

Northeast Asia on the way to the unified gas market

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Northeast Asia is one of the largest natural gas markets, whose role in the world energy arena is growing annually. Currently, this market already comprises over 7% of the world gas consumption, and approximately 60% of the world liquefied natural gas (LNG) is channeled to this region. The pace of economic development in Northeast Asia requires further increase in gas import volumes to ensure maximum reliability of supply. Developing the regional gas market will be one of the decisive factors for the economic development of all the countries in this region.

Rapid development of the bilateral international gas trade leads to the integration of the separate national gas-transporting systems into more complex ones, including several countries. Currently, similar integration of regional gas markets is observed all over the world. Within the framework of the world economy and the energy sector improvement, this is a natural evolution. As a result of the gas pipeline systems integration, the transcontinental gas market in the North-American continent has been formed, EU is working toward a “Unified internal market for natural gas,” and UGSS (Unified Gas Supply System)ESG of the former USSR remains the leader in the integration processes. At the same time, LNG supplies are increasing fast, which include intercontinental supplies. Markets within a region develop unified standard supply and price setting rules in a systematic manner. The above rules will permit free trade and gas flow between countries. This is of great importance when there is a demand imbalance, which happens due to a variety of factors: weather conditions, disrupted supply in separate locations, suspension of nuclear power plants (NPP), opportunity to use alternative types of fuel (coal, oil products, RER), etc.

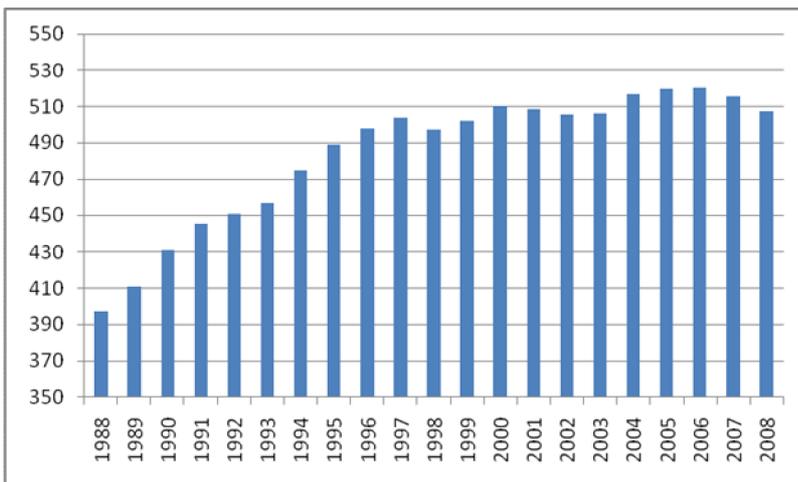
Integration of markets within one region allows improved sustainability, flexibility, and adaptability of the regional gas pipeline system and therefore enhanced energy security for each participating country. However, this process is impossible without the development of unified market functioning rules. Currently, gas sectors in the northeast Asian countries have key differences, which characterize their heterogeneous nature. Russia has a developed gas market, which is integrated with the neighboring countries; however, geographically, it is located mainly in the European part of the country. In the Eastern part of Russia, natural gas industry is underdeveloped—market shaping in the Far East and Eastern Siberia has only begun, and the development plans as well as principles for price setting have not been fully defined. (In the European part of the country, the price setting system, which is based on the equal profitability of internal prices with export prices to the European market, is applicable; however, it is evident that this principal is not applicable to the Eastern part of Russia). Japan and South Korea do not possess gas production and pipeline networks and link with other countries. Practically, the supply for the entire gas

consumption is from overseas, as an LNG based on the price setting system linked to Japanese Crude Cocktail; as a result, these countries have the highest prices for natural gas in the world. In China, the demand for natural gas is growing rapidly, but the market is still immature. China has its own production and sets up infrastructure for importing pipeline gas and LNG. The price setting system depends on agreements with concrete supplies, and it is actually aiming at “cost plus” system. All those different aspects of these countries present obvious obstacles, interfering in the balanced development of the unified market and complicating interaction among the four largest players in the regional gas market—Russia, China, Japan, and South Korea.

In order to understand the basic features of the existing markets in each of the regional countries, we have examined these in detail.

Over the last ten years, primary energy consumption in Japan has increased insignificantly—approximately by 2%. The country’s economy is mainly aimed at sustaining the current levels of energy consumption and active use of energy-saving technologies.

Figure 1. Primary energy consumption in Japan, million tons of oil equivalents



Source: “Statistical review of world energy full report,” BP, 2009

Natural gas constitutes a relatively low share in Japan’s energy consumption—15.7% in 2007 (whereas the world average is 23%). However, the government’s pursuit to reduce dependency on oil from the Middle East (which contributes to the main share of imports) may lead to the gradual expansion of the natural gas share in the energy balance of Japan to the world average level.

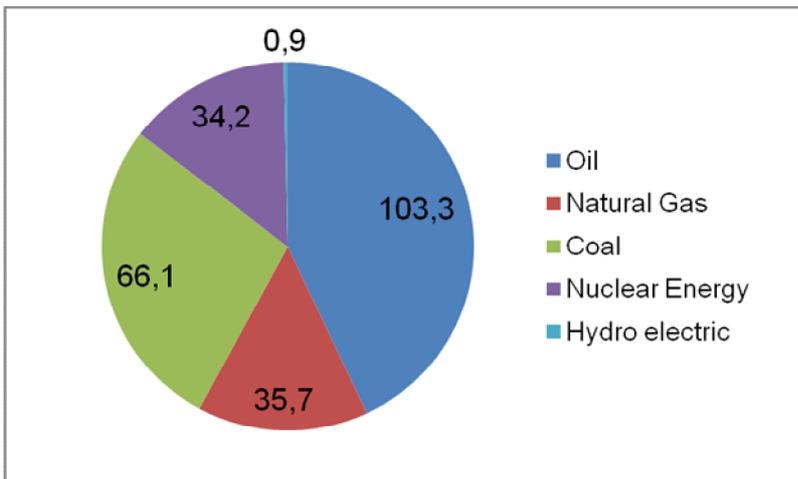
Japan is the largest world importer of LNG, which is used to practically completely satisfy its gas demand. As estimated by the International Energy Agency to 2030, the demand for natural gas in Japan will increase on average by 0.4% annually, and by the end of the forecast period, it will have reached 111 billion square meters [1]. At the same time, the Institute of Energy Economics of Japan (IEEJ) estimated that by the year 2030, its own production can reach about 5–7 billion cubic meters, while the rest will be imported.

The main suppliers of LNG to Japan are the Middle East countries (25% of imports) and Malaysia, Indonesia, and Australia, which contribute to 20%, 19%, 17% of the imports, respectively [2]. To ensure energy security, Japan is examining possibilities for diversifying the supply of synthetic natural gas (SNG). In March 2009, Russia supplied to Japan its first batch of LNG, as within the framework of the project Sakhalin 2. It is expected that once the plant commences operations at full capacity (9.6 million tons), about 65% of the annual LNG production in Sakhalin will be supplied to Japan.

In 2009, consequent to the world economic crisis, LNG imports to Japan reduced by 7%, to 64.5 million tons; however, the imports are expected to reach the pre-crisis levels as early as 2010–2011 [3].

South Korea is the world's second largest consumer of natural gas. Oil and coal, respectively, make up for 46% and 26% of the total energy consumed in the country, while nuclear energy and natural gas together make up for approximately 14% (Figure 2). The share of natural gas in energy consumption is growing very fast—in 1995, it was only 6%, whereas by 2012, it is expected to reach 15.3%.

Figure 2. Energy consumption structure in South Korea by types of fuel in percentage, 2008



Source: "Statistical review of world energy full report," BP, 2009

Currently, Korea as well as Japan completely use the LNG, which is supplied to them under the same conditions—long-term contracts, linked to oil prices.

The Korean gas market boasts of a developed internal gas pipeline network, which links shore-based LNG terminals with the main consumption centers in the country, thereby allowing a wide use of natural gas for not only energy production but also industrial and utilities sectors of the economy.

Natural gas consumption in the Republic of Korea is growing rapidly. Over the ten years from 1998 to 2008, it increased by 2.6 times, and in 2008, it reached 39.7 billion square meters.

In 2009, South Korea reduced the LNG imports by 5.5% to 25.8 million tons. However, it is expected that pre-crisis level of import will be achieved as early as 2010 [3].

Initially, Southeast Asian countries had targeted LNG imports from South Korea; however, since 1999, the geographic location of supply sources significantly expanded because of countries in the Middle East, Africa, and even Latin America. Russian LNG has been supplied to these countries since 2009.

The possibility of supplying pipeline gas from Russia to Korea is being discussed for over ten years. To intensify this process at the national level, the two countries signed the Intergovernmental Agreement (October 2006), while at the corporate level, Gazprom and Kogas signed the Memorandum of Understanding on “natural gas supplies from Russia to Korea” (September 2008) and an agreement to jointly explore the gas supply project from Russia to the Republic of Korea (June 2009). Additionally, the two companies have set up permanent Joint Working Group, which considers a wide variety of issues related to the realization of the 5-year Agreement of Cooperation, dated 2003 and extended to 2008. Naturally, the main contentious issue between the two countries related to the setting up of a pipeline supply in transit through the North Korean territory. In the future, if the given project realizes, it can become a convergence symbol for both North and South Korea. Setting up a different sea pipeline or LNG supply can become alternative solutions to this politically complicated project.

China's entry into the world gas market is relatively recent as compared with those of Japan and South Korea; however, it is expected that China's import of natural gas will grow fast, and in medium- to long-term, China will become the largest world player. The fast pace of industrial development characterizes the country even in crisis and post-crisis periods. The urbanization, gasification of Chinese cities, electricity crisis in 2003–2006, rapid development of gas infrastructure, as well as government policy, aimed at shifting the energy consumption structure toward consumption of more ecologically sound sources of energy, have ensured a rapid growth of gas consumption in the People's Republic of China (PRC). The first LNG supply to China began in 2006, before which the demand was met with by using internal reserves. Currently, China is rapidly increasing its natural gas imports. The LNG imports to the country grew by approximately 70% and reached 5.5 million tons [3]. In the coming years, it is anticipated that gas imports will increase by several times, which is confirmed by the already concluded contracts.

China has its own reserves of natural gas, which amount to 2.46 trillion cubic meters, as estimated by BP [2]. As estimated by the national sources, the proved gas reserves of the country exceed international estimates and amount to 5.94 trillion cubic meters, including 3.09 trillion cubic meters, which is accessible for production by technical and economic parameters [4]. Currently, the possibility for large-scale development of unconventional gas such as shale and coal-bed methane has been examined. Mining of coal-bed methane is ongoing in small volumes; perspectives on the production of shale gas require additional research of technological and economic parameters.

Примечание [Editor1]: Do my changes reflect your intended meaning?

Примечание [Editor2]: Is this what you meant here?

Примечание [Editor3]: Although I have edited this sentence for language, I am uncertain what you meant to convey here. Please provide some clarifications.

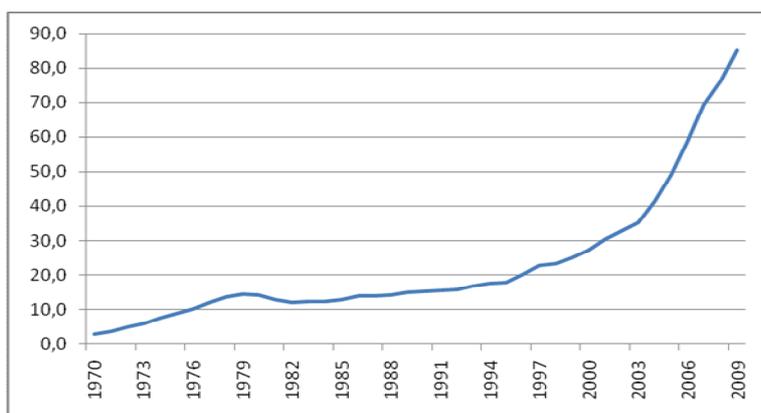
Примечание [Editor4]: Did you mean “signed”?

Примечание [Editor5]: The original was slightly confusing, and I made this change assuming that the “which” I have inserted here modifies the 3.09 trillion cubic meters. Am I right?

In compliance with the government agenda for increasing the production of their own energy resources, natural gas production is developing at a significant pace—in fact, over the last ten years, it has increased 3.5 fold (Figure 3).

Примечание [Editor6]: Does this edit create a change in impact?

Figure 3. Production of natural gas in China, 1970–2009, in billion cubic meters



Sources: “Statistical review of world energy full report,” BP, 2009; “China Gas Data Tables,” CERA, 2010.

However, further expansion of natural gas production may present a significant problem for Chinese companies. The largest producers of natural gas in China, CNPC, has announced its plans to expand production; however, owing to the significant depth of resource occurrence, occurrence of soft sandstones, high sulphur content, and other issues related to the depletion of deposits, the company will require new technologies and specialized production methods and production stimulation, which will significantly increase its costs.

Despite the fact that natural gas constitutes only 3.6% [2] of the energy consumption of China, over the last few years, the demand for this resource has been developing rapidly. The average growth of gas consumption over 2000–2008 comprised 16% annually, and according to the targets of the tenth (2001–2005) and eleventh (2006–2010) five-year plans, by 2020, the share of gas in the country’s energy consumption is set to reach 10%. The government strives to promote the development of the gas sector in order to diversify energy consumption (still, the main share of energy consumption structure is coal, as shown in Table 2), increase energy efficiency, as well as resolving ecological issues. Thus, the National Energy Policy and Strategy, approved by the State Council in 2004, includes provisions under which the promotion of gas consumption as a more ecologically sound energy source as that compared to coal is one of the main priorities in the energy policy.

Table 2. Energy consumption structure in China, 2000–2050

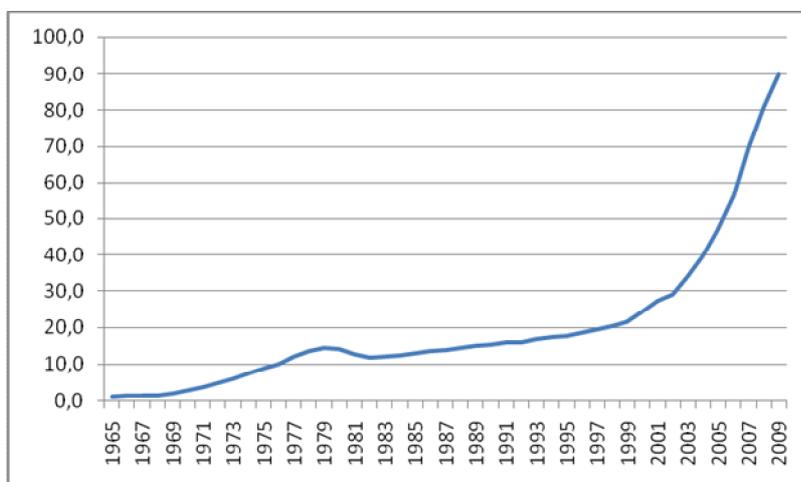
	Primary consumption	Coal	Oil	Gas	Other sources (%)

	(million tce)	(%)	(%)	(%)	
2000	1386	67.8	23.2	2.4	6.7
2008	2863	70.2	18.8	3.6	7.6
2010 (target figures)	2700	66.1	20.5	5.3	8.1
2020 (forecast)		55	22	8	15
2050 (forecast)		40	23	12	25

Sources: China Energy Statistical Yearbook 2008, "Statistical review of world energy," BP, 2009, target figures 2010: «Energy industry development plan for 11 five-year long periods», 2007; forecast data, Chinese Academy of Sciences, 2006.

Over the last years, the growth pace of natural gas consumption in China has by far exceeded the economy growth. In 2009, the demand for natural gas grew by 11% (Figure 4).

Figure 4. Consumption of natural gas in China, billion cubic meters



Sources: "Statistical review of world energy full report," BP, 2009; "China gas data tables," IHS CERA, 04.12.2010

The housing sector has reflected the highest consumption growth in China. Over the period of 2000–2007, demand for domestic gas increased by an average of 25%, annually, from 3.7 billion cubic meters in 2000 to 17.7 cubic meters in 2007. Its share in the total gas consumption for the above period increased from 19% in 2000 to 26% in 2007. This is

Примечание [Editor7]: I have made this change in keeping with the American English date style.

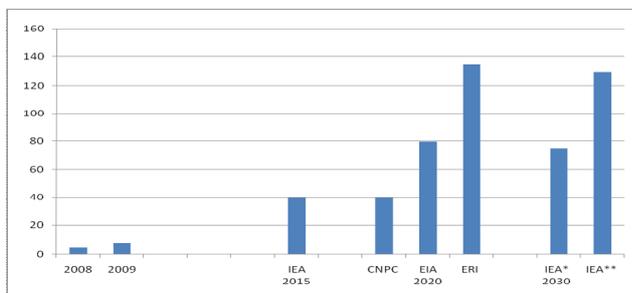
attributed to a more active use of domestic gas, urbanization, and modernization of Chinese cities. The development of gas infrastructure (construction of national and interregional pipelines and LNG terminals) has enabled timely supply of gas to consumers in the economically developed regions during peak demand periods. Shift in the structure of energy consumption toward gas in domestic and industrial sectors is attributed to high prices of oil products in that using natural gas (as a fuel as well as a raw material) proves cheaper than using oil products. Currently, natural gas loses competition against cheap local coal, but the government policy (including the price one), which is aimed at diversifying energy generation sources and reducing environment pollution, has led to the increased use of natural gas in a number of regions, especially in the Yangzi River delta.

Примечание [Editor8]: Do you agree with this change?

As estimated by the National Energy Agency, by 2015, the consumption of natural gas in China will have reached 142 billion cubic meters (which will still comprise an insignificant share of the total energy consumption, however, reflecting a three-fold increase in the demand for 2007). Under the base-line scenario, it is expected that by 2030, the demand will have reached 242 billion cubic meters.

Natural gas production and consumption forecasts in China increase annually, and national and international estimates of the country's import requirement differ significantly (Figure 5). According to different estimates, the import of natural gas to PRC will constitute 40–50 billion cubic meters by 2020 (data from CNPC), up to 80 (EIA)—135 billion cubic meters (ERI). By 2030, under the latest IEA forecast, imports may reach 75–130 billion cubic meters.

Figure 5. Consumption, production, and import of natural gas to China (forecast), billion cubic meters



*ecological scenario **base-line scenario

Sources: "Statistical review of world energy full report," BP, 2009; Nobuyuki Higashi, "Natural Gas in China. Market evolution and strategy," IEA, June 2009; "World energy outlook," IEA, 2008; "World energy outlook," IEA, 2009; CNPC, www.cnpc.com.cn; media publications.

By the start of 2010, China commenced the import of pipeline gas from Central Asia. It is planned that initially, the pipeline will supply 13 billion cubic meters annually and that by

the end of 2013, supplies would increase to 30 billion cubic meters, owing to the launch of the second pipeline link.

Russia and China carry out negotiations on the supply of natural gas and LNG. In June 2009, the countries signed the Russia–China Memorandum of understanding for cooperation in the field of natural gas. The Road Map, which defines actual steps for developing cooperation between the parties, is included as an Addendum to this Memo. In compliance with these documents, Gazprom and Chinese National Oil and Gas Corporation (CNOGC) carry out negotiations regarding the possible directions for gas supply and price setting. In October 2009, CNPC and Gazprom signed, “Framework Agreement on major terms and conditions for natural gas supply from Russia.” The agreement provides that both parties will examine a possibility of joint investment for implementing joint gas processing and gas chemical projects in eastern Siberia and joint marketing in the third country markets and China. In addition, the companies are examining possibilities for ensuring uninterrupted supply of LNG to China from Sakhalin (the first small batches have been supplied to China since 2009).

In the future, it may become possible to integrate the gas pipeline network of China with those of Myanmar and North and South Korea. In December 2008, China and Myanmar signed a long-term agreement for the purchase of 10 billion cubic meters of gas and an Agreement for constructing import pipe, which would link Myanmar and the South of China [5].

In addition to the increased pipeline supply, an increase in LNG import is expected. The capacity of the already operating LNG terminals is approximately 10 million tons, and another 10 million terminals will be added by 2011. Terminals for gas intake are located in the Southern provinces of Guangdong and Fujian and in Shanghai. The main part of LNG is supplied from Australia, approximately 20% from African countries. In 2009, the list of suppliers included Malaysia and Indonesia; their total import comprised 20%. As expected, the main part of LNG will be supplied to the southern provinces of Guangdong and Fujian (Figure 6). Large city gasification programs are also being implemented, starting with Shanghai and Peking.

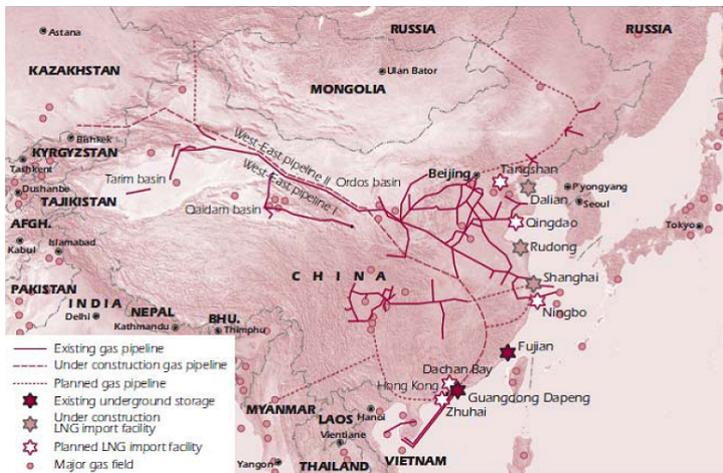
Figure 6. Gas infrastructure of China

Примечание [Editor9]: Should this appear as “negotiations”? However, if my understanding of the context is incorrect, please ignore this note.

Примечание [Editor10]: Did you mean “world”?

Примечание [Editor11]: Is this insertion correct?

Примечание [Editor12]: I am unsure what you meant here. Did you mean “Most of the LNG”? Please revise this here and at the next instance where the phrase repeats in the paragraph.



Source: "Natural Gas in China: market evolution and strategy," IEA, June 2009, *Petroleum Economist*, CNPC.

One of the disadvantages of the Chinese market is the lack of a transparent, objective system of price setting for gas supply, which would have allowed suppliers to gain margins similar to those attained in neighboring countries. Over the last ten years, the vague price setting system has become a constraint in realizing many pipeline and production projects targeted at Chinese consumers.

In general, the lack of agreed upon "rules of the game," distrust between market participants, and lack of coordinated mechanisms slow down and limit the possibilities of profiting from the distinct advantages of the integrated markets.

Equalization of gas prices in the Asian region is also of great importance for developing fair competition in the industry. This will allow energy-intensive industries from different countries to be on equal terms and will reduce their dependence on market fluctuations.

In 2009, following the launch of the LNG production within the framework of the project Sakhalin 2, Russia became one of the main suppliers of gas to the Asian market. Russian companies are prepared to make significant investments into new gas production projects and are setting up their respective infrastructure; however, long-term capital investment require payback guarantees. Therefore, it is necessary to create a harmonized and transparent Asian gas market, which will match the interest of both energy producers as well as consumers. Currently, pipeline projects from Russia to China and South Korea are under discussion, as are plans for expanding the LNG capacity. In the future, due to the rapid economic development of the regions, further delay in the above projects may result in the limited supply and market deficit. The above, once again, emphasizes the necessity to create attractive regional markets.

As the world experience shows, gas markets integration in North-East Asia is unavoidable. The sooner this process is implemented, the earlier the countries in the region will be prepared for the global economy and will have higher energy security. Therefore, heads of our governments and leading companies have to take steps toward creating a unified market

Примечание [Editor13]: Please check this change.

already now, including its operational procedures (price setting, contract terms, and development of exchange trade) and creating respective infrastructure.

Примечание [Editor14]: By this, did you mean "as soon as possible"? Please revise.

Information sources

1. IEA, World Energy Outlook 2009.
2. BP, Statistical Review of World Energy 2009.
3. CERA Market Briefing Global LNG: Mixed Growth Signals in Northeast Asia, May 2010.
4. CNPC, data for the end of 2008 ^h.
5. "China will start receiving oil and gas through Myanmar," oilcapital.ru, 06.17.2009

Примечание [Editor15]: I am unsure what this symbol is. Please check this.

Примечание [Editor16]: Please check this insertion here.