
THE JAMES A. BAKER III
INSTITUTE FOR PUBLIC POLICY
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# JAPANESE ENERGY SECURITY AND CHANGING GLOBAL ENERGY MARKETS:
# *AN ANALYSIS OF NORTHEAST ASIAN ENERGY COOPERATION AND JAPAN'S EVOLVING LEADERSHIP ROLE IN THE REGION*

## SINO-RUSSIAN GAS CONNECTIONS AND IMPACTS

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PREPARED IN CONJUNCTION WITH AN ENERGY STUDY SPONSORED BY
THE CENTER FOR INTERNATIONAL POLITICAL ECONOMY
AND
THE JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY
RICE UNIVERSITY – MAY 2000

# CONTENT

# INTRODUCTION

Northeast Asia (N. E. Asia), a sub-region on the Eurasian continent, is strategically significant both geographically and economically. The region has a history of strife including the Russian occupation of Japanese northern islands, the separation of the Koreas as result of Korean War and the Japanese invasion of China during the World War II. Economic connections and political cooperation in this region was minimal during the entire Cold War. Energy producing countries did not export to key consumers in the region.

Russian Siberia is bestowed with huge hydrocarbon resources and serves as a large non-OPEC producer competing with OPEC. In 1998, Russian oil production reached 304 million tones (Mt) while gas output reached 551.3 billion cubic meters (bcm). About 78 percent of oil and 87 percents of gas produced in Russia come from Western Siberia. Future supplies may come from the Yamal peninsular in Northwest Siberia, Eastern Siberia and Russian Far East. Based on these resources, Russia continues to be well positioned as a major oil and gas producer and exporter into the 21$^{st}$ century.

Japan is the largest petroleum consumer in the region and the second largest in the world with annual oil demand of 255 Mt and gas 69.5 bcm. Over 97 percent of oil comes from outside the region, mainly from the Persian Gulf.

South Korea also depends on oil supplies from outside the region Notably, South Korean petroleum demand in the last decade has been growing rapidly from 35.6 Mt to 93.Mt. In 1996 demand outstripped 100 Mt, about 95 percent coming from outside the region. This thirst for oil constitutes a great challenge for the country's energy security in the years to come.

Mongolia and North Korea also lack significant hydrocarbon reserves. During the past decade, Mongolia has been dependent on Russian oil, while North Korea has relied largely on Chinese oil supply. Considering its border security and traditional relations with North Korea, China continues to maintain about half million tones of oil export to North Korea.

China became a major oil producer when its output reached 100 Mt in 1978. In 1998, Chinese oil and gas production reached 159 Mt and 22 bcm, respectively. Currently, Chinese crude oil production has peaked at last for the time being while gas output continues to increase. Chinese domestic supplies of oil and gas are no longer sufficient to meet growing domestic energy demand. China is seeking substantial new sources from both domestic remote regions (e.g. the Tarim basin) and from the outside world.

Except for Russia, countries in the region cannot meet their energy demand without links to oil exporting countries. The situation became more serious when China became a net importer in 1993. Japanese, South Korean and Chinese oil imports from the Middle East were about 94, 77 and 62 percent, respectively, of their domestic demand in 1998.

Various studies indicate a great potential for oil and gas in Eastern Siberia, Russian

Far East and Chinese Xinjiang. They are geographically remote, but strategically important hydrocarbon provinces. Thanks to the end of the Cold War, these resources have become potentially accessible as new sources for almost all of the countries in the sub-region. Russia has strong interests in developing oil and gas resources in Eastern Siberia and its Far East. At the same time, Japan, South Korea and China have ambitious plans to tap new energy resources from Russia.

Discussions of energy linkages with Russia have intensified since the 1980s. Among them are Sino-Russian gas connections and possible links to other countries in the region such as Japan and South Korea. It is believed that these connections will play a critical role in the regional energy trade. This paper reviews energy trends in Northeast Asia in its section titled "Energy Trends in Northeast Asia."

The second section titled "Searching for Cooperation" elaborates on the reasons and the efforts to attain Russian energy supplies by all consuming countries in the region. Sino-Russia natural gas connections are specifically emphasized, taking into account the importance of the two countries in moving resources into major markets. This section addresses possible regional cooperation in natural gas exploration and production activities, transnational transportation project financing, governmental coordination and risk management of these activities.

The third section analyzes the geopolitical impact of energy development projects in Northeast Asia including Sino-Russian gas connections, Sino-Middle East oil cross investment and Sino-Central Asian links. These three topics represent long term Chinese strategic options. In conclusion, prospects for Sino-Russian gas connections are analyzed by several political, economic and regional pre-conditions.

The author's principal conclusion is that shipments from Irkutzk and Sakhalin Islands are the most viable for transport to China, but require a coordinated effort of exploration and pipeline construction. The geopolitical advantages of such linkages for China are discussed.

## ENERGY TRENDS IN NORTHEAST ASIA

A series of political and economic changes is altering the world energy arena. On the supply side, the Persian Gulf continues to be the principal source of the world's oil, and serves as the stockpile of the world's oil for several great consumers (the USA, Japan and European countries). However, the fall of the former Soviet Union (FSU) has opened Central Asia as an additional supply source. Also, Russia is in the process of pursuing its open policy introducing foreign investment for oil and gas projects to Eastern Siberia and the Far East.

On the demand side, the pattern of Asian oil and gas demand has been dramatically altered. In Northeast Asia, rising demand is mainly coming from China, South Korea and some Southeast Asian nations. Together with high Japanese demand, the overall demand in Asia constitutes a growing *Demand Crescent* for higher energy requirements addressed below.

### *1. Increasing Energy Demand in Northeast Asia*

Following strong economic growth from 1960 through the 1970s, Japan became the biggest oil consumer in Asia since 1965. Its consumption accounted for about two thirds of demand in the Asian Pacific region in the Cold War era. South Korea used to be a relatively small consumer during the 1970s while China was energy self-sufficient. North Korea has relied on oil exports from China. Mongolia was dependent on Russian oil exports. However, energy import requirements in Northeast Asia and geopolitical interactions started to change in the late 1980s with dramatic shifts in the years following the end of the Cold War. These changes are reviewed in detail below.

***Japan*** lacks significant domestic sources of energy - except coal - and imports almost all crude oil, natural gas, and other energy resources including uranium. In 1998, oil provided Japan with 56% of its total energy needs, mostly imported from abroad. About half of Japan's energy is used by industry, about one-fourth by transportation, with nearly all the rest going to the residential, agricultural, and service sectors. In 1998, 75-80 percent of oil consumed in Japan came from OPEC, particularly Persian Gulf countries (the United Arab Emirates, Saudi Arabia, Kuwait, and Iran).

In recent years, Japanese energy consumption has grown more slowly with the advance of energy saving technology over the past decade. Economic downturn has weakened demand for energy as well. As a result, Japanese share in oil imports to the region has been shrinking since the late 1980s compared to the growing demand in China and South Korea. The following tables show the trends in Japanese, Chinese and South Korean oil consumption shares.

Table-1 Northeast Asian Oil Consumption Pattern during 1989-1999 (Mt)

| | 1989 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 |
|---|---|---|---|---|---|---|---|---|---|---|
| China | 112.3 | 110.3 | 117.9 | 129 | 140.5 | 149.5 | 160.7 | 174.4 | 185.6 | 190.3 |
| Japan | 232.9 | 247.7 | 252.1 | 258.5 | 252.7 | 268.4 | 268.6 | 269.9 | 266.3 | 255 |
| S. Korea | 41 | 49.5 | 59.9 | 72.3 | 79.3 | 87 | 94.8 | 101.4 | 110.3 | 93.3 |

Source: BP-Amoco World Energy Statistical Review, June 1999.

Japanese crude oil import heavily depends on the Middle East and will continue into the future. Japanese natural gas import relies mostly on Southeast Asia (Indonesia, Malaysia and Brunei) and the Middle East (Qatar) in the form of LNG. LNG import has been increasing gradually since 1969. About 97 percent of natural gas supply was LNG in 1995. In the past few years, Japanese energy industry saw a big change in respect of deregulation, restructuring and construction. Taking these factors into account, national gas demand is estimated as a High Case and the Base Case as follows.

Table-2 Japanese Natural Gas Demand Forecast Mt (LNG equivalent)

| | 1995 | 2000 | 2010 |
|---|---|---|---|
| Base Case | 45 | 53 | 58 |

| | | | |
|---|---|---|---|
| High Case | 45 | 63-71 | 83-95 |

Source: Asakura, Natural Gas Demand Outlook of Japan, 1998

Japan has about 1.4 trillion cubic feet (Tcf) in proven natural gas reserves, with more possibly under the seabed surrounding Japan. Because its domestic natural gas production is minimal, rising demand is being met by greater imports. About 97% of Japan's gas is imported, all in the form of liquefied natural gas (LNG). Most of this gas comes from Southeast Asia (40% from Indonesia alone). Japan, South Korea and Taiwan account for about three-quarters of world LNG demand. As a result of the Japanese economic recession and reduced energy demand, Japanese LNG buyers were expected to purchase between 5%-10% less than their annual contracted volume of approximately 54 million tons in 1999, slightly above 1998 volume.

Only about 5% of Japan's urban areas are served by gas distribution systems thus far. With plans to increase the natural gas portion of its primary energy supply to 13% by 2010, however, Japan is considering expansion of its gas pipeline system. Meanwhile, Japan is also studying plans to import gas by pipeline from Sakhalin Island or Mainland China but such programs might require Japan to develop a more effective gas distribution system.

Table-3 Chinese, Japanese and South Korean Gas Demand 1988-1998 (Mtoe)

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|---|---|
| China | 12.9 | 13.2 | 13.4 | 13.6 | 14.6 | 14.9 | 15.9 | 15.9 | 17.4 | 17.4 |
| Japan | 43.1 | 46.1 | 49.2 | 50.4 | 50.7 | 54.3 | 55 | 59.5 | 58.6 | 62.5 |
| South Korea | 2.6 | 3 | 3.5 | 4.6 | 5.7 | 7.6 | 9.2 | 12.2 | 15 | 14.1 |

Source: BP-Amoco World Energy Statistical Review, June 1999.

Table-4 Sources of Japanese and South Korean LNG Imports (Bcm)

| | US | Qatar | UAE | Australia | Brunei | Indonesia | Malaysia | Total |
|---|---|---|---|---|---|---|---|---|
| North Korea | -- | -- | 0.1 | -- | 0.8 | 9.5 | 3.9 | 14.3 |
| Japan | 1.8 | 3.7 | 6.2 | 9.7 | 7.3 | 24.2 | 13.2 | 66.1 |

Source: BP-Amoco World Energy Statistical Review, June 1999.

***South Korean*** oil and gas consumption accounts for around 70 percent of its primary energy needs[1]. During 1988-1998, consumption grew at 10 percent annually and continued to be largely met by imports from the Middle East.

Table-5 Sources of South Korean Crude Import 1994-1996 (Mt)

| Years | Imports | Percentage | | | |
|---|---|---|---|---|---|
| | Volume | Mideast % | Asia % | Africa % | Americas % |

[1] South Korean coal imports account for 20 percent of domestic energy demand, while electricity including thermal, nuclear and hydropower accounts for 10 percent with about 40.4 GW in 1979.

| | | | | | |
|---|---|---|---|---|---|
| 1994 | 78.59 | 76.58 | 15.88 | 4.05 | 3.50 |
| 1995 | 85.61 | 77.85 | 13.13 | 6.07 | 2.95 |
| 1996 | 98.89 | 77.72 | 13.66 | 5.13 | 3.49 |

As the sixth largest consumer and the fourth largest importer of oil in the world, South Korea has to ensure its energy security. To enhance oil security, the Korea Petroleum Development Corporation (KPDC) was established in 1979 and joined oil development in Indonesia in 1981. From1981 until 1993, KPDC invested $1 billion in 43 overseas projects in 26 countries including Indonesia, Yemen, Egypt, Argentina and Venezuela. Since 1993, KPDC has increased its investment in the Middle East considering domestic demand growth at 9.4 percent (EIA, 1998). So far, KPDC has 18 overseas exploration and development projects in 12 countries (4 production oil fields, 2 development fields and 12 exploration projects).

South Korean gas demand has risen over the past decade. Natural gas consumption share accounted for 8.6 percent of South Korean primary energy needs in 1997, 84 percent growth compared with that of 1990 according to Kogas' statistics in 1997. Based on the longer-term projection, the gas share in its primary energy mix was expected to reach 10 percent in 1998, 12 percent in 2010 and 13.5 percent in 2020.

Table-6 Forecast of South Korean Energy Consumption Mix into 2020

| | 1997 | 2001 | 2006 | 2010 | 2020 |
|---|---|---|---|---|---|
| Oil | 58.8 | 54.7 | 51.7 | 50.5 | 49.0 |
| Coal | 19.5 | 19.7 | 21.0 | 18.8 | 17.7 |
| Nuclear | 10.7 | 12.3 | 13.5 | 16.2 | 16.8 |
| Gas | 9.5 | 11.7 | 11.5 | 12.1 | 13.5 |
| Hydro | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 |
| Renewable | 0.8 | 1.1 | 1.6 | 1.8 | 2.4 |

Source: A Study on the National Long-term Energy Plan, December 1996, Ministry of Trade, Industry and Energy, Korean Energy Economics Institute

According to South Korean government plans, by 2010, natural gas will be used all across the country except for Cheju Island where the number of households is less than 150,000.

The LNG business is being opened up gradually because growing demand has been highly dependent on foreign LNG imports. As the second largest world importer of LNG, South Korea imported 11.3 Mt by the end of 1997, about 14 percent of world total, largely coming from Indonesia (55 percent) and Malaysia (34 percent) Brunei and Australia. Imports are projected to increase to 16.5 Mt in 2000 (Kogas, 1997). To make Qatar's Ras Laffan LNG available, Kogas is promoting LNG receiving terminal construction and extend its existing terminal capacity in Pyongtaek and Inchon.

In addition, in October 1998, Japanese Mitsubishi and Pohangare planed to construct LNG terminal and related infrastructure in South Korean coastal line sponsored by

Japanese Import/Export Bank.

Table-7 Sources of Japanese and South Korean LNG Imports (bcm)

| | US | Qatar | UAE | Australia | Brunei | Indonesia | Malaysia | Total |
|---|---|---|---|---|---|---|---|---|
| S. Korea | -- | -- | 0.1 | -- | 0.8 | 9.5 | 3.9 | 14.3 |
| Japan | 1.8 | 3.7 | 6.2 | 9.7 | 7.3 | 24.2 | 13.2 | 66.1 |

***The Democratic Peoples Republic of Korea*** *(North Korea)* occupies a strategic location bordering China, South Korea and Russia. North Korea relies on two domestic energy sources – coal and hydropower – for most of its energy needs. In 1997, coal accounted for more than 80 percent of its primary energy consumption while hydropower accounted for more than 10 percent. North Korea has few oil reserves, but there are some areas (Hamhung and Sinpo) under exploration. Oil accounts for about 6 percent of its primary energy consumption, and is largely limited to non-substitutable uses such as motor gasoline, diesel and jet fuel. North Korean industrial production is regularly interrupted by energy shortages. North Korea imports all of the 2.85 Mt of oil it consumes. As mentioned above, its imports come largely from China, plus about 0.5 Mt provided by the US under the 1994 nuclear accord. North Korea's nuclear program is a major concern for regional security ever since the country withdrew from the Nuclear Non-Proliferation Treaty in 1993.

***Mongolia***. At present, the primary energy source of Mongolia is coal, which is used at coal-fired power stations to produce electricity and to provide heat to the urban population. Some petroleum exploration activities in Tamsag and East Gibi Basins are under way, but annual oil consumption remains small at 0.59 Mt. Mongolia has no substantial natural gas reserves though some sedimentary basins are to be explored. Besides coal, on which it largely depends (about 4.67 Mt annually), Mongolia generates 2.425 billion kwh power with 0.23 billion kwh shortage. Mongolia has no experience of utilizing natural gas or Liquified Petroleum Gas (LPG). Its energy company, NIC Company, has made an attempt to market small amount of LPG balloons in the coal market. LPG balloons are imported from Russia and China and distributed to a steel mill located in the northern part of the country and to catering facilities (D. Gansukh, VP of NIC Co.).

Mongolia in January 1999 imported about 11 Mt of fuel oil from China to meet its domestic needs. According to a briefing released by Mongolian Ministry of Agriculture and Industry, Mongolian annual fuel consumption has been over 0.4 Mt and almost completely dependent on imports from Russia in the past. Since the second half of 1999, Mongolia has had to reduce its imports from Russia due to financial pressures. The import from China has been planned for years, and will greatly ease the Mongolian supply constraints in the future.

***China*** is the fifth largest oil producer and the twentieth largest natural gas producer in the world (BP-Amoco, 1999). Currently, oil and gas shares in Chinese primary energy mix account for 19 percent and 1.9 percent, respectively (Chinese Statistical Report, 1999). Chinese gas usage is lower than most industrialized countries and developing countries

(Table-8). In recent years, the Chinese gas sector has become a focus of international attention.

Table-8 Natural Gas Consumption Share Compared by Country

| Countries | USA | France | Japan | S. Korea | India | Brazil | China |
|---|---|---|---|---|---|---|---|
| Gas shares | 25.7 | 13.5 | 12.5 | 8.4 | 7.7 | 4.6 | 2.2 |

Source: BP-Amoco, 1999

Over the past decade, Chinese low natural gas utilization, as indicated by following *oil-gas ratio* below (see Terminology at the end on the paper), gas deficit and regional imbalance are major concerns and vulnerabilities.

Table-9 Oil/Gas Consumption Ratio

| | 1988 | 1990 | 1992 | 1994 | 1996 | 1998 |
|---|---|---|---|---|---|---|
| China | 8.68 | 8.36 | 9.49 | 10.03 | 10.97 | 10.94 |
| Japan | 5.58 | 5.37 | 5.13 | 4.94 | 4.54 | 4.08 |
| S. Korea | 13.19 | 16.5 | 15.72 | 11.44 | 8.31 | 6.60 |
| USA | 1.70 | 1.61 | 1.54 | 1.51 | 1.47 | 1.55 |
| Australia | 2.09 | 1.92 | 2.03 | 1.94 | 2.01 | 2.04 |
| UK | 1.72 | 1.75 | 1.64 | 1.38 | 1.10 | 1.01 |
| India | 7.80 | 5.17 | 4.34 | 4.29 | 4.29 | 4.12 |
| Brazil | 17.85 | 17.18 | 17.25 | 16.02 | 14.82 | 14.34 |

Source: BP-Amoco, 1999; EIA Outlook, 1996.

Chinese oil production grew rapidly from 0.12 Mt in 1949 to 100 Mt in 1978 and 161 Mt in 1999. Reserves to production (R/P) ratio peaked in 1961, and declined thereafter. The R/P rate has decreased substantially to 14.78 years as newly added reserves failed to keep pace with high output since the early 1980s.

Thanks to four gas strategic areas (Sichuan, the Tarim, Changqing and Yingehai), China's newly added gas reserves and output grew steadily over the past few years, and will continue to increase into the next decade. Natural gas R/P ratio is estimated at around 40.57 years (Hu, 1997).

Over the last decade, oil/gas ratio in terms of production is downward sloping for all countries except China as indicated in Table-9. The Chinese ratio shows an increasingly higher dependency on oil than some industrialized and even developing countries.

Moreover, high economic growth and environmental concerns call for an increase in the use of oil and especially natural gas. China's gross domestic product (GDP) reached 8.8 percent in 1997, 7.5 percent in 1999 and will level out 7 percent after the year 2000 (CASS, 1996). The gas deficit was estimated at over 40 bcm (low scenario) in 2010 (Hu, 1997) as indicated in the following table:

Table-10 Chinese Gas Production and Consumption Forecast (bcm)

| | 1998 | 2000 | 2005 | 2010 |
|---|---|---|---|---|
| Production | 22 | 24 | -- | 70.7 |
| Consumption | 17.4 | 27.67 | 60.6 | 134.4 |
| Gas gap | 4.6 | -3.67 | -- | 40-63.7 |

Source: Wan; 1997 and SDPC Energy Institute. Chinese Gas Demand Projection to 2010, 1996

Main natural gas consumption points are far away from the gas fields. Chinese gas resources are located in Southwest and western China (Sichuan, Changqing, Qinhai and the Tarim) and Chinese offshore. Sichuan gas accounts for over 32 percent of the total output. Changqing will be a growing supplier in the next five years. Chinese gas consumption is mainly coming from Northeast China, the Bohai Bay region, the Yangtze River Delta and Central South China. Currently, Central South China is the biggest gas consumer. However, the Yangtze River Delta, Northeast China and the Bohai Bay region could become the major gas centers within the country. Table-11 shows the serious imbalance in the projected Chinese natural gas production and consumption pattern.

Northeast China is constituted of Heilongjiang, Jilin and Liaoning provinces with a population of 120 million. This is the old industrial region with GDP per capita $727 and GDP growth rate 25 percent. Coal is the primary energy source. Gas consumption (around 3.83 bcm annually) concentrates in the region around Daqing and Liaohe. It is estimated that natural gas demand in the region would approach 7.27 bcm in 2005 and 17.98 bcm in 2010. The local gas producers could supply up to 6 bcm. Considering future domestic supplies, gas deficit in this region would be 12.9 bcm.

The Bohai Bay region consists of Beijing, Tinjing, Hebei and Shangdong with a population of 175 million and GDP per capita of $960 in 1997. Coal consumption accounts for 75 percent of its energy needs. The gas demand is projected to grow annually at 14 percent and reach 13.93 bcm in 2005 and 28.28 bcm in 2010. Taking supplies from local gas producers of 13 bcm into account, the gas deficit would be 13.6 bcm. Currently, Shanjing gas pipeline can supply up to 3.3 bcm.

The Yangtze Delta includes greater Shanghai, Jiangsu and Zhejiang provinces with a population of 130 million and GDP per capita of $1,760 in 1997. The regional demand for cleaner energy is expected to grow from the current 2 bcm to 14.54 in 2005 and 32.32 bcm in 2010 although there are no significant winter gas requirements. The proposed eastbound supplies (from Sichuan, Changqing, Qinghai and Tarim combined) will bring about 19.0 bcm by 2010.

Table-11 China Regional Gas Demands and Gaps 2010

| Regions | Demand | Suppliers | | | | | | Gap |
|---|---|---|---|---|---|---|---|---|
| | | East | Ordos | Sichuan | Qinghai | Xinjiang | Star | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| N.E. China | 18.9 | 4 | | | | | 2 | 12.9 |
| Bohai Bay | 26.6 | 3 | 3 | 1 | 2 | | 4 | 13.6 |
| Yangtze Delta | 31.0 | | 5 | 2 | | 10 | 2 | 12.0 |
| C. S China | 14.5 | | | | | | 2 | 10.5 |
| Total | 91.0 | 7 | 8 | 3 | 2 | 10 | 10 | 49.0 |

Source: various.

Table-12 Chinese natural gas production and consumption forecast to 2015 (bcm)

| | 1998 | 2000 | 2005 | 2010 |
|---|---|---|---|---|
| Production | 23.2 | 25.0 | | 70.7 |
| Sichuan | 7.53 | 7.70 | 11.8 | |
| Changqing | 1.80 | 2.31 | 8.04 | |
| Qinghai | 0.64 | 0.66 | 1.81 | |
| Tarim | 0.55 | 0.55 | 0.92 | |
| Offshore | 1.92 | | | |
| | | | | |
| Consumption | 17.4 | 27.4 | 60.6 | 134.7 |
| N.E. China | 3.82 | 3.83 | 7.27 | 30.98 |
| Bohai Bay | 2.08 | 6.30 | 13.93 | 28.28 |
| Yangtze Delta | 0.87 | 1.92 | 14.54 | 32.32 |
| C. S. China | 8.17 | 10.41 | 12.12 | 18.85 |
| Rest of China | 2.43 | 4.93 | 12.72 | 24.24 |

Source: Government and Private Forecasts

The expected natural gas deficit has forced China to plan national gas trunk lines moving gas from fields in the Southwest and Western China to markets in North and Eastern China. Current pipeline infrastructure constitutes a serious bottleneck in efforts to balance the market. Up until 1999, China's oil and gas pipelines totaled 11,552 km and 13,148 km in length, respectively. Currently, over 71 percent of crude oil production is shipped through the pipelines; the rest is transported by rail and river combined. China is facing two serious constraints to better domestic distribution of oil and gas:

1. There are no major east-west pipelines or liquefied natural gas facilities on the coastline. This creates serious bottlenecks to balance national petroleum markets between east and west, and north and south.
2. It is difficult to receive large foreign hydrocarbon imports because of inadequate infrastructure. Huge investments as well as institutional restructuring is required to overcome this constraint.

To overcome these constraints, China National Petroleum Corporation (CNPC) has developed a master plan called the Eastbound Natural Gas Transportation to ship Sichuan and Chinese western gas to Central China (Wuhan) and the Yangtze River Delta in stages over the coming years (2002, 2005 and after 2005). The development of major gas infrastructure will enhance the diversity of China’s energy mix, improve environmental

conditions and underpin sustainable development in the next decades. Also, modernized infrastructure will enable China to bridge the gas gap by importing substantial additional sources from neighboring countries by LNG and pipeline.

All countries in Northeast Asia are searching for cleaner and reliable energy supplies to ensure sustainable economic growth at least until the year 2010. Their search would be determined by the following factors:

- Growing oil and gas demand in China, South Korea and Southeast Asia, together with Japanese traditional demand, constitute huge requirements for natural gas resources;
- Japanese demand growth will continue to be outpaced by accelerating demand from China and South Korea; and
- Assessing regional projects can have a greater benefit than developing individual national grids. As a part of the *Demand Crescent* (see Terminology in the end of the paper), almost all gas consumers in the region are searching for multiple cleaner and reliable energy supplies from strategic energy areas including the Persian Gulf, Caspian Basin and Russia.

### *2. New Hydrocarbon Sources in Siberia and the Russian Far East*

Russia's eastern region is composed of Eastern Siberia and the Russian Far East. Eastern Siberia is located in the central plateau of Siberia between two principal rivers the Lena and the Yenisey in the Northern Asia[2]. The southern Siberian valley contains Lake Bajkal, the world's deepest lake. Eastern Siberia is a plateau rich with natural resources. According to technical survey, there are about 8.6 billion tones oil and 31 Tcm of gas (Li, 1996). Thus far, proven oil reserves were estimated at 1.25-1.75 billion tones, and gas at 2 Tcm (Table-13). These resources, including its Far East and Yakutia, represent a great potential (Table-14); the proven reserve rate for oil remains at 3.6 percent and for gas at 4.47 percent.

Table-13 Eastern Siberian Oil and Gas Prospects

| Region | Original Proven Reserves | | Possible Annual Capacity | |
|---|---|---|---|---|
| | Oil (Mt) | Gas (bcm) | Oil (Mt) | Gas (bcm) |
| Yakutia | | 500 (A+B) | 2-5 | 1.5 |
| Irkutzk | 355 | 541 | 8.7-15 | 4.2-11 |

[2] In some textbooks, this area is identified as the Central Siberian Plateau while eastern Siberia is the highlands of Siberia facing the Pacific, we call Russian Far East. For example, according to Microsoft World Atlas, Siberia stretches from the Ural Mountains in the west to the Bering Sea of the Pacific Ocean in the east. The southern border is defined by the steppes of north central Kazakhstan as well as the borders with China and Mongolia. The land can be divided into three major geographic regions: the West Siberian Plain, an enormous, flat expanse of lowlands interspersed with swampland; the Central Siberian Plateau, with mid-range elevations of volcanic rock carved by steep river canyons; and the highlands of eastern Siberia, crossed by a complex system of volcanic mountain ranges, including the Verkhoyansk Range, the Khrebet Cherskogo, and the Dzhugdzur Mountains. The Koryak Range of the Kamchatka Peninsula, the northeast extremity of Siberia, contains the highest peak in Siberia Mount Klyuchevskaya.

| | | | | |
|---|---|---|---|---|
| Krasnoyarsk | 900-1400 | 1000 | 40 | 20 |
| Total | 1255-1755 | 2041 | 50.9-60 | 39.2-46 |

Source: Li, Guoyu, 1997

Table-14 Oil and Gas Reserves in Eastern Siberia and the Russian Far East

| Region | Oil Reserve (Mt) | | Gas (Tcm) | |
|---|---|---|---|---|
| | Resource | Proven Reserve | Resource | Proven Reserve |
| Total Resources | 17759 | 641 | 55.9 | 2.5419 |
| Eastern. Siberia<br>1. Krasnoyarsk<br>2. Irkutzk | 86.36.9 | 313 | 31.83 | 0.9443 |
| | 6854.3 | 133 | 24.85 | 0.6546 |
| | 1984.2 | 179.6 | 6.97 | 0.2897 |
| Far East | 8922.3 | | 24.1 | 1.5976 |

Source: Ibid.

Early exploration activities in Eastern Siberia have encountered unexpected geophysical challenges and development hardships. There are a number of giant natural gas fields in Eastern Siberia and at least eight big gas fields in Russian Far East as well as smaller ones less developed, not to mention underdeveloped oil fields (Paik, 1996). Li reported that oil production in Eastern Siberia could reach 45 Mt in 2015 (Li, 1997) and eventually peak at 100 Mt for oil and 40-45 bcm for gas.

This is a huge undeveloped area of hydrocarbon resources and potential warehouse of strategic hydrocarbon resources. Unfortunately, Moscow did not pay much attention to the importance of its Asian strategic energy supplies during the Cold War, given other political considerations. Under the Soviet system, Russia also focused the majority of its exploration and production activities on the vast reserves of Western Siberia. Ironically, even Eastern Siberia and the Russian Far East had been supplied at least in part with oil from Western Siberia.

In 1975, in the aftermath of the 1973 Oil Crisis, Russia conducted geological surveys and exploration activities in its Far East with Japan and South Korea and offshore on the Sakhalin (Sakhalin I). By the early 1980s, interest in development of Eastern Siberia and the Russian Far East revived. In 1986, Gorbachev stated Russian eastern policy in the Far East with clear intention to accelerate its Eastern economic development. In 1988, Russian energy agencies and companies constituted MMMS consortium with Japan and American counterparts to further development in a project referred to as Sakhalin II. Two additional projects, Sakhalin III and Sakhalin IV, were established after 1993. However, these oil and gas ventures have been stalled due to uncertain political, legal and investment environments. Some western joint ventures in Russia encountered serious hardship. Questions remain about the future of Sino-Russian gas cooperation.

The collapse of the Soviet Union brought about radical political and economic

changes including the severing of oil rich Central Asia from Russia and an acceleration in the production decline rate of oil fields in Western Siberia. In 1990, Moscow began to discuss developing energy resources in Eastern Siberia and the Far East in an effort to strengthen its political and economic ties with Northeast Asian countries. However, due to a variety of reasons, these plans have failed to materialize in any significant fashion.

In 1996, at the First International World Energy System Conference (Toronto), a research team headed by R. Merenkov from the Siberian Energy Institute addressed the potential oil and gas reserves and its connections with Northeast Asian markets. Mr. Merenkov predicted that oil output from Western Siberia will continue to decline steadily in the next decades while oil and gas production from Eastern Siberia and the Russian Far East will rise (Table-15.

Table-15 Forecast of Natural Gas Production from Siberia and the Russian Far East (bcm)

| Regions | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|
| W. Siberia | 65(88.79)* | 70(77.77) | 70(66.66) | 75(62.5) | 80(57.74) |
| E. Siberia | 5(6.8) | 15(16.66) | 25(23.8) | 30(25) | 40(28.57) |
| Far East | 3.2(4.37) | 5(5.55) | 10(9.52) | 15(12.5) | 20(14.28) |
| Total | 73.2 | 90 | 105 | 120 | 140 |

* The bracketed presents percentage
Source: M. Merenkov.1996.

Table-16 below highlights the potential for oil and gas to be exported to Northeast Asia. Over 90 percent of Japanese and South Korean domestic demand currently is supplied by the Middle East. Japanese, South Korean and Chinese Taiwan LNG imports account for 78 percent of the world total LNG exports, and this share should remain as high at least until 2015, according to the Enron Energy Outlook 1997[3]. This high share highlights the importance of developing alternative strategic sources of oil and gas to diversify supplies for countries in Northeast Asia. Russian oil and gas deposits in Eastern Siberia and the Far East provide a notable opportunity in this regard.

Table-16 Prospective Gas Production and Consumption in Sakha and Sakhalin (bcm)

| | 1995 | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|---|
| Sakha Republic | | | | | |
| Production | 3 | 12 | 20 | 26 | 26 |
| Consumption | 2.9 | 4.2 | 5.6 | 7.3 | 7.3 |

[3] Enron Energy Outlook 1997, p16, Enron Corporation.

| | | | | | |
|---|---|---|---|---|---|
| Export capacity | 7 | 10 | 10 | 10 | |
| Sakhalin Region | | | | | |
| Production | 4.7 | 21.9 | 23.3 | 23 | 22.8 |
| Consumption | 4.8 | 12.7 | 17.4 | 21.7 | 21.5 |
| Export capacity | 10 | 10 | 10 | 10 | |

Source: Paik, p218 Table 7.2.

Simultaneously, exporting oil and gas to Asian markets is a major step for Russia, which has been involved, so far, only marginally in the Northeast Asian energy markets. The Siberian Energy Institute made the following projection about gas export capacity to Northeast Asia.

Table-17 Projection of Russian Export Capacity Northeast Asia to 2020 (bcm)

| Country/Region | 2005 | 2010 | 2020 |
|---|---|---|---|
| China | 10-15 | 16-23 | 30-45 |
| South Korea | 8-10 | 10-23 | 12-14 |
| North Korea | 2-4 | 3-5 | 5-6 |
| Japan | 5-8 | 18-10 | 10-15 |
| Taiwan | 2-3 | 3-4 | 4-5 |
| Mongolia | 0-2 | 1-3 | 2-3 |
| Total | 27-42 | 41-58 | 63-88 |

Source: Merenkov, 1996.

In terms of resource potential, there is little doubt about the export capacity of Eastern Siberia and the Russian Far East in the coming decades. More importantly, Eastern Siberia and the Russian Far East could become an important component of the *Petroleum Heartland* (Xu June, 1996). The future Northeast Asian natural gas demand, an important part of the *Demand Crescent*, would be increasingly dependent on energy imports from and cooperation with Russia.

## SEARCHING FOR COOPERATION

### *1. Quests for Russian Resources*

*Japan*

Excessive dependence and long distances to transport vital supplies of oil and natural gas are major strategic concerns. The over-dependency on and transportation from the remote hydrocarbon countries remain a big concern. Therefore, to seek new strategic energy sources (especially cleaner sources) from neighboring Russian Far East and East Siberia seems logical, spurring a Japanese-Russian joint survey in 1995.

In June 1994, Japanese Ministry of Trade and Industries' Comprehensive Energy Research Board prepared a long-term energy demand forecast for Japan and its neighboring economies (Chinese mainland, Taiwan, Korea and six ASEAN nations) into 2010. They forecasted Asian-Pacific regional oil import from outside the region to increase from 50 percent to 69 percent from 1980 through 2010 while gas import from outside the region to increase from 8.7 percent to about 27 percent by 2010.

According to a report prepared by Mitsubishi Research Institute, Inc., "oil businesses have explored and reviewed other E&P activities and gas pipelines from Russia in economic terms". No gas transnational pipeline currently exists in Northeast Asia except the pipeline between Malaysia and Singapore. Overall, Asian regional pipeline networks are underdeveloped. No technical obstacle exists in terms of laying transnational pipelines, including subsea pipe, as there is a proven technology used, for example, by the Trans-Mediterranean Pipeline at a depth of 600m.

According to Mr. Peter Egyed, Japanese intentions to participate in the Russian Yakutia gas transportation project can be traced back to 1968-1974[4]. Later on, Emeritus Professor Masaru Hirata, of the University of Tokyo, outlined a proposal of gas pipelines in Northeast Asia in 1991[5]. Now the proposal has developed into a major project conducted by the Institute for Energy Economy (IEE) and National Pipeline Research Society in Japan. Similarly, the Northeast Natural Gas Conference was held in Beijing (1996), Seoul (1997), Japan (1998) and Yakutia (Sakha Republic) (1999). Japan has comprehensive information of Russian natural gas resources and transportation. The IEE is a hub of the second track in Japan and regional exchange at large.

*South Korea*

South Korea has been seeking diversified imports from Eastern Siberia, the Russian Far East and the remote western region of China since the 1980s. Hyundai Group was the first among the members of the Korean Petroleum Development Corporation (KPDC) that negotiated with the Soviet Union on oil and gas developments in the Russian Far East. In 1990, Hyundai signed an agreement with the Soviet energy representative regarding Yakutia oil and gas development. Korean Ministry of Energy started to develop Lunskoye gas field after Gorbachev's visit in Cheju Island in April 1991. International bids for Lunskoye and Piltun-Astokskoye fields started several months later. Since the fall of the FSU, Daewoo Group has taken over from Hyundai to join Yakutia gas development. Notably, former President Boris Yeltsin's official visit to South Korea in November 1992 greatly promoted Korean investment in Lunskoye field. A Korean consortium reviewed Sakhalin II in November 1993 and reassessed its investment budget in Yakutia in 1994.

*North Korea and Mongolia*.

Both North Korea and Mongolia are located in a critical avenue for gas transportation from Russia. However, the North Korean stance and policy towards such projects and cooperation remains a large uncertainty. Theoretically, North Korea could use Russian gas to fuel its own economy, but has not expressed explicit policy interest towards a Russian gas pipeline through its territory. Few experts and officers from the country have made exchanges with its neighboring countries. In comparison, Mongolia is watching with a great interest the progress of the transnational gas pipeline to be

[4] Western Participation in the Development of Siberian Energy Resources: Case Studies in 1983

[5] Paik, pp 183.

constructed from Russia to China through Mongolia and the efforts by South Korea, Japan, Russia and China to lay the foundation for the Northeast Asian natural gas pipeline (D. Gansukh). Mongolian government agencies have been actively approaching neighboring countries concerning gas transnational transportation. Its energy companies are seeking first hand, adequate and accurate information on the project by attending Northeast Asian Natural Gas Pipeline Conferences in Seoul and Sahka in 1998 and 1999.

*China*.

During the Cold War, China did not seek energy resources from the Russian Far East. During the 1980s, Chinese East Asian policy was mainly focusing on improving relations with Japan to garner Japanese capital and technology. But as energy demand has increased in China, Beijing has been forced to review its policy toward neighboring countries, especially neighboring energy producing countries.

Strategically, northeastern China and northwestern China are key vantage points to import Russian oil and gas by trans-national trunklines. But major markets will be in several densely populated urban centers in the northeast, the Bohai Bay region and the Yangtze River Delta.

Chinese interest in Russian gas can be traced back to the late 1980s. There were several meetings and exchanges in the early 1990s, including those with the Russian oil company, Sidanco which expressed interest in cooperating with Chinese counterparts in exporting gas. Local Russian officials expressed similar intentions. In 1992, when Li Guoyu, a senior geologist of CNPC, brought back Russian suggestion to China, a debate ensued on whether or not to import Russian gas to China.

Two schools of thought formed. The first advocated Russian gas imports as an excellent chance for China to invest in undeveloped Russian energy resources. The other school of thought argued that China may encounter serious risks considering political uncertainties in Russia. Despite these reservations, Russian and Chinese planners agreed to conduct feasibility studies separately. Chinese experts believe that new gas sources from the Russian Far East would greatly contribute to bridging the domestic gas deficit in China. The future transnational transportation will also give the impetus to expand China's own domestic pipelines. Russia, for its part, is in the process of opening its Eastern Siberia and the Far East to international energy investments. These mutual interests create a solid foundation for Sino-Russian energy cooperation.

As indicated above, Russia is rich in natural resources but lacks capital to develop them. Japan and South Korea are major consumers and capital suppliers. Compared with these countries, China is an emerging and stable consuming market, but short of both capital and natural resources. Mongolia and North Korea are seriously short of both natural resources and capital, but are located in highly sensitive strategic places in the region. These differences result in common interests and great impulse for multilateral cooperation. Sino-Russian gas connection is particularly well positioned geographically and geopolitically.

***2. Sino-Russian Gas Cooperation***

*Gas import options and routes*. Considering gas shortages in northeast China and the Bohai Bay region, China can consider substantial imports from Russia. The capability of Russian exports to Asia-Pacific countries is estimated at 40-60 bcm (Merenkov). There are at least a dozen energy links and multiple transportation options (Map-4). Among them are four possible pipelines linking China-Irkutzk-Beijing, Yakutia-Shengyang, Sakhalin-Beijing, as well as Novosibirsk-Shanghai.

- It is estimated that there are gas fields containing about 3,000 bcm in Irkutsuk, Sakha Republic and Kransnoyask. There are proven gas reserves of 760-870 bcm with possible capability 15 bcm gas output in Kovyktinskoye in the Irkutsk region.

- Gas fields containing 15 bcm in Chayandinskoye and in Sakha. Considering 10 bcm of Russian local consumption, China is planning imports of 20 bcm from this area to its northeastern provinces and the Bohai Bay region and to distribute 8-10 bcm to South Korea.

- Sakhalin offshore presents a huge potential natural gas source estimated at 580 bcm. There is about 11.5 bcm of output coming from Sakhalin I. ExxonMobil has discussed the possibility to export 10 bcm to Chinese northeast provinces. Khabarovsk officials reportedly support this activity.

- In February 1997, Russia announced plans to ship about 20 bcm from its Bolshekhetskaya Cavity region in Western Siberia to Shanghai in China. The pipeline proposed by Gazprom encounters competition by the sources from Central Asia (Turkmenistan, Uzbekistan and Kazakhstan). These western gas sources could be transported to Central China and the Yangtze Delta region, a fast growing and huge consuming market in China.

Table-18 Proposed Russia-China Natural Gas Pipelines

| Pipeline | Length km | Throughput bcm | Investment $bn |
|---|---|---|---|
| Irkutzk- Rizhao | 3300 | 10-15 | 7 |
| Sakhalin- Shenyang | 2400 | 10 | 3 |
| Novosibirsk- Shanghai | 6800 | 20-30 | 10 |

Source: CNPC

Feasibility studies for the proposed four pipelines are underway. Further technical data require review by both Chinese and Russian specialists. The total cost is estimated at over $20 billion. The commercial viability of the proposed routes through Mongolia, or bypassing it, is still uncertain. An additional problem is high transportation costs to South Korea.

The timing of these projects is also complicated. Chinese gas imports from Russia have generally been planned to 2005-2010 because of its domestic pipeline construction. China has to address its gas import policy and relations with Russia and the other

neighboring countries to cope with geopolitical uncertainties and underlying regional insecurity.

Furthermore, the proposed routes of natural gas transportation from Russia to China, Korea and Japan are giant transnational projects requiring around $20 billion in investment capital and at least a 10 year long construction period. Similar projects are transnational natural gas pipelines like the Magreb pipeline and the proposed Yamal pipeline. Close cooperation among the countries involved would be essential to make such an expensive undertaking feasible.

*E&P joint ventures in Russia.* Japanese, Korean and Chinese energy companies are searching for major energy investment opportunities in Eastern Siberia and the Russian Far East. A joint E&P venture is an essential initiative to control the origin of place and secure transportation. China National Petroleum Corporation (CNPC), Chinese oil and gas flagship, has considerable experience in geological surveying, exploration and development. Recently, CNPC has strengthened its monopolistic position in natural gas sector in China.

To meet growing demand in the northeast, the Bohai Bay and the Yangtze Delta, China has its reasons to participate in E&P activities along with transportation from Russia. Japanese and South Korean energy companies have capital and technological know-how. They control multiple overseas energy sources, and have had strong interests in Russia since the 1970s.

Energy companies from China, Japan and South Korea are exploring independently for Kysyl-Syr, Tas-Tumus, and Yakutzk gas fields in the Republic of Sakha (Yakutia), Sakhalin offshore and condensate field in Kovyktinskoye, north of Irkutzk. Ideally, these companies should cooperate to improve the economic feasibility of these activities. The foregone solution is a search for cooperation to make the gas cooperation economically feasible. However, all parties remain reluctant to go ahead, because current, insufficient resources make decision-makers less satisfactory and confident.

*Extensive Cooperation.* In addition to gas and oil cooperation, cooperation in power development and transmission are in the interest of all countries in Northeast Asia. As South Korea suggested, hydropower development and gas-fired generation are also important in meeting Chinese and South Korean demands. A possible electricity deal indicates Russian exports of 20 billion KW/h from the Irkutsk region to either Shenyang (Liaoning province) in northeast China or Beijing. Estimated investment is about $1.5 billion. China National Electricity Corporation (CNEC) has been encouraged to join the extensive cooperation. The potential for related businesses like technical service and equipment supply will be large.

*Financing requirements*. Financial requirements for E&P and pipeline projects are staggering. Chinese preliminary estimates indicate that total investment for three pipelines from Russia to China would cost close to $20 billion. By 2006, investment in the Chinese section of the pipelines from Sakhalin and Western Siberia will approach $10

billion while, by the year 2010, the Chinese section of the pipeline from Irkustzk to Rizhao will require about $2.28 billion. During 1999-2005, these two pipelines will require $1.41 billion per annum. The financing requirements would be peak at $2.06 billion in 2003 and 2004. Construction of the third pipeline is proposed in 2006-2009 with the investment of over $571 million annually. Therefore, no single company or even a single country could take all the risk. The solution is to arrange a consortium of several oil companies backed by all governments involved.

Environmental protection considerations. There is a variety of cooperation areas in environmental protection including mitigation of CO2 emission, prevention of gas-spills and other (land, air and water) anti-pollution measures, which could be jointly exploited as part of the proposed oil and gas development projects. Coordination among Japan, South Korea and China along with Mongolia and even North Korea are currently searching for cleaner alternative energy sources from Russia. There are reasons to believe that Russia, China and Japan are playing increasingly important roles in promoting energy cooperation.

Inter-governmental coordination is necessary to support industrial and corporate cooperation in the region in undertaking these giant projects. Governmental regulation is needed to oversee pipeline construction and operation in the future. Russia is working on legal frameworks and deregulation in some gas sectors including E&P and transmission. China is making its new gas pricing policy. Japan and South Korea are beginning to deregulate their gas sectors. Technical and academic exchanges are one method to implement joint governmental policies and exchange different points of view on several strategic issues.

*Risk Managemen*t. There are several risk factors that need to be addressed to ensure successful implementation of the major pipeline projects under discussion above.

- Resource Supply Uncertainties. Notwithstanding evidence of the proven gas resources in Sakhalin and East Siberia, these resources are smaller than those in Western Siberia which will remain the largest and most stable source of natural gas supply in the coming decade. Further exploration in Eastern Siberia and the Russian Far East or banding of these major gas fields may be required to make them economically viable.

- Financial Risk. Technological risk is less problematic as Russia and the other countries have experience in developing huge natural gas resources and transportation networks. The financial requirements for both pipeline construction and E&P activities are huge. As shown above, the total investment for three pipelines from Russia to China will cost about $20 billion. By 2006, the investment on Chinese section of the pipelines from Sakhalin and Western Siberia will be approach $10 billion while, by 2010, the Chinese section of the pipeline from Irkustzk to Rizhao will cost $2.28 billion.

- Market Risk. China, South Korea and Japan have seen a growing demand for cleaner

energy in the past. Gas markets in these countries are under development. Japan, South Korea and China still suffer from market segmentation, infrastructure bottlenecks and distribution problems. It is estimated that about $36 billion is needed for de-bottlenecking the imbalance of the gas market in China. The Chinese north and northeast regions may lag behind in development of the local distribution system, reform pricing and taxation of natural gas. They may not be ready in time to receive supplies from costly pipelines.

- Political Risk. Bilateral relations are problematic in particular. Social stability in Russia is a big concern. The Russian federal government is in a difficult position to maintain political stability and ensure loyalty of local authorities in Eastern Siberia and the Far East. The data from the *Universe Information* indicates Russian local economic and political risks. Eastern Siberia and the Russian Far East are considered to be high-risk areas (Table 19) as indicated below.

Table-19 Risk Assessment for Russia

| | Internal economic risk | External economic risk | Social political risk | Mixed risk |
|---|---|---|---|---|
| North | 5.7 | 6.3 | 5.98 | 5.78 |
| Northwest | 5.8 | 6.1 | 5.8 | 5.72 |
| Central | 5.9 | 3.2 | 5.47 | 4.68 |
| Volga | 6 | 7.1 | 6.41 | 6.29 |
| Central Blackearth | 5.7 | 6 | 5.59 | 5.55 |
| Povolzh'ye | 5.35 | 4 | 6.1 | 5 |
| North Caucasus | 6.85 | 7.1 | 6.51 | 6.51 |
| Ural | 6.05 | 6.2 | 6.58 | 6.1 |
| W. Siberia | 5.45 | 5.2 | 6.3 | 5 |
| E. Siberia | 5.85 | 7 | 6.12 | 6.15 |
| Far East | 5.5 | 5 | 6.14 | 5.44 |
| Kaliningrad | 6 | 7.9 | 5.81 | 6.33 |
| Russia | 6.7 | 5.15 | 6.8 | 6.22 |

Source: Universe Information, 1996

Politically speaking, China plays a key role in maintaining regional stability and security. It is a fact that Chinese growing energy demand and its search for the outside sources could fuel competition in the region. Sino-Russian cooperation will act to counter-balance strength of the western/US hegemony in the region.

The risk of conflict on the Korean peninsula is another uncertainty. An economic collapse in North Korea may be possible and could be dangerous. However, there are some levers for China, Japan or the US to compel North Korea to a more peaceful path.

## GEOPOLITICAL IMPACT

China, Russia, Japan and the West have considerable economic and political interests at stake in Northeast Asia, and will vie for their stakes in many ways. To meet rising

demand, China has plans to build a threefold energy bridge to enhance regional oil and gas linkages:

- Sino-Middle East oil cross investment[6], which embraces the existing oil import sources and the future energy cooperation with them.
- China-Central Asian oil and gas links, by which China could move westward and join E&P activities in Kazakhstan and other Caspian sea littoral states[7].
- Sino-Russian energy connection is dedicated to enhance Sino-Russian industrial cooperation and political partnership in the 21st century[8].

The three energy linkages will play a complementary role in securing Chinese cooperation with energy suppliers. The natural gas in the FSU is particularly interesting to Beijing. However, China does encounter high risks and uncertainties around these energy linkages with the outside world given the current geopolitical environment.

It was the author's early judgment that China would use Central Asia as its overseas strategic base for its geopolitical and economic stakes and link Russian resources and the Persian Gulf in the future (Xu, April 1998). Taking new realities into account, China will begin by emphasizing its current and future oil imports from the Middle East and thereafter, focus on Eastern Siberia and the Russian Far East while maintaining its early forays into Central Asia.

In Northeast Asia, China acts as an important land bridge for Japan and South Korea for oil and gas from either Central Asia or Russia. As a major exporter, both Russia and Central Asia recognise China as a major player in the geopolitical balance of power in East Asia. Because of Beijing's importance in this regard, Moscow has pursued a strategic partnership with China and is responding positively to Chinese initiatives starting around 1996.

Improving Sino-Russian relations are driven by mutual political interests. After the US led NATO bombing of Kosovo, Sino-Russian political closeness became more important to Beijing. On August 25th 1999, before taking part in a five-nation summit in Kyrgyzstan, Chinese President Jiang Zemin met Russian President Boris Yeltsin. The two leaders signaled their desire to forge a closer "alliance" to counterbalance U.S. global power. In December 1999, Yeltsin and Jiang met again on security issues in Beijing prior to President Yeltsin's resignation. Industrial and military cooperation is planned as the core component of the "alliance."

Russia has placed conditions on its energy cooperation with China while China is

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[6] See the author's paper Sino-Arabic Oil Cross Investment on request.

[7] See the author's paper China-Central Asian Oil and gas Linkages sponsored by the James Baker Institute III for Public Policy at Rice University under the grant of Center for International Political Economy in April 1998.

[8] The author's paper on Sino-Korean Gas Cooperation on Russian Gas Importing (in Chinese), Korean Studies, CASS, October 1999.

facing competition and other uncertainties such as the economic weakness and political uncertainties in Russia and Russian Far East. So far, a Sino-Russian strategic partnership has been limited to political intent and diplomatic events rather than actual industrial cooperation. China has not yet made a commitment but is waiting to assess availability of resources and feasible options of the gas transportation from either Russia or elsewhere.

The US, Japan and the EU have placed great emphasis on diversifying away from the Middle East. Japan has taken active investment steps in FSU as addressed in the first section. Statistically, the US has heavier investments in Russian Far East and Central Asia than other western countries (NIS/Tacis, 1999). American input in Central Asia and the Caucasus region aims to mitigate Russian dominance, both economically and geopolitically.

However, given the changing geopolitical picture in Northeast Asia, the US would be better advised to initiate positive strategic dialogue and strategically engage instead of trying to contain China and Russia in the region. As China and Russia move into closer political cooperation, the US and Japan will have to deal more carefully with major conflicts in the region including Korean Peninsular issue, military confrontation and territorial disputes.

The bilateral relationships between China and Russian, the US and China, and China and Japan and South Korea are directly intertwined. China and Russia have reevaluated and repositioned themselves to allow for fuller cooperation[9]. The Kosovo conflict brought the two countries closer together than ever. Under the enhanced political cooperation, energy, hi-tech, forestry development, along with military cooperation, have become key initiatives to echo the political "alliance." Sino-Russian energy cooperation is not a strategy to "contain" other countries, however. Rather, China would like to coordinate its energy cooperation with Russia to take into account the energy requirements of other major players in order to derive the best possible geopolitical outcome.

With strong interests in Asia, the US should recognize both Chinese and Russian roles and Sino-Russian "alliance" against any unipolar world order. Russian energy exports to East Asian markets are in the direct interests of not only China, but also US allies Japan and South Korea.

Cooperation among China, Russia, Japan and the US on energy matters can be used to ease potential conflicts with Russia and China in light of the US-Japanese security alliance. Japan will reap directly from energy cooperation. As the remaining superpower, the US has to reposition its relationship with Japan, South Korea and North Korea as well to fit the changing realities in the region. Japan and South Korea also have to actively cooperate with the US, China, and Russia. Overall, a strategic engagement among China, Russia, the US and Japan will play a critical role in Northeast Asian

[9] Li, Jianyie. An Analysis on Sino-Russian Strategic Partnership. E. European and Central Asian Studies, No. 2 1997.

regional energy cooperation. Given their geographical importance, it might also be necessary to involve Mongolia and North Korea.

## CONCLUSIONS

Russia is the largest natural gas producer with 32.9 percent of world's gas reserves and 24.3 percent of the world's gas production. More importantly, Siberia and the Russian Far East are located in the *Petroleum Heartland* (Xu, June 1997). As a result of the changing energy world, the importance of Sino-Russian energy linkages is becoming critical not only to China but also to Japan, the Koreas, Mongolia and other countries in Northeast Asia. These linkages are important to diversify energy supplies, mitigate air pollution, and maintain regional cooperation. This cooperation will greatly cement the Sino-Russian strategic partnership and contribute to the stability in Northeast Asia as a whole. Accordingly, the US, Japan, Russia and China have to re-evaluate their own positions in the region and cooperate to reap from the stability in the future.

### *1. Prospects for Sino-Russian Gas Connections*

Based on the analysis in the paper, the author gives an optimistic view on future cooperation, because both China and Russia have solid economic and political reasons to promote, and even to prioritize, the energy cooperation in the fifth prime-minister meeting in the first half of 2000. Specifically, two scenarios could result:

1. Natural gas transportation route from Irkutzk + Sakha to China would be confirmed if Russia could coordinate its local inter-governmental affairs in its Far East. This is a longer term view considering the current situation in Russia; otherwise,
2. An enhancement of gas E&P investment, plus transportation from Eastern Siberia to China, would be integrated if a consortium including China, Japan and South Korea could be formed in the near future.

### *2. Strategic Choices*

The two scenarios have different economic and geopolitical outcomes. China, Russia, Japan and the US, along with other countries involved, have to make their strategic choices to cope with the inherent uncertainties.

It is in Chinese and Russian strategic interest to maintain and to enhance Sino-Russian strategic partnership. Sino-Russian summit and the meeting of the prime ministers are key channels to propel strategic coordination regularly. Both countries' energy companies and local governments are encouraged to cooperate.

China has to accelerate its eastbound natural gas transportation in the coming five years. In this regard, foreign investments in the Chinese gas sector (especially gas infrastructure construction) are encouraged. For example, Enron has concluded a contract with CNPC to construct a gas pipeline from Zhong County in Central Sichuan to Wuhan. Exxon has also express its interests in developing the gas market in northeast China. Meanwhile, Shell signed a gas E&P contract with CNPC to develop gas resource in Ordos basin in September 1999. China has to be ready to improve its all-around relationships with neighbors in general, and with Russia, Japan and the US in particular,

for stable and sustainable energy cooperation in the region.

## Acknowledgements

This paper was commissioned by the James A. Baker III Institute for Public Policy at Rice University, under the grant from the Center for International Political Economy. Ms. Amy M. Jaffe (a Senior Energy Analyst) and Mr. Jason Lyons with the Baker Institute offered their valuable advice and editing assistance. Some ideas were developed when the author made exchanges with Prof. Guoyu Li (a Senior Geologist of CNPC and Academician of Russian Academy of Sciences) and Mr. Zhengshe Hang (a Research Fellow of CASS). However, opinions expressed, and any errors and omissions, are entirely the responsibility of the author. The author can be reached at xuoffice@email.com.

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# 1. CONVERSION TABLE

| | 1 barrel of equivalent | 1 cubic meter of gas | 1 ton of oil | 1 cubic feet of gas |
|---|---|---|---|---|
| 1 barrel of equivalent | 1 | 159 | 0.1353 | 6,000 |
| 1 cubic meter of gas | 0.0063 | 1 | 0.0009 | 35.315 |
| 1 ton of oil | 7.389* | 1174.9087 | 1 | 41491.8990 |

* Assuming an API gravity of 34

Currency exchange rates: USD 100 = RMB 827

## 2. ABBREVIATIONS

| | |
|---|---|
| DPRK | Democratic People Republics of Korea |
| PNG | Pipeline natural gas |
| LNG | Liquefied natural gas |
| CNPC | China national Petroleum Corporation |
| CNEC | China national Electricity Corporation |
| OPEC | Organization of Petroleum Exporting Countries |
| FSU | Former Soviet Union |
| LPG | Liquefied petroleum gas |
| E&P | Exploration and production |
| R/P | Reserve versus production |
| TMD | Theater missile defense |
| NATO | North Atlantic Treaty Organization |
| KEDO | Korean Energy Development Organization |
| KPDC | Korean Petroleum Development Corporation |
| SDPC | State development and planning commission |

## 3. TERMINOLOGY

**R/P ratio** is a ratio of reserves versus production reflecting the lifetime of the production in terms of the current proven reserves and production pace.

**Oil/Gas ratio** is a ratio of oil output versus gas output indicating the degree of dependency on oil or gas.

**Demand Crescent** refers to the growing demand belt along Asia-Pacific rim. To meet the huge demanding belt, almost all consumers within the Crescent are questing for bulk energy imports from the outside sources.

**Petroleum Heartland** refers to a great geographical girdle ranging from the Magreb, the Persian Gulf, the Caspian Sea, Siberia and Russian Far East where there are over 70 percent of world gas reserves and 68 percent oil reserves. Since the fall of the FSU and end of the Cold War, the hydrocarbon provinces in the mentioned regions are increasingly integrated in terms of exploration, exporting and pricing.

**The Eastbound Natural Gas Transportation** is Chinese master plan to construct its east-western transportation infrastructure by moving natural gas resources from Sichuan basin in southwest, Qinghai and the Tarim basin in West China to several consuming centers in Central China and the Yangtze River Delta region.

**Regional Energy Linkages** is a term reflecting interdependency, or cross investment between energy resources and major consuming markets in Eurasia. It is a core idea of the author that the regional energy linkages would be more critical than single country specific approach in the post-Cold War era and a better way to fit the new realities we are facing today and in the future.