regasification terminal can be built after being approved by the government. An alternative is to import LNG through regasification terminals owned by other companies with the latter's permit to access.

2. Key factors that will influence China LNG import

2.1. Analysis of key factors

Industry and environment policies

Gas industry policies have a significant impact on both the demand and supply of natural gas. In 2017 NDRC clearly proposed to accelerate gas utilization and make gas one of the main energy sources in China's clean energy system. In China's*13th Five-year Plan of Natural Gas Development*, it was proposed that share of gas in China's primary energy consumption will rise to 8.3~10% by 2020. In 2018, China State Council issued a document named *Several Opinions on Promoting Harmonious and Stable Development of Natural Gas*, in which it proposed targets and measures to promote gas production, infrastructure building, market development and emergency system establishment. According to the document, incumbent gas producers should increase domestic gas exploration and development and strive to produce more than 200 bcm of gas by the end of 2020.

Environment policies mainly influence the demand side of gas. In 2013, China State Council issued *Action Plan of Air Pollution Prevention and Control*, which vigorously promoted air pollution control nationwide, and aimed to be implemented by the end of 2017. However, some regions still failed to meet air quality standards. Following that in 2018, China State Council issued another plan named *Three-year Action Plan of Battle for Blue Sky*, which demonstrated China's strong determination to improve air quality. The new plan encourages coal to gas switch and gas utilized in transportation sector, however, it discourages natural gas cogeneration projects, which may reduce gas demand growth in power generation. In December 2017, 10 Ministries jointly issued *Winter Clean Heating Plan for Northern China (2017-2021)* to promote clean heating in northern China, especially main cities, and according to this plan, the incremental demand per year for gas heating will be 23 bcm by 2021.

In terms of fiscal and taxation policies, as the domestic gas price is in many cases lower than import costs, there is a VAT refund policy for imported gas. In the upstream, in order to promote exploration and development of gas, the government reduces the resource tax on shale gas, and at the same time, subsidizes the development of shale gas and coal-bed methane. Due to the tax reduction policies implemented by China in recent year, VAT rate on gas has been lowered from 13% to 11% and further to 10%.

LNG infrastructure

Access to LNG regasification terminals is an important prerequisite for market players to enter LNG importing market. By the end of 2018, China had built 19 LNG receiving stations, with a total regasification capacity of 70 MMTPA. CNOOC has the largest share of LNG regasification capacity (51%), followed by PetroChina (28%) and Sinopec (13%). In addition, ENN Energy, Jovo Group and Xinjiang Guanghui Energy have also built their own LNG receiving terminals.

In anticipation of a substantial increase in LNG import in the following years, construction of LNG regasification capacity has accelerated. Several greenfield terminals and expansion of existing terminals started construction in 2018. Construction and expansion of LNG storage tanks of regasification terminals have also speeded up. According to China's *Medium and long-term Oil and Gas Pipeline Network Plan*, it is projected that China's LNG receiving capacity will exceed 100 MMTPA by 2025. The government has started to make a unified plan for LNG regasification terminals, and a nationwide plan for coastal and inland LNG terminals is expected to be issued in 2019.

Gas price competitiveness

The price competitiveness of imported LNG is a key factor determining its market share in China gas supply mix. The affordability of gas users in China is generally low. As for residential gas consumers, they are less willing to pay for higher gas prices because of low residential gas prices in the past. Users in industrial sector are mostly highly sensitive to gas price because of low price level of coal, the main alternative of gas in industrial sector. Driven by forceful environment policies, however, gas demand in industrial sector may still increase rigidly. In terms of power sector, gas-fired power plants need to compete with coal-fired power plants, making it at disadvantage because of low price of coal.

Furthermore, because domestic wholesale price is in some cases underpriced compared with higher LNG import cost, LNG importing enterprises may lose money on imported LNG, which demotivates them to increase LNG import. This issue will be gradually streamlined as domestic gas price deregulation proceeds.

Pipeline gas import

There are three main channels for China's pipeline gas import—China-Myanmar Pipeline, China-Russia Eastern Pipeline and Central Asia Pipeline. Total pipeline gas import capacity is 67 bcm/yr in 2018, and will expand to 105 bcm/yr after completion of China-Russia Eastern Pipeline. It is projected that pipeline gas import of China will be 64 bcm in 2020 and 110 bcm in 2030.

China-Russia Eastern Pipeline will have a great impact on LNG import. After completing construction in 2020, the pipeline will be able to deliver 10 bcm of gas per year, and is expected to reach the design capacity of 38 bcm/yr in the following five years. Especially in the Bohai Rim region, the price of imported LNG needs to be more competitive than Russian pipeline gas to gain market share. As China-Russia Eastern Pipeline reaches full capacity, domestic gas supply-demand situation will shift from tight to loose.

2.2. Outlook of China LNG import

Outlook of China LNG import is calculated based on projection of future gas demand, production and pipeline gas import (Figure 4). Environment policy will be the main driving force for the growth of China's gas demand in medium and long term. According to China's *13th Five-year Plan for Natural Gas Development* and *Suggestion of Promoting Gas Utilization*, the share of gas in the primary energy mix aims to reach 8.3%-10% by 2020 and 15% by 2030. According to CNPC ETRI's forecast, China's gas demand is expected to reach 330 bcm by 2020 and 510 bcm by 2030 if relevant policies are in place and well-implemented. Domestic gas output is expected to increase steadily as the government attaches more importance on domestic gas exploration and production, reaching 180 bcm in 2020 and 302 bcm in 2030. In terms of pipeline gas import, it is estimated that the pipeline import volume will reach 64 bcm in 2020 and 110 bcm in 2030 after China-Russia Eastern Pipeline and Central Asia D Pipeline complete construction and start operation.

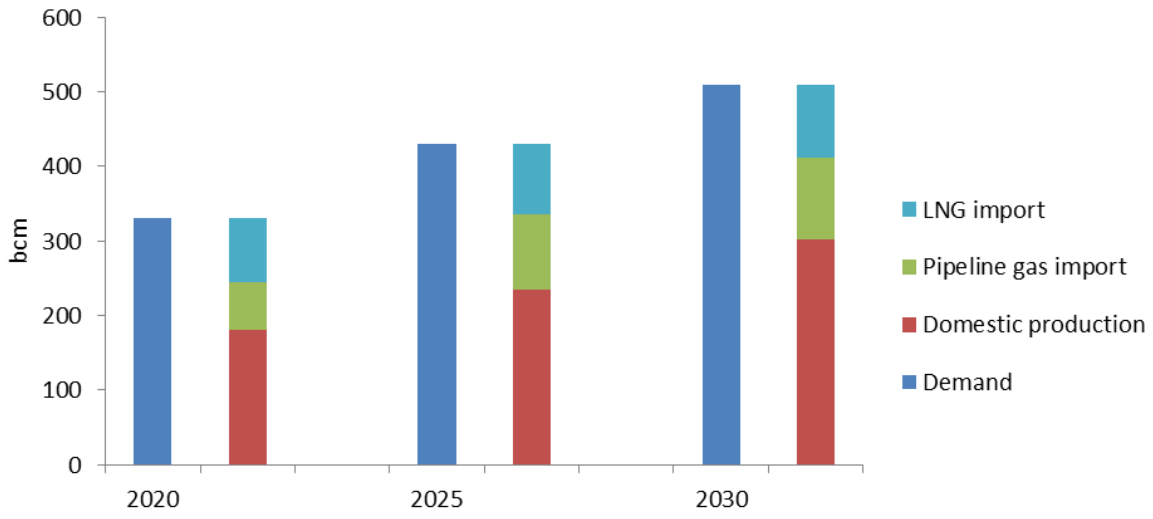

Figure 4 Gas demand and supply projection in 2020, 2025 and 2030

China's LNG import in 2020 is projected to be 61 MMt (86 bcm). During 2020-2030, domestic gas production and pipeline gas import will increase and LNG import are expected to reach 68 MMt (95 bcm) in 2025 and 70 MMt (98 bcm) in 2030. By the end of 2018, the total volume of signed contracts amounts to 49 MMt in 2020 and 49.6 MMt in 2030, repectively (Table 1).

Table 1 LNG contracts signed by Chinese enterprises by end of 2018

Country	Project	Exporter	Buyer	Announced start	Length	Volume (MMtpa)
Russia	Yamal LNG	Yamal LNG	CNPC	2018	15.0	3.00
United States	Corpus Christi LNG	Cheniere	CNPC	2023	20.0	0.90
Qatar	Qatargas-RasGas	Qatargas	CNOOC	2009	25.0	2.00
Qatar	Qatargas-RasGas	Qatargas	CNPC	2011	25.0	3.00
Qatar	Qatargas-RasGas	Qatargas	CNPC	2018	22.0	3.40
UNSPECIFIED	BP Portfolio	BP	CNOOC	2020	20.0	1.50
UNSPECIFIED	BP Portfolio	BP	China	2021	20.0	1.00

UNSPECIFIED	Cheniere Portfolio	Cheniere	Huadian CNPC	2018	3.0	0.00
UNSPECIFIED	Cheniere Portfolio	Cheniere	CNPC	2018	25.0	0.30
UNSPECIFIED	Chevron Portfolio	Chevron	ENN Energy	2019	10.0	0.65
UNSPECIFIED	Origin Energy Portfolio	Origin Energy	ENN Energy	2019	5.0	0.28
UNSPECIFIED	PETRONAS Portfolio	PETRONAS	Jovo Group	2016	7.0	0.50
UNSPECIFIED	PETRONAS Portfolio	PETRONAS	CNOOC	2019	5.0	0.50
UNSPECIFIED	Shell Portfolio	Shell	CNOOC	2014	20.0	5.00
UNSPECIFIED	Shell Portfolio	Shell	CNOOC	2014	20.0	3.60
UNSPECIFIED	Shell Portfolio	Shell	CNPC	2016	20.0	2.00
UNSPECIFIED	TOTAL Portfolio	TOTAL	CNOOC	2010	20.0	1.50
UNSPECIFIED	TOTAL Portfolio	TOTAL	ENN Energy	2019	10.0	0.50
Australia	Australia Pacific LNG	Australia Pacific LNG	Sinopec	2016	20.0	4.30
Australia	Australia Pacific LNG	Australia Pacific LNG	Sinopec	2017	20.0	3.30
Australia	Gorgon LNG	ExxonMobil	CNPC	2016	20.0	2.25
Australia	North West Shelf	North West Shelf	CNOOC	2006	25.0	3.30
Canada	LNG Canada	PetroChina	CNPC	2024	25.0	2.10
Indonesia	Tangguh LNG	Tangguh LNG	CNOOC	2009	25.0	2.60
Malaysia	Malaysia LNG	Malaysia LNG	CNOOC	2009	30.0	3.03
Papua New Guinea	PNG LNG	PNG LNG	Sinopec	2014	20.0	2.00
Papua New Guinea	PNG LNG	PNG LNG	CNPC	2018	3.0	0.45

Source: IHS Markit

As gas import reliance increases quickly, establishing a diversified LNG supply mix is a key strategy to ensure energy security. According to LNG contracts signed by Chinese enterprises, one third of the contract volume will be supplied by portfolio players in 2020, and in 2030 LNG import from North America will increase (Figure 5). From a global optimization point of view, due to the transportation cost, future LNG supply to China will mainly come from the Middle East (Qatar) and Asia-pacific exporters (Australia, Malaysia, Indonesia and Papua New Guinea). Europe will be the first-choice destination for LNG from Russia and Gulf of Mexico. Only when there is a wide spread between Asian markets and Europe, will these LNG flow to Asian markets.

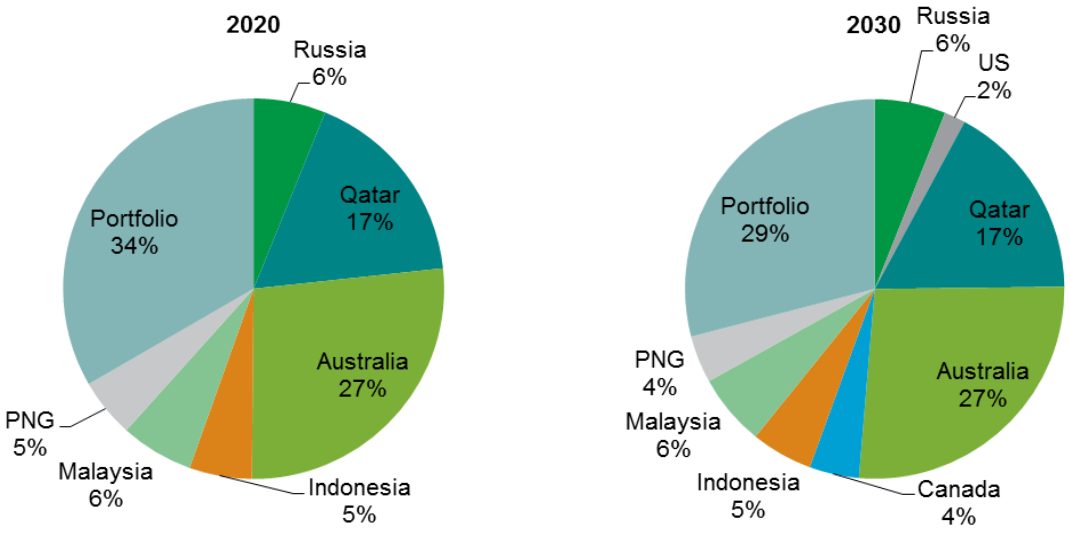

Figure 5 Sources of LNG import under signed contracts in 2020 and 2030

Source: IHS Markit

Prospect of U.S. LNG import

The gas production of the United States is growing rapidly and its LNG export capacity is expect to increase significantly. Currently U.S. LNG export capacity is 24.6 MMt, and more export projects with capacity of 47.8 MMt are under construction. U.S. is expected to become one of world's top three LNG exporters in the next five years. In 2018, China imported 2.26 MMt of LNG from U.S., accounting for 4% of China's total LNG import.

China and the United States reached several LNG cooperation agreements in 2017. Nevertheless, as the trade dispute between the two countries escalated since 2018, LNG cooperation faces huge challenges. China has imposed additional 10% tariff on U.S. LNG starting from September, 2018, which means that the economics of U.S. LNG to China is worsened and the political risks increased. The uncertainty of China-U.S. LNG trade increased greatly and trade cooperation could be stalled. China currently imports only a small amount of LNG from U.S, and most post-final investment decision (FID) LNG export projects in U.S. have signed long-term contracts with buyers in Japan, South Korea, India, etc., so the impact is limited in the short term. But this additional tariff on LNG from U.S. would weaken China's bargaining power as a big buyer of other sources of LNG. In the medium and long term, if the trade friction between the two countries continues, American LNG exporting companies will have to seek for buyers in other markets outside China and many LNG export projects in U.S. may not achieve FID because of insufficient contract volume. Only when the two countries resolve conflicts and jointly build a stable international trade environment can Chinese and American companies carry out cooperation in LNG trade and investment.

As a source of flexible marginal supply, U.S. LNG will create a cap for global LNG and gas prices. On the one hand, it will create a price cap for LNG from the Middle East and Asia Pacific to the Asian market, and increase the bargaining power for Asian buyers when importing LNG from Qatar, Australia and other traditional exporters. On

the other hand, U.S. LNG will compete with Russian LNG and pipeline gas in Europe and create a price cap for Russian gas export to Europe. From a global optimization point of view, due to the transportation cost, LNG from Gulf of Mexico is at disadvantage compared with LNG from the Middle East or Asia Pacific Region, and Europe will be the first-choice target market for LNG from Gulf of Mexico.

Role of short-term/ spot LNG in the supply mix

The prosperity of short-term and spot LNG trade has improved global LNG market liquidity. China's spot LNG import in 2018 amounted to 18.6 MMt, twice the volume of 2017. Spot purchase now accounts for one third of China's total LNG import. Using a flexible combination of long-term and short-term/ spot contracts will be a key strategy for China LNG import. While long-term contracts ensure stable supply for long-term demand, short-term and spot purchases improve flexibility of supply. For market whose demand is subject to great uncertainty or potential downside risk, such as Japan, the risk of signing long-term contracts is greater. In a steadily growing market like China, however, the risk inherent with a long-term contract is mainly associated with the price but the quantity. The LNG spot market is characterized by high price fluctuations and procurement uncertainties, which can lead to high peak-shaving costs and safety risks. Therefore, it is suggested to appropriately control the proportion of spot procurement as most Chinese LNG importers are not equipped with strong risk management capabilities. Besides securing stable supply, signing long-term contract also helps to establish cooperative partnership between sellers and buyers. In addition, long-term contracts play a key role in the final investment of LNG projects and will help increase global LNG supply and avoid potential LNG supply shortage.

3. Diversification and increasing flexibility are the key strategies

As discussed in the previous section, diversification and increasing flexibility are the key strategies to ensure a reliable and resilient LNG import system, which mainly involves establishing a diversified LNG supply mix, using a flexible combination of long-term contracts and short-term/ spot purchases, and adopting flexible pricing strategies.

Gas importing strategies of Europe and Japan might shed some light on strategies for Chinese enterprises. Europe has a similar gas import structure with China and half of the gas supply is imported. Europe has been seeking to diversify sources of gas supply and manage supply and demand fluctuations through a flexible power sector which can switch between coal and gas, and LNG traders that can redirect LNG cargoes to markets with higher prices. Japan's gas import reliance is almost 100%, and in order to enhance gas supply security and increase bargaining power, its key strategies are increasing upstream investment and equity production, carrying out joint procurement with domestic buyers, and cooperating with European buyers in trans-regional joint procurement. Increasing upstream investment will strengthen buyers' control of oversea resources and reduce the risks associated with high import reliance and risks caused by cyclical changes of gas prices. Investing in LNG liquefaction project is a way to hedge price risks and market risks through vertical integration, and can also help to solve FID dilemma of LNG liquefaction projects.

Adopting proper and flexible pricing mechanism

Under the condition that there is no benchmark gas price in Asia, oil-linked pricing is not a bad option in that it is globally accepted and hard to be manipulated, and that risk exposure to oil price can be properly hedged and managed through financial markets. The rationality behind oil-linked LNG pricing is the substitution relationship between oil and gas. Reasonable design of pricing formula and more flexible price review mechanism are needed to protect the interests of both buyers and sellers.

An alternative is Henry Hub-based pricing. It is expected that gas market in the United States will continue to be loose in short to medium term and the Henry Hub gas price will be well below 4 $/MMBtu. This will increase competitiveness of LNG export from the United States. On the other hand, however, Henry Hub gas price is very likely to show large seasonal fluctuations. Therefore LNG import enterprises need to increase their capabilities to manage such price fluctuations. The developed financial markets of gas in the United States provide market players with such possibility.

Creating a more liquid, flexible and transparent Asian LNG market

In the longer term, it is suggested that Asian countries seize the opportunity to increase the size and liquidity of Asian LNG market, to establish Asia-pacific LNG hub, and to promote the formation of Asia-pacific LNG benchmark price. With the increased flexibility of LNG supply and expansion of spot market, the commoditization of LNG is accelerated. Japan and Singapore both had made some effort in building Asian LNG trading hub and launching Asian LNG price index. Global LNG market will remain relatively loose until 2022, which will promote the competition of resources and thus provide good opportunity for LNG trading and development of LNG hub. Hence it is suggested that LNG seller and buyers, especially Asian countries take advantage of the current over-supplied market and explore measures and paths to develop Asia-pacific LNG hub and benchmark price.

References

[1] Liu Chaoquan, Jiang Xuefeng. China and Global Oil and Gas Industry Development Report 2018 [B].

[2] CNPC Economics & Technology Research Institute. World and China Energy Outlook to 2050 (2018 edition) [R]. 2018.

[3] IEA. Gas 2018 Analysis and Forecasts to 2023 [R], 2018-06.

[4] Zheng Hongtao, Ma Jun, Jin Yuxiang. The mutual impact for medium-to-long-term LNG trade cooperation under Sino-US trade tension [J].International Petroleum Economics,2018,26(09):1-5.

[5] IHS Markit. Global LNG Trade Data [DB]. 2019-01.

[6] IHS Markit. Waterborne LNG Export-Import Data Tables [DB].2019-01.

[7] IHS Markit. Liquefaction Database [DB]. 2019-01.

[8] IHS Markit. LNG Sales Contracts Database [DB]. 2018-12.