

Research Article

To fully exert the important role of natural gas in building a modern energy security system in China: An understanding of *China's National 13th Five-Year Plan for Natural Gas Development*

Wang Zhen^{a,b}, Xue Qing^{b,*}

^a CNPC Policy Research Center, Beijing 100007, China

^b Academy of Chinese Energy Strategy, China University of Petroleum, Beijing 102249, China

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Abstract

Along with the introduction of 13th Five-Year Plans in succession for natural gas development programmed by governments at all levels and much more attention paid to haze governance by relevant departments, natural gas, as one of the major energy sources, has ushered in a strategic opportunity era. In view of this, based upon *China's National 13th Five-Year Plan for Natural Gas Development* formulated by the National Development and Reform Commission, the developing trend of natural gas sector was predicted in the period of 13th Five-Year Plan in terms of supply side, demand side, pricing system, infrastructure construction, etc. and some feasible proposals were made on the whole industrial chain. In terms of the supply side, natural gas will be of availability, accessibility, assurance, affordability, and accountability in the production and supply chains. In terms of the demand side, air pollution treatment will indirectly stimulate gas consumption increase. Gas power generation will become the dominant. Natural gas as a transportation fuel will bring a good new opportunity. Thus it is believed that as the present natural gas development is restricted by both gas pricing system and infrastructure construction, further reform should be strengthened to break the barriers of systems and mechanisms; and that due to many uncertainties in the natural gas market, the decisive role of market in the resource allocation should be fully exerted to ensure the main force of natural gas in building a dependable energy strategic system in present and future China. © 2017 Sichuan Petroleum Administration. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: China; Natural gas; 13th Five-Year Plan; Major energy source; Supply side; Demand side; Pricing system; Infrastructure

In December 2016, the National Development and Reform Commission of the People's Republic of China (hereinafter referred to as NDRC) formulated and issued *China's National 13th Five-Year Plan for Natural Gas Development* (hereinafter referred to as the Plan) on the basis of the 13th Five-Year Plan for Energy Development. In view of the issues of the natural gas industry in China, such as the slowdown in consumption growth, inadequate investment in domestic exploration, structural contradictions in system and mechanism and

arduous infrastructure construction and maintenance tasks, an overall planning of the natural gas sector in terms of the guiding ideology, the basic principles, development goals, key tasks and organization and implementation in the period of the 13th Five-Year Plan was put forward in the Plan. Since 2017, some provinces and municipalities directly under the central government have made the deployment on the regional natural gas industry development in the period of the 13th Five-Year Plan in the form of special natural gas planning or energy planning.

The introduction of 13th Five-Year Plans in succession for natural gas development programmed by governments at all levels and much more attention paid to haze governance by

* Corresponding author.

E-mail address: xueqing@cup.edu.cn (Xue Q.).

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relevant departments provide a rare period of strategic opportunity for natural gas to become one of China's major energy resources. However, uncertainties in the natural gas market are potential risks for the future development of the sector. In view of this, some feasible proposals were made on the whole industrial chain in terms of supply side, demand side, pricing system, and infrastructure construction, in order to promote the orderly, healthy and sustainable development of natural gas industry in China.

1. Build a 5A-class natural gas industry chain on the supply side

A perfect supply system is the basis and guarantee for the sustainable development of natural gas industry. Specifically, it is necessary to achieve the availability, accessibility, assurance, affordability and accountability (referred to as “5A”) in the production and supply chains [1]. The authors analyzed the path to ensuring China's gas supply security in the period of the 13th Five-Year Plan from the above five aspects, based on the theory of supply-side structural reform.

- 1) The “Availability” means that natural gas supply capacity must be guaranteed. To strengthen the exploration and development of domestic resources is the direction of development on the natural gas supply side in the period of the 13th Five-Year Plan. The Plan points out that by 2020, China is expected to achieve newly incremental proved reserves of natural gas of $4.42 \times 10^{12} \text{ m}^3$ and domestic natural gas production of $2070 \times 10^8 \text{ m}^3$ and form a comprehensive gas supply capacity of more than $3600 \times 10^8 \text{ m}^3$ (Fig. 1), including conventional natural gas production of $1670 \times 10^8 \text{ m}^3$, shale gas production of $300 \times 10^8 \text{ m}^3$, CBM production of $100 \times 10^8 \text{ m}^3$ and import gas capacity of $1530 \times 10^8 \text{ m}^3$ [2].

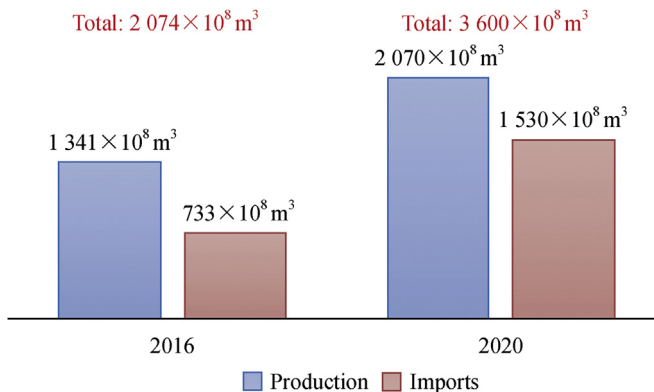


Fig. 1. China's natural gas supply in 2016 and 2020. Note: The data came from the 13th Five-Year Plan for Natural Gas Development of the NDRC and the Domestic and Foreign Oil and Gas Industry Development Report in 2016 of the CNPC Economics & Technology Research Institute.

- 2) The “Accessibility” means that the connection between supply and demand and the market expansion must be realized relying on an extensive and efficient natural gas pipeline network. In the period of the 13th Five-Year Plan, China should further improve the construction of four major import channels in the northwest, northeast, southwest and on the sea, improve trunk pipeline capacity and strengthen the construction of regional pipe networks and interconnecting pipelines. Therefore, the Plan proposes that new natural gas trunk and supporting pipeline of $4 \times 10^4 \text{ km}$ be built, and that by 2020 the total length of the national pipe network be expected to reach $10.4 \times 10^4 \text{ km}$, with trunk gas transmission capacity of more than $4000 \times 10^8 \text{ m}^3/\text{yr.}$, to ensure the rapid development of China's natural gas industry.
- 3) The “Assurance” means that in order to protect the safe and stable supply of natural gas, it is a must to form a strong comprehensive peak-shaving capacity in the natural gas pipeline network system. The Plan proposes that promoting the construction of natural gas reserves peak-shaving capacity be emphasized, that the construction of LNG receiving stations and distribution facilities be strengthened, and that accumulated working gas capacity of $148 \times 10^8 \text{ m}^3$ in underground gas storage by 2020 be formed. Perfect comprehensive peak-shaving facility is an important part of the natural gas pipeline network system and an important means to ensure the safe and stable supply of natural gas.
- 4) The “Affordability” means that in order to promote the development of the natural gas market, we must establish a scientific and reasonable pricing system. Before 2020, the specific path of natural gas market reform is: ① promote the separation of natural gas pipeline transport and sales, to vigorously promote the natural gas infrastructure opening to the third-party market entities; ② loosen up the prices of gas for non-domestic use, further improve the pricing mechanism of gas for domestic use, strengthen the natural gas pipeline transmission price and cost supervision and effectively reduce the costs of gas transmission and distribution, to expand the scale of natural gas utilization; ③ establish and improve the price linkage mechanism of the upstream, middle and lower reaches of the natural gas market, increase the development of the natural gas downstream market and provide a general service obligation to the gas supply enterprises to form a competitive environment for the terminal market; and ④ allow more qualified enterprises to participate in natural gas imports based on the principle of marketization.
- 5) The “Responsibility” means that all links in the whole natural gas industry chain from mining, storage and transportation to utilization must be environment-friendly, to achieve real clean and low-carbon utilization. Although natural gas is a type of cleaner low-carbon energy than coal and oil, it still belongs to the category of fossil fuels. Whether it is used as in-

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