



Pipeline Gas Introduction to the Korean Peninsula

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Summary

- Energy cooperation on the Korean peninsula is now a real possibility after the historic North - South Korea Summit in June 2000. However, it will only be possible after a political settlement of the current nuclear crisis.
- The introduction of a natural gas pipeline on the Korean peninsula will be more than a symbolic gesture. It could serve as part of the political settlement package, and could help ease North Korea's energy shortage.
- There are three major natural gas supply sources in the Russian Federation – Irkutsk region Kovykta gas, the Sakha Republic Chayandgas, and Sakhalin Islands offshore gas fields. The frontrunner is Kovykta gas, since the feasibility study of the project is already done. However, there is considerable uncertainty due to Gazprom's resistance to the Kovykta gas pipeline route.
- Korea Gas Corp has recently decided to pursue a long-term LNG supply, rather than a pipeline gas introduction in 2008. The Ministry of Commerce, Industry and Energy decided to allow Korea Electric Power Corp to pursue a 5.7 mt/y LNG supply independently. If these LNG supply contracts are signed as announced, it will eradicate the pipeline gas market at least 4-5 years and consequently a significant delay to the pipeline gas introduction will be inevitable.
- Despite these problems, it is not a question of if but when pipeline gas will be introduced into the Korean peninsula. If Gazprom changes its stance towards Kovykta gas and agrees to pursue the earliest pipeline gas supply to China and Korea, the earliest introduction will be between 2010 and 2012. If Gazprom fails, however, to make a compromise on its plan of directing the gas pipeline to Nakhodka, the earliest introduction will be closer to 2020, as the LNG expansion in the region will not save a large proportion of the gas market for the pipeline gas easily.
- The development of a pipeline network will lay the ground for cooperation between the regions' key actors, furthering the chances of a Northeast Asian Energy Treaty or Community being established in the coming decade.

1.1. Pipeline Gas Supply Sources for the Korean Peninsula

Until the end of the Cold War, the concept of developing a trans-national pipeline network in Northeast Asian region was a mere pipe-dream. It was inconceivable to have a long distance pipeline from Russia to Korea or Russia to Korea via China. However, the establishment of diplomatic relations between Former Soviet Union (FSU) and Korea in September 1990 and China and Korea in August 1992, opened a new chapter for energy cooperation in the region.

When China's energy self-reliance policy virtually ended in 1993, the trans-national pipeline concept was looked at afresh. PRC energy planners took the proposal seriously, and the concept was well thought of by Dr. Wang Tao (then president of China National Petroleum Corporation), particularly when it appeared in June 1996, as part of the proposal to establish a Pan-Asian oil and gas pipeline grid covering Russia, Japan, Korea and central Asian Republics.

During the first half of the 1990s, Japan carried out a comprehensive study of the potential for Russia's oil and gas supply into Northeast Asia. The study identified a number of major oil and gas export sources, including the Yurubchonskoye oil field in the Krasnoyarsk region, Verkhechonskoye oil field in the Irkutsk region, Talakanskoye and Sredne-Botuobinskoye oil fields in Sakha Republic, Kovyktinskoye gas field in the Irkutsk region, and a cluster of gas fields in Sakha Republic (at that time the Chayandinskoye field reserves were only 200bcm).¹

In Northeast Asia there are currently six pipeline gas supply sources targeting mainly China, Korea and Japan. As shown in Table 1, the Russian Federation has four gas supply sources for China, and in the central Asian Republic region there are two gas supply sources. There are three major pipeline gas supply sources for the Korean Peninsula.

In recent years it has been China that has been driving the introduction of a trans-national pipeline in Northeast Asian region. Despite ten years preparation and negotiations, agreement on the pipeline have been prevented by geopolitical tensions and the expense involved. In the meantime, the decision to supply LNG into both Guangdong and Fujian provinces introduced LNG to China. When the breakthrough comes, trans-national pipeline development will bring a new dimension to the Korean Peninsula and Northeast Asian region's energy structure. The implications of a long distance pipeline development will be broad in scale, since they will not be confined to the Korean Peninsula.

¹ Energy Research Institute of the Russian Academy of Sciences and Institute of Energy Economics, Japan, Study on Comprehensive Energy Plan in East Siberia and Far East of the Russian Federation: Second Phase Executive Summary, September 1995.

Table 1 - Main gas supply sources for Northeast Asia

Region	Field (Licensed Company)	Reserves (C1+C2)
Sakhalin Islands	Odoptu, Chaivo, Arkutun-Dagi (Sakhalin I project) Piltun-Astokskoye, Lunskoye (Sakhalin Energy Investment Corp)	485bcm + 307 mt
		800bcm + 185 mt
Irkutsk	Kovyktinksoye (Russia Petroleum) Verkhnechonskoye	1,932bcm + 90 mt condensate + 2.3bcm helium
		280 mt
Republic of Sakha*	Chayandinskoye (Sakha Republic Gov)	1240bcm + 50 mt
	Sredne- Botuobinskoye (Sakhaneftegas)	171bcm
	Taas-Yuriakskoye (Sakhaneftegas)	114bcm
	Talakanskoye (Surgutneftegas)	124 mt + 50bcm
Krasnoyarsk**	Yurubchonskoye (Yukos)	282 mt + 374bcm + 29 mt condensate
	Kuyumbinskoye (Slavneft)	154 mt
	Sobinskoye (Gazprom)	159bcm
West Siberia	Palkliahinskoye, Bolshehetskaya (Gasprom)	3,021bcm, of which C1 751bcm, C2 596bcm, and C3 1,203bcm
Kazakhstan	Karachaganak (BG-Agip-Exaco)	1,300bcm
Turkmenistan*		9.2 tcm in-place, of which 4.6 tcm proven
	Shatlyskoye Dayletabad	roughly 1,000bcm recoverable (est) 1,380bcm recoverable

Note:

- * As of 2002, the estimated recoverable oil and gas reserves in Sakha Republic are 2.39 billion tonnes of oil, 9,420bcm of gas, and 409m tonnes of condensate respectively.

** The geological oil and gas reserves of Yurubchen-Tokhomszkaya area composed of Yurubchen, Kuyumbinskoye, and Tersko-Kamovskoye fields stand at 1.2 billion tonnes and 1,000-1,200bcm respectively.

- * Besides the above mentioned, the gas fields like Bagadzhin, Kirpichlin, Naipskoye, and Gugurtlinskoye record over 100bcm gas reserves.

1.1.1. Irkutsk gas export to the Korean Peninsula

The year 1992 witnessed two major initiatives by the China National Petroleum Corporation (CNPC) with regard to pipeline gas imports. The first involved East Siberian oil and gas development and their export to China. In July 1992, Professor Zhang Yongyi, then vice president of CNPC, proposed the export of oil from East Siberia to Russia and Japan. Prof. Zhang added that the oil pipeline could be extended to Japan via Korea if Japan got involved in the project. The second initiative was the importation of Central Asian gas into China. This was proposed by CNPC together with Mitsubishi at the end of 1992.

During 1993-1994, CNPC identified the Kovykta gas project in the Irkutsk region as the priority project for the trans-national pipeline development between Russia and China, and in November 1994 a memorandum of understanding (MOU) was signed between CNPC and Mintopenergo for the construction of a long distance pipeline to promote East Siberian oil and gas resources. The 1994 agreement was the first official expression of shared determination for the pipeline development. The trans-boundary pipeline, proposed by Sidanco, then the major Russian share holder, aims at transporting 20-30bcm annually from the Irkutsk region in East Siberia to the coastal cities of East China, and possibly to Korea and Japan.

In September 1993, CNPC began to negotiate with the Russians for exploration rights for the Markovskoye and Yaraktinskoye oil and gas fields in the Irkutsk region.² CNPC's Russian counterpart was Irkutsk's Petroleum and Gas Geological Company and Geophysical Research Institute, together with 14 other local companies and entities. CNPC's two exploratory wells were drilled in two virgin fields.³ As a result of this initial investigation, CNPC understood the potential of Kovykta gas exports to China.

Another major agreement was made in late June 1997, when a Russian delegation led by Premier Viktor Chernomyrdin, visited Beijing and signed a governmental framework agreement between Russia and China to export natural gas and electricity from East Siberia to China. Under the deal, Russia would export 25bcm/y of gas over thirty years, from the Irkutsk. \$1.5bn worth of electricity will be exported over 25 years, based on a supply of 20 billion KW/h of electricity from Irkutsk to either Shenyang, Liaoning province or to Beijing. This framework agreement is effectively a re-confirmation of the 1994 MOU.

The most important agreements were signed in February 1999 after the fourth meeting between Premier Zhu Rongji and his counterpart Yevgeny Primakov. Both sides signed 11 agreements, of which three are related with oil and gas.⁴

² These two fields are located between Kovyktinskoye and Verkhnechonskoye fields.

³ Keun-Wook Paik, 'Energy Cooperation in Sino-Russian Relations: The Importance of Oil and Gas', *The Pacific Review*, vol. 9, no. 1 (1996), pp. 77-95.

⁴ Keun-Wook Paik, 'Sino-Russian Oil and Gas Cooperative Relationship: Implications for Economic Development in Northeast Asia', presented at Northeast Asia Co-operation Dialogue XIII: Infrastructure and Economic Development Workshop', organised by Institute for Far Eastern Affairs, Russian Academy of Sciences, and Institute on Global Conflict and Co-operation, University of California, Moscow, October 4, 2002.

- The first was for a preliminary feasibility study for crude oil exports from Angarsk to Daqing through a 20-30 mt/y capacity pipeline.
- The second was for a feasibility study on natural gas exports from the Irkutsk region to north-eastern China through a long distance pipeline.
- The third was for a preliminary feasibility study on gas exports from western Siberia to Shanghai by a trans-national pipeline passing through the Xinjiang region.

Based on this 1999 agreement, a three-year study by the parties (CNPC, Korea Gas Corp and Russia Petroleum) was undertaken in November 2000 and the results were submitted in November 2003.

Kovykta Gas Development⁵

The ten years preparation period for the Kovykta gas project can be divided into five stages as Table 2 explains.

Table 2 - The five stages of the Kovykta Project

1994-1996	This period is characterised as 'bilateral relationship development period' between CNPC and Mintopenergo.
1996-1997	This is the first stage for the western investment, initiated by Korea's Hanbo group and then by BP's serious move.
1998	This is the negotiation period for 'five country FS work' (Had it hammered out a compromise, it would have opened the door for the genuine multi-lateral cooperation era' in Northeast Asia). The driving force of this negotiation was Japan, but its initiative to lend a major loan for the FS work was not supported due to its failure to open their gas market for the development.
1999-2000	The focus is once again on bilateral relationship between Russia and China until the three party FS work agreement is signed.
2000-2003	Both Russia and China agree to invite South Korea to the project, to minimize the risk of market availability in the early stage of the project. Even though the official agreement for the feasibility study of the Irkutsk gas project was signed in November 2000, the negotiation was suspended for at least 7-8 months due to a number of unresolved issues since Autumn 2001. The negotiation resumed in Summer 2002. The result of the FS was completed in November 2003.

Source: Keun-Wook Paik, 'Sino-Russian Oil and Gas Co-operative Relationship: Implications for Economic Development in Northeast Asia', presented at Northeast Asia Cooperation Dialogue XIII: Infrastructure and Economic Development Workshop', organised by Institute for Far Eastern Affairs, Russian Academy of Sciences, and

⁵ Some work had been done before 1994 when the memorandum was created for the development of East Siberian gas development between CNPC and Mintopenergo (the Russian Ministry of Fuel and Energy). In 1991 Baikalekogaz consortium and BP/Statoil alliance conducted a study on East Siberian oil and gas resources in East Siberia in the early 1990s, but BP/Statoil concluded that the study had no incentive for taking further steps, due to the lack of immediate market for East Siberian oil and gas export. In 1992 the Baikalekogaz consortium was converted into Russia Petroleum. The same year Canada's SNC and Lavalin, under the sponsorship of Canadian Bitech Corp., carried out a pilot feasibility study on the Irkutsk region's gas supply project based on Kovyktinskoye development.

Institute on Global Conflict and Cooperation, University of California, Moscow, 4 October, 2002.

The Kovyktinskoye gas/condensate field discovered by Vostsibneftegasgeologiya, a subdivision of the former Ministry of Geology of Russian Federation, is located in the Zhigalovsky region, 350 km to the north-northeast of Irkutsk.

Table 3 - Kovykta Gas

Field size	7,499.5 sq km
Depth of Occurrence (along the vertical)	2,838 – 3,388 metres
Pay Thickness	Up to 78 metres
Effective Thickness	Up to 29 metres
Sandstone Porosity	10-19%
Gas Saturation	0.6 – 0.9
Formation Pressure	25.7 MPa
Reservoir Temperature	55 degree C
Condensate Content	67.0 g/cu.m
Content of CH4 in gas	90.3 moles / %
Reserves (as of early 2003)*	1,931.6 tcm + 90 mt of condensate + 2.3bcm of helium

Note: On 28 February 2000, the Federal Geological Committee confirmed that Kovykta's C1+C2 reserves are 1,120bcm. If the adjacent Khandinsky and Yuzhno-Ust-Kutsky blocks' 280bcm are included, the total will be 1,400bcm.

* On March 15, 2002, the 1,932bcm (of which C1 1,100bcm +C2 754.7bcm) reserves registered by Central Commission for Reserves of Russian Federation Ministry of Natural Resources.

Source: Russia Petroleum Investor

When the project was initially introduced to the western world, the proven reserves of the field stood at 870 bcm, of which C1 was only 277 bcm. However, as of 2002 the figure became 1932 bcm, of which C1 was 1,000 bcm. The scale of the proven reserves was large enough to justify a major export scheme.

The turning point of the Kovykta project development was BP's acquisition of a 45% equity stake in Russia Petroleum, achieved by providing \$172m to the cost of appraising the Kovykta field. BP's involvement helped accelerate the exploration, which confirmed the real scale of the proven reserves.

The project's three-year feasibility study was completed in November 2003. The main objective of the study was to show whether gas supply to China and Korea would be effective and commercially viable. The study assumed that Russia Petroleum would sell 600bcm of gas (20bcm/y) to CNPC and 300bcm (10bcm/y) to Korea Gas Corp (Kogas) over 30 years. The supply would start in 2008, reaching 30bcm/y by 2017. The study called for up to 4bcm/y of gas to be supplied to Irkutsk, Chita and Buryatia regions. The required investment for the project would total \$17bn, much higher than the \$12bn price tag suggested in 1995.

About 400-500 wells with average depth of 3,000 meters would be needed to develop the Kovykta field. The project includes the construction of nine gas treatment plants, 20 compressor stations and 20 collection stations. Russia's projected demand for the Kovykta gas was 4bcm, while that of north-eastern China and northern China was 12bcm and 8bcm respectively, and that of Korea were 10bcm per year.⁶ The next step was to obtain the approval of the governments involved.

If the project was approved by all three governments, its value would soar. In 2003 the biggest share holder is BP-TNK, with a 62% controlling stake, as table 4 shows. It is worth noting that Interros Holdings Company's 25.8% stake was put on sale for approximately \$500m soon after the feasibility work was completed. However, the most important players that will decide the fate of the project – Gazprom and CNPC – did not make an offer.⁷

Table 4 - Russia Petroleum's shareholder structure, 2003

<i>Shareholders</i>	<i>Equity %</i>
BP	33.39
TNK	29.03
Interros	25.82
Irkutsk State Property Committee	11.24

Source: Interfax Petroleum Report

A number of issues need to be resolved for this project to move forward:

1. Who should co-ordinate the negotiations? There has been considerable confusion about the role of co-ordinator. Gazprom argues that it has a mandate from Russia's central government to co-ordinate gas export projects.⁸ In fact, during a keynote speech at the 22nd International Gas Conference held in Tokyo in June 2003, Alexei Miller, CEO of Gazprom, confirmed that Gazprom had been authorised to co-ordinate the establishment of a united system for gas production and transportation.⁹ However, his talk did not give any details about how Gazprom would approach its coordinating role.

TNK-BP understands that Gazprom's commitment is vital for the project's implementation. Industry officials have said recently that Russia is considering changing the source of the gas supply to China and South Korea, using gas from the Republic of Sakha instead of Kovykta. In January 2004, Gazprom said there were 'numerous violations' in the Kovykta's exploration and development license that would have to be resolved before it would participate. Gazprom has an outstanding offer to join the project from all the shareholders. Vekselberg, TNK-BP managing director, said Gazprom "is a little afraid to lose its position (as the gas export monopoly), but we don't want to change

⁶ Alastair Ferguson, 'Kovykta Project' presented at an International Seminar on Policies and Strategies toward Korea-Russia Energy Co-operation organised by Korea Energy Economics Institute, Vladivostok, October 7, 2003.

⁷ Whatever suggested or reported, author's view is that Gazprom aims at securing a blocking stake, that is 25% plus one share eventually.

⁸ Interfax Petroleum Report, June 3-9, 2004.

⁹ Alexey B. Miller, 'Eurasian Direction of the Russia's Gas Strategy' presented at 22nd World Gas Conference.

anything." He said it might be possible to find an arrangement that would allow Gazprom to participate without taking an equity stake.¹⁰ 'We're ready to organise gas exports through Gazprom,' he said, noting that while Gazprom could have 'operational control' it would not have absolute control.¹¹

Considering that Gazprom has agreed to make a swap deal with Shell for its positioning in Sakhalin II's LNG project,¹² there is a possibility that TNK-BP might do the similar deal with Gazprom to minimize the entry time of pipeline gas to Northeast Asian region. Gazprom strongly indicated that the gas export source for China and Korea could be the Chayandinskoye field rather than Kovykta field.¹³ Gazprom knows too well that the Chayandagas project is not ready for immediate export, and a compromise between TNK-BP and Gazprom is a very likely possibility.

2. The pipeline route. During the third meeting of the coordinating committee for managing the Kovykta feasibility study, China asked that the western route of the gas pipeline (the Mongolian line) should be rejected. China seems to prefer the eastern route because:

- China prefers to minimize the political risks involved in transiting through Mongolia.
- The economic benefits brought by the pipeline could make the Mongolians suddenly richer than inhabitants in China's Inner Mongolia.
- China would be able to channel some of the economic benefits of the pipelines to its Northeast region, areas in desperate need of economic stimulus.

The Mongolian route is the most economic for each of the parties due to the easy terrain and relatively short distance to the main gas market. However, the discovery of the Sulige-6 field in the Ordos Basin provided the opportunity for the Chinese planners to reconsider their stance towards the Mongolian route. Sulige gas was good enough to be the main gas supplier for Beijing and Tianjin areas in the short term. The elimination of the Mongolia route was a serious blow to South Korea, since the cost of either eastern route meant that the pipeline could not be as competitive as LNG shipped into Guangdong and Fujian provinces.

¹⁰ Gazprom could, for instance, buy shares in Russia Petroleum from the regional government and Interros, which own respectively 10.78% and 25.82% of the company. Interfax Petroleum Report, April 16-22, 2004.

¹¹ Dow Jones China Energy Report, April 23rd 2004.

¹² Moscow Times, Nov 29, 2004.

¹³ Alexey M. Mastepanov and Victor P. Timoshilov, 'Perspectives of Development of Eurasian Gas Pipeline System and Energy Resources of Northeast Asia: Gazprom's Point of View', presented at International Conference on Northeast Asian Natural Gas and Pipeline : Multilateral Co-operation, organised by Northeast Asian Gas and Pipeline Forum, and Asia Gas & Pipeline Co-operation Research Center of China, Shanghai, March 8-10, 2004.

Table 5 - Proposed Pipeline Routes

Mongolia Route	Manzhouli Route I	Manzhouli Route II
Kovykta - Irkutsk – Ulan Bataar – Beijing – Shandong Peninsula – Yellow Sea – Pyeongtaek	Kovykta – Irkutsk – Manzhouli – Harbin - Shenyang – Shinuiju – Ilsan – Pyeongtaek	Kovykta – Irkutsk – Manzhouli – Harbin – Shenyang – Dalian – Yellow Sea – Pyeongtaek
3,819 km , of which - 1,027 km in Russia - 1,017 km in Mongolia - 1,490 km in China	4,065 km , of which - 1,850 km in Russia - 1,879 km in China	4,249 km , of which - 1,850 km in Russia - 1,659 km in China

Source: Ministry of Commerce, Industry and Energy (MOCIE), Korea

South Korea's preference is the Manzhouli II route since it would bypass North Korea, and the construction and maintenance costs would be cheaper than Manzhouli route I.¹⁴ However, a recent report has suggested that Gazprom does not support this route. During a Moscow meeting with Kogas in early August, Gazprom confirmed that the route towards Nakhodka and then a sub-sea pipeline to South Korea is being seriously considered. This route would bypass China, and the project would target Korea as the main buyer.¹⁵ It is worth noting that Gazprom's confirmation on the Asia-Pacific direction export route was made soon after China's decision to terminate the negotiations with western energy firms – Shell, ExxonMobil and Gazprom consortium – for the WEP (West-East Pipeline) project.¹⁶

3. The price of the gas. It will be the city gate price of the imported gas that will decide the fate of this Kovykta project, and difficult negotiations are continuing. The Russians want a \$100/1,000 cm price, but eventually a compromise price is likely to come down to the range of \$70-80/1,000cm, considering that Russia's Energy Strategy 2020 envisages the domestic gas price will reach to \$ 40-41 / 1,000 cm by 2006, and \$ 59-64 / 1,000 cm by 2010.¹⁷ The Chinese would like the gas to be priced at \$20-25/1,000cm, since consumers in North-eastern China cannot afford to pay more. According to Gazprom's calculations, the production cost alone is \$30/1,000cm, while transportation will cost at least \$30/1,000 cm, excluding tax and a profit margin. Gazprom is unsure whether China could accept even the price of \$70/1,000cm.

¹⁴ At a parliamentary hearing in late September 2003, Kogas president Kang-Hyun Oh said that the cost of pipeline gas passing through the DPRK would be 1.8 times more expensive than that of the Yellow Sea line, assuming the gas supply period was 30 years. He added that the timing of pipeline gas supply could be delayed from 2008 to 2010-2013. *The Gas Industry News*, 30 September 2003.

¹⁵ Dong-Ah Ilbo, 5 August, 2004. Interestingly, the route that would bypass China is strongly supported by Prof. Tai-Yoo Kim, former advisor to the president. In fact he highlighted this point in the Korea Leader's Forum on 'Next Generation Growth Drive and Energy, What is the issue?', held in Seoul on July 15, 2004. See, Choong-Ang Ilbo, July 16, 2004.

¹⁶ Hoyos, Carola and McGregor, Richard, 'PetroChina ends talks on pipeline' *Financial Times*, 4 August, 2004.

¹⁷ In fact, the Russian side indicated that it was prepared to see gas for US\$ 75 / 1000 cm as minimum. See *Russian Petroleum Investor*, March 2003, P. 52.

The real pressure on the price comes from the Guangdong and Fujian LNG price secured by China in August 2002, a breakdown of which are shown in tables 6 and 7. CNOOC initially projected that China would pay an LNG price of \$3.84/mmbtu. However, this figure is over \$1.0/mmbtu higher than the price agreed for Tangguh in Indonesia. According to interviews with industry and financial sector specialists, the LNG price delivered to China will be as low as \$2.5/mmbtu; even after regasification.

Table 6 - An estimated breakdown of the LNG price

	<i>BP Indonesia</i>	<i>ALNG</i>	<i>Qatar</i>
Wellhead gas costs	0.60-0.80	0.65-0.95	0.55-0.75
Liquefaction costs	0.45-.065	0.40-0.60	0.40-0.60
Transportation costs	0.45-0.65	0.65-.085	1.00-1.10
Regasification costs	0.30-0.60	0.35-0.55	0.40-0.60
CIF cost	1.80-2.70	2.05-2.95	2.35-3.05

Unit: \$/mmbtu

Source: HSBC, quoted by China OGP, vol. 10, no. 16, August 15th 2002.

Table 7 - LNG price for a 6mt/y supply initially calculated by CNOOC

	<i>Rmb/cm</i>	<i>US\$/mmbtu</i>
Receiving station price	1.176	3.838
Gasification cost	0.145	0.473
Average cost of pipeline transportation	0.130	0.424
City gate price (VAT not included)	1.451	4.736
City gate price (VAT included)	1.622	5.294

Source: China OGP

The drop in LNG prices heralded a new era in which Northeast Asia did not have to pay more than other regions. LNG suppliers were very unhappy about this price discount that wiped out the premium which Japan and Korea have paid for a long period.

During the first of half of 2003, the Sakhalin II project announced that a total of 2.8 mt/y LNG would be supplied to Japanese utilities such as Tokyo Electricity, Tokyo Gas, and Kyushu Electricity, starting from 2007. Sakhalin Energy Investment Co (SEIL) refused to expose anything related to the delivered gas price, choosing only to highlight the short distance from Sakhalin Islands to Japan. However, industry sources confirm that the price is about \$3.5/mmbtu. As shown in Table 8, the average LNG price paid by Japan in 2002 was \$4.27/mmbtu. The figure indirectly confirms that less than 20% discount was made.¹⁸ In other words, Japan received some discount from the Sakhalin LNG price, but

¹⁸ ABARE Economics and ERI's joint research report pointed out the average real LNG import price to Japan over the period 1995-2001 ranged from \$3.27 to \$4.84/mmbtu, in 2001 prices. The average price over the period was \$4.02/mmbtu. The report also argued that LNG import prices to eastern coastal China could be marginally (\$0.10/mmbtu) lower than those to Japan. (See, ABARE Economics and Energy Research institute, Natural gas in eastern China: The role of LNG, ABARE Research Report 03.1, p. 7). It remains to be seen whether this projection is accurate.

the scale of discount from the SEIL project is not as considerable as the discount for Australia's Northwest Shelf and Indonesia's Tangguh project for the Guangdong and Fujian LNG price.

Table 8 - Gas price comparison

	<i>Korea CIF</i>	<i>Japan CIF</i>	<i>EU CIF</i>	<i>UK (Heren index)</i>	<i>NBP</i>	<i>USA Henry Hub</i>
1985		5.23	3.83			
1986	2.77	4.10	3.65			
1989	3.30	3.28	2.09			1.70
1991	3.56	3.99	3.18			1.49
1993	3.35	3.52	2.53			2.12
1995	3.37	3.46	2.37			1.69
1996	3.80	3.66	2.43	1.85		2.76
1998	2.83	3.05	2.26	1.92		2.08
2000	5.03	4.72	3.25	2.68		4.23
2001	4.84	4.64	4.15	3.22		4.07
2002	4.24	4.27	3.46	2.58		3.33
2003	-	4.77	4.40	3.26		5.63

Unit: \$/mmbtu

Source: BP Statistical Review of World Energy (June 2004) & MOCIE (2002)

In August 2003 when Indonesia's Tangguh project was chosen as the POSCO & SK's 1.15 mt/y LNG supplier, price was the most important factor. The price reported to the Korean government was as good as the Guangdong and Fujian LNG price. (In August 2004, Kogas decided to invite a bidding for 5 mt/y of LNG for 20 years from 2008 and quite a number of potential suppliers expressed their interest in supplying the LNG. However, no supplier is willing to offer Guangdong and Fujian an LNG supply price due to the combination of strong LNG demand from the United States and high oil prices.)

In the context of low LNG prices, securing a pipeline gas price that is 20-25% cheaper than LNG is simply not possible. Even to secure a pipeline gas price of \$3.0/mmbtu is a very tough target to achieve.

It is also worth noting that China's stance towards Russia's pipeline gas cannot be justified if China's domestic pipeline gas price is considered. In mid-September 2001, PetroChina announced that the average gas price for the West-East Pipeline (WEP) will be Rmb1.327/cm (US \$4.332 / mmbtu). This is a guideline price prepared by the State Development Planning Commission (since renamed the National Development and Reform Commission) for the WEP's 12bcm gas. The guideline price is composed of Rmb0.45/cm (\$1.47) as the wellhead price and Rmb0.877/cm (US \$2.87 / mmbtu) as the transportation tariff.

Table 9 - The West-East Pipeline guideline price by SDPC

	<i>City gate price announced mid-September 2001</i>		<i>City gate price announced in September 2003</i>	
	Rmb/cm	\$/mmbtu	Rmb/cm	\$/mmbtu
Henan Province	1.16	3.786	1.14	3.721
Anhui Province	1.24	4.048	1.23	4.015
Jiangsu Province	1.31	4.276	1.27	4.145
Shanghai	1.35	4.407	1.32	4.308
Zhejiang Province	1.37	4.472	1.31	4.276
Average	1.327	4.332	1.27	4.145

Source: China OGP, Xinhua News Agency & Interfax China Report.

Due to this expensive domestic pipeline gas price, power producers are refusing to sign the take-or-pay contract with PetroChina. The producers are arguing that a price exceeding Rmb1.1/cm is not acceptable.

If the Chinese authorities change their stance and agree to accept the Mongolian route, the pipeline gas price to the Bohai Bay areas could be lower than \$3/mmbtu, and there is a very strong possibility of setting the city gate price in Inchon at \$3.0-3.2/mmbtu.

A pipeline passing through Manzhouli will not offer the kind of price that the Mongolian route can provide, and this pricing issue will present difficulties in the negotiations over the introduction of Kovykta gas into China and Korea. The meeting between Gazprom and Kogas in early August 2004 in Moscow confirmed that Gazprom does not like CNPC's price negotiation strategy and would like to give priority to the Nakhodka export route. Kovykta gas to Nakhodka will be too expensive and a big question will be who will buy the expensive pipeline gas. The most likely possibility is that Gazprom will make a compromise, in order to protect the entry timing of Russia's pipeline gas to Northeast Asian region.

1.1.2. Sakha gas exports to the Korean Peninsula

The initiative to export gas from East Siberia to Northeast Asia came from the Sakha Republic. As early as the 1960s the possibility of Yakutian gas exports to Japan was explored and promoted, but activities were suspended in the wake of the Former Soviet Union's Afghanistan invasion in late 1979. In the late 1980s Korea's Hyundai group revived the forgotten project, and in 1995 the preliminary feasibility study on Sakha gas development, funded by Russia and South Korea at \$10m each, was eventually implemented. However, the outcome of this study was not encouraging, and no further steps were taken.

The conclusion was that Sakha gas exports to Korea were not feasible because of the remote location, harsh environment and poor economic rationale. However, the Sakha Republic now boasts a relatively large proven gas reserve (over 1 tcm), and argues it has enough proven reserves to justify a long distance, trans-national pipeline.

According to Vasiliy Moiseyevich Efimov, then president of Sakhaneftegas, as of 1998 the registered C1 category reserves in the Vilyuisk region (10 fields: 437.8bcm) and

Botuobinsk region (21 fields: 586.3bcm) were 1,000bcm. Besides this, the reserves of Chayandinskoye field in Botuobinsk region were estimated at 755bcm (previously 208bcm), of which 535bcm is exploitable. Already 64 wells have been drilled in the field.

Desperate to become the main gas export source in the region, Sakhaneftegaz has proposed a East-Siberian consortium based in the Irkutsk region, Sakha Republic and Evenki Autonomous region of Krasnoyarsk Krai in 1998. The proposal is supported by Rosneft, the administration of the Chita region, JSC UES of Russia, the administration of the Evenki Autonomous region and Russia Petroleum. Interestingly, Sakhaneftegaz has signed an agreement with Russia Petroleum for the joint development of Kovyktinskoye and Chayandinskoye fields, although the priority will be given to Kovyktinskoye.

At that time, the only way to remove any suspicion on the reliability of the proven reserves scale was to combine both Kovykta gas and Chayandagas. The significance of the proposal lay in the fact that the combined development of the Kovyktinskoye and Chayandinskoye fields would provide proven gas reserves enough to justify a 4000km-long pipeline development.

The combined or hybrid export scheme has two options, even though there is no difference in the pipeline section within the Chinese territory. The first is a 4,961km pipeline, of which the Russian section is 1,960km in length, and the two pipelines from Kovykta and Chayanda fields meeting at Bodajbo (adjacent to the northern tip of the Baikal lake). The second option is a 5,626km pipeline of which 2,2625km is in Russian territory. This second option gives the absolute priority to the Kovykta project as the Chayanda is connected as a back-up supply source.

As Kovykta's gas reserves are large enough to pursue a level of exports of 30bcm/y for 30 years, there is actually no need to make the Chayandinskoye gas field the back-up supply source for the project. The Chayandagas project could be pursued on its own though in terms of preparation, it is far behind the Kovykta project.

However, significant work has been carried out during the last few years. First, on July 26th 2002 Sakhaneftegaz completed a preliminary feasibility study for a gas pipeline that will export gas from Chayandagas to Shenyang.¹⁹ The initial export volume will be 12-15bcm/y and the figure could expand to 20bcm/y later. Second, the Central Commission for Reserves of the Russian Federation's Ministry of Natural Resources approved the revised figure of Chayandagas proven gas reserves as 1,240bcm as of 2002. Thirdly, in October 2002, Gazprom and the Sakha Republic Government signed a framework agreement on forming a joint venture to make a tender bid for a development license for the Chayandinskoye and other fields in the Sakha Republic.

Gazprom's strategic alliance with the Sakha Republic Government has special implications. In early 2002, the Sakha Government reported to the local legislative assembly that Yukos has secured a 47% controlling stake in Sakhaneftegaz (which was originally controlled by Sakha Republic government). Yukos' initiative forced the Sakha Republic Government to be a minor shareholder. The Sakha Republic government's response was to form a strategic partnership with Gazprom, which itself has neglected

¹⁹ This work started based on the agreement signed between CNPC and Sakhaneftegaz in April 1999, soon after the Feb 1999 agreement.

the Kovykta project and became a dominant player in the solely Russian Federation government asset, Chayandagas.

In February 2003, Gazprom chairman Alexei Miller and Rosneft president Sergei Bogdanchikov asked President Putin to instruct the Ministry of Natural Resources and other relevant ministries to consider developing the Chayandinskoye, Talakanskoye, Sredne-Botuobinskoye, Kovyktinskoye and Verkhnechonskoye oil and gas fields under a single project and initiate an auction for it, in accordance with legislation. Putin accepted the proposal.²⁰

In March 2003, the Russian government held its first cabinet meeting to discuss the development of oil and gas reserves in Eastern Siberia and the Far East. During this meeting, the government adopted a draft entitled 'Programme to Establish a Unified System of Production, Transportation and Supply of Gas in Eastern Siberia and the Far East' which outlined possible exports to markets in China and other countries in the Asia Pacific region. Besides this, the government also decided to include the Gazprom-developed programme in the draft 'Principal Provisions of the Energy Strategy of Russia for the Period until 2020'.²¹

Interfax reported in early 2004 that the proposals from the state energy firms, in particular Gazprom, Transneft and Rosneft were being taken very seriously by President Putin.²²

In February 2004, Transneft revealed its revised pipeline plan and won the approval of the Amur region administration, as well as the governments of Khabarovsk and Primorye. Interestingly, the authors of this revised plan ignored the previous plan of Angarsk-Nakhodka line which had a branch line to Daqing.

Transneft's Semyon Vainshtok said it would take a year to draft a new feasibility study of the revised pipeline project, a further year to design it and about four years to build it. The new route begins much further west in Taishet and the distance from the pipeline to Lake Baikal has been doubled. Transneft is no longer considering routes that would send the pipeline south of Lake Baikal. The new pipeline will be 4,130km long, compared with 3,765km for the Angarsk-Nakhodka pipeline, and will be able to transport 56mt/y of oil. The project includes the construction of 32 pumping stations, of which 13 will have oil storage facilities. The route includes 48 river crossings and 115 road and railroad crossings.²³

Besides Transneft's revised plan, the government of the Sakha Republic (Yakutia) along with Gazprom, the Natural Resources Ministry, and Surgutneftegaz have drawn up an alternate route to the Pacific Ocean with oil and gas pipelines in a single corridor.

This route would run from Nizhnyaya Poima (Transneft pipeline system) – Yurubcheno-Tokhonskoye field-Verkhnechonskoye field-Talakan field-Chayanda field-Lensk-Olekminsk-Aldan-Neryungri-Tynda-Skovorodino-Blagoveschensk-Khabarovsk-Vladivostok-Nakhodka. Fields like Kovykta, Dulsimininskoye, and Yarakinskoye would

²⁰ Russian Petroleum Investor, April 2003.

²¹ Russian Petroleum Investor, April & September 2003.

²² Interfax Petroleum Report, March 26 – April 1, 2004.

²³ Interfax Petroleum Report, June 17-23, 2004 ; Russian Petroleum Investor, May 2004.

be linked in later. Thus, a single network would include all the major oil and gas fields in the Yakutia and Irkutsk regions, as well as the Krasnodar territory. The pipeline would stretch for 6,224km.²⁴

The project that combines the oil and gas pipelines was submitted to President Putin at a meeting on the development of Far East transport infrastructure on February 26th 2004 in Khabarovsk. Putin designated the pipeline as being of national strategic interest and told Sakha President Vyacheslav Shtyrov to continue work on the project. President Putin also said that all designs for the pipeline must be included in the documents to be submitted to the government.²⁵

It is worth noting Gazprom's intention to develop the Eurasian gas pipeline system. Prof. Alexey M. Mastepanov, Gazprom argued that "the export of Kovyktinskoye gas will lead to the temporary closure of the Chayandinksoye gas field for the long-term. This will complicate the organisation of gas supplies to the Far East region. As a result the gas fields of Yakutia will lose the market for a long period of time. It will involve a loss of profits for the Russian state. The Chayandinkoye gas field can satisfy the prospective demand of China and Korea, and Gazprom proposes to realise this project starting from 2009-2010".²⁶ If this approach is accepted and supported by Russian authorities, then Kovykta gas export to China and Korea will have no choice but to consider a new route different from the one adopted by the feasibility study.

1.1.3. Sakhalin Gas exports to the Korean Peninsula

In 1991 the Development of Yakutian and Sakhalin Gas and Mineral Resources of Eastern Siberia and the USSR Far East, the so-called Vostok (East) Plan, was announced. The key element of the plan was the construction of a 3230km gas pipeline from Sakhalin across Russian territory through North Korea to South Korea, and a 3050km pipeline from Yakutsk to Khabarovsk.

Like Sakha gas, Sakhalin offshore development has been discussed since the 1960s, but until the early 1990s no real development was made - partly because of uneasy relations between the former Soviet Union and Japan, and partly because of the cost-benefit analysis. As shown in Table 13-14, the gas reserves in Sakhalin I (owned by Exxon 30%, Sodeco 30%, Rosneft and Sakhalinmorneftegas 20%, and ONGC Videsh Ltd 20%), and Sakhalin II (Shell 55%, Mitsui 25%, and Mitsubishi 20%) stand at 485bcm and 460bcm respectively. Besides this, the ExxonMobil-Texaco consortium estimates the gas reserves of the Kirinskya prospect in Sakhalin Block III at 720bcm. If the figures in Table 10-15 are proved after exploration, Sakhalin offshore could produce enough gas to be exported not only to Japan, but also to other gas markets in Northeast Asia.

²⁴ Russian Petroleum Investor, May 2004.

²⁵ Russian Petroleum Investor, May 2004.

²⁶ Mastepanov, and Timoshilov, Perspectives of Development of Eurasian Gas Pipeline System and Energy Resources of Northeast Asia.

Table 10 - Sakhalin I project

Fields	Odoptu Chayvo Arkutun-Dagi
Consortium name	Sakhalin I Project
Partners	Exxonmefegas Ltd 30%: Operator SODECO 30% ONGC Videsh Ltd 20% Sakhalinmorneftegas-Shelf 11.5% Rosneft-Astra 8.5%
Recoverable Reserves	Crude oil: 307 mt or 2.3 billion barrels Natural Gas: 485bcm
Estimated development cost	\$12-15 billion, of which Phase I, oil development \$4.0 billion
Production start	Crude oil: peak 26.5 mt/y Chayvo: Dec 2005 Odoptu: Dec 2007 Natural Gas: 2007/8. Peak production 21bcm/y

Source: Sakhalin 1 project presentation materials and Sakhalin Oblast Administration.

Table 11 - Sakhalin II project

Fields	Piltun-Astokskoye Lunskoye
Consortium name	Sakhalin Energy Investment Corp (SEIC)
Partners	Shell 55%: Operator Mitsui 25% Mitsubishi 20%
Recoverable reserves	Crude oil: 185 mt Natural Gas: 800bcm
Estimated development cost	\$10 billion, of which Phase II, natural gas development (800 km pipeline + LNG terminal) \$8.5 billion
Production start	Crude oil: 1999. Peak 6-9 mt Natural Gas: 2006/7. Peak production 13.7bcm/y or 9.6 mt/y

Source: SEIC presentation materials and Sakhalin Oblast Administration.

Table 12 - Sakhalin III project

Fields / Structure	Kirinsky
Consortium name	PegaStar Neftegas LLC
Partners	ExxonMobil 33.3% ChevronTexaco 33.3% Rosneft 16.6% Sakhalinmorneftegas 16.6%
Projected recoverable reserves	Condensate: 62 mt Natural Gas: 713bcm or 25.4 tcf
Estimated development cost	\$6.4 billion
Exploration	Need to get an agreement on PSA. FS draft prepared.

Source: Sakhalin Oblast Administration.

Table 13 - Sakhalin IV project

Fields / Structure	Astrakhanovskiy Block Shmidtoskiy Block
Consortium name	Sakhalin IV project
Partners	BP: 49% Rosneft: 25.5% Sakhalinmorneftegas: 25.5%
Projected recoverable reserves	Crude Oil: 110 mt or 0.82 billion barrels Natural Gas: 440bcm or 15.7 tcf
Estimated development cost	Not available
Exploration	In 2000, the first exploration well was drilled. Technical and economic evaluation of Astrakhanov structure was completed.

Source: Sakhalin Oblast Administration.

Table 14 - Sakhalin V project

Fields / Structure	Kayaganskiy Block Vasyukanskiy Block Vostochno-Shmidtovski Block Elizavetinskiy Block
Consortium name	Sakhalin V project
Partners	BP: 49% Rosneft: 25.5% Sakhalinmorneftegas: 25.5%
Preliminary estimate of the reserves	Crude Oil: 783 mt or 5.87 billion barrels Natural Gas: 432bcm or 15.4 tcf
Estimated development cost	Not available
Exploration	In 2000, 5000 km 2D seismic work done. In 2002, a total of 2,300 sq. km 3D seismic work done. On July 2,2002 Rosneft was awarded with exploration license of Kaygansko-Vasukanskiy Block

Source: Sakhalin Oblast Administration.

Table 15 - Sakhalin VI project

Fields / Structure	Sakhalin Vi Block, including a license are of PetroSakh CJSC
Consortium name	Sakhalin VI project
Partners	Rosneft: 50.0% Alpha-Eco: 50.0%
Preliminary estimate of the reserves	520m tonnes of oil equivalent, of which 1/3 for oil and 2/3 for natural gas
Estimated development cost	Not available
Exploration	In 2002, 450 sq. km 3D seismic work done. The license agreement provides for Four exploration wells drilling before 2005.

Source: Sakhalin Oblast Administration.

Japan is interested in the Sakhalin projects, despite long standing territorial disputes between Japan and the Russian Federation. Around 1998, Japex and four Japanese steel companies investigated the possibility of building a 2,225km pipeline connecting the Sakhalin Islands with mainland Japan. The pipeline was composed of three sections: the first section, 625km from Katangli to Prigorodnoye, the second section, 1300km from Prigorodnye to Niigata via an offshore route, and the last section 300km from Niigata to Tokyo. In May 1997, minister Shinji Sato of Japan's Ministry of International Trade and Industry (MITI) announced that Japan was considering the Sakhalin offshore gas import pipeline.

During April 1999 and Spring 2002, both Exxon Japan Pipeline and Japan Sakhalin Pipeline (JSPC) carried out a feasibility study at a cost of \$40m.²⁷ The study assumed a pipe diameter of 26-28 inch (65-70 cm) and delivery capacity of 8bcm/y. The distances from Sakhalin I to Tokyo and Niigata are 900 miles (1,400 km) and 700 miles (1,120 km) respectively. The FS concluded the project was technically and commercially viable.²⁸

However, the Japanese utilities companies decided to back Sakhalin LNG rather than Sakhalin pipeline gas. A breakthrough was made with Sakhalin II's LNG exports to Japan during the first half of 2003. Three firms, Tokyo Gas, Tokyo Electricity and Kyushu Electricity, agreed to import a total of 2.8mt of LNG from Sakhalin II from 2007. In 2004, SEIC announced that Toho Gas and Tokyo Electricity agreed to import 0.6mt/y of LNG from the Sakhalin Islands (see Table 16).

Table 16 - Sakhalin LNG supply to Japan

Signed year	Company	Volume	Contract Period
2003	Tokyo Gas	1.1 mt/y	2007 - 2031
	Tokyo Electricity	1.2 mt/y	2007 - 2029
	Kyushu Electricity	0.5 mt/y	2010 - 2031
2004	Tokyo Electricity	0.3 mt/y extra maximum 0.7 mt	2007 - 2008
	Toho Gas	0.3 mt	2010 - 2033
Sub-Total		3.4 mt/y + 0.7 mt	2007 - 2033

Source: Interfax Petroleum Report & The Gas Industry News (Korea)

The contracts with the Japanese utilities have eliminated the possibility of a pipeline gas supply from Sakhalin I to Japan until 2013-14. Thus, it is no co-incidence that Sakhalin I began to float the idea of gas supply to the north-eastern provinces of China soon after SEIC's LNG deal with the Japanese utilities. The idea of a gas supply to China was

²⁷ JSPC is composed of Japex 45%, Itochu 23.1%, Marubeni-Itochu Steel Inc. 18.7%, and Marubeni Corp 13.2% and was the operator in efforts to develop the FS.

²⁸ Russian Petroleum Investor, Nov/Dec 2002. On June 10, 2004, it was announced that the Sakhalin-1 Project signed Letters of Intent to sell natural gas from Sakhalin offshore fields with two buyers in Khabarovsk Krai, Russia. According to the operator for the Project, Exxon Neftegas Limited (ENL), the Sakhalin-1 Participants will endeavor to begin gas deliveries to OAO Khabarovskenergo and OAO Khabarovskkraigas as early as the start of the 2005-2006 heating season. Gas sales to buyers in Khabarovsk Krai could grow to up to 3 billion cubic meters of gas per year by 2009. See, <http://www.sakhalin1.com/en/index.htm> & Interfax Petroleum Report, June 10-16, 2004. Author interviewed a number of Russian specialists and the suggested price hovers \$60-65 plus VAT.

originally promoted by Rosneft, a shareholder in the Sakhalin I project. The Sakhalin I consortium plans to resume the talk with the Chinese, which were halted in 2002 over disagreements on the gas price.²⁹ In terms of location, China's north-eastern provinces are well positioned to be the beneficiaries of Sakhalin offshore gas development. According to the State Reform and Development Commission (SDPC), China is also considering importing Sakhalin offshore gas to the Heilongjiang province during 2011-2020. China studied the possibility of Sakhalin gas imports to Heilongjiang, Jilin and Liaoning provinces in the late 1990s, but the suggested supply volume was not sufficient. During the first half of 2004, the issue was revisited, but this time it was the border price that has blocked the negotiation.

Korea's interest in Sakhalin gas dates back to early 1994 when the Korean government and companies considered the possibility of initiating LNG supplies from the Lunskoye gas field.

Since 2000, the Sakhalin Islands authorities have intensified efforts to secure the LNG export market for Sakhalin II's 9.6mt/y LNG scheme, but the administration's 2005-2006 export timetable was ambitious. The administration was slow in understanding the difficulty in securing the commitment from the gas buyers. Sakhalin regional governor Igor Farkhutdinov has repeatedly announced that the Sakhalin region is interested in supplying gas to Korea, and that this supply could begin in 2005-2006. Shell, which has a 55% equity stake in Sakhalin Energy, has lobbied hard to secure an early commitment from the Korean government. Due to the privatisation drive in Korea's gas industry, however, Sakhalin Energy Investment Corp (SEIC) lobbying to penetrate Korea's gas market has not yet been successful.³⁰

In August 2004, Kogas announced a 5 mt/y of LNG long term supply bidding and SEIC's proposal was included in the short list of the five potential supply sources. Very recently it was reported that Gazprom agreed to swap the asset for its entry in Sakhalin 2 project.³¹ Industry sources are saying that Gazprom would take 25% equity in Sakhalin 2 project and in return Shell would take equity in the Zapolyarnoye oil field, which is located in west Siberia and is owned by Gazprom. This development would strengthen the chance of SEIC's LNG supply contract (1.5 mt/y) with Kogas.

²⁹ FT International Gas Report, August 1, 2003, p. 14.

³⁰ In November 2000, Mr. Yong-Soo Kang, vice president of Kogas, delivered an interesting paper at an international conference. He said that "The most possible candidate in Russian gas project for the Northeast Asian gas market are the Irkutsk project and the Sakhalin project.....Kogas hopes to carry out the feasibility study on the Sakhalin project to see how much the Sakhalin project will contribute to the Korean gas market and to find possible ways to cooperate with each other in the region. Then he added that for the implementation of Sakhalin Project, two different options can be considered. One is the pipeline gas option which is to construct the pipeline through Khabarovsk, Vladivostok, and North Korea, and the other is the LNG option which is to construct the export terminal in the ice free southern port of the island. The length of pipeline from Sakhalin to Korean gas market is about 2,300 km and the day of voyage for LNG carrier is about 2.5 days compared with 7 days from Southeast Asian countries and 15 days from Middle East countries". Yong-Soo Kang, 'The Potential to supply Natural Gas from Sakhalin project to Korean market' presented at the Fourth Annual Conference on Sakhalin Oil and Gas organised by IBC Global Conferences Ltd in London, 20-21 November 2000.

³¹ Initially Nihon Keizai Report (Nov 27, 2004) covered this story and it was quoted by the Moscow Times, Nov 29th, 2004.

However, the management of the Sakhalin I project has not shown any interest in the option of supplying gas to the Korean Peninsula by pipeline via North Korea. In addition, the Kovykta gas project cannot compete with the Sakhalin offshore gas project, as the latter is much more cost-effective if the sizeable gas markets of South Korea and southern Japan are to be supplied. In fact the distance from northern Sakhalin to Korea is around 2,700km and the majority of the Russian section terrain is flat. In terms of price, the Sakhalin pipeline option could be very competitive against Kovykta project if a sizable gas market (17 bcm/y) from South Korea and southern Japan were to be offered simultaneously.

Table 17 - Projected Delivered Gas Price to Korea

Gas field	Transit Countries	Arrival Country	Delivered Price to Korea (\$/ mmbtu)	
			Transportation Tariff (TT)	TT+ Gas field cost
Sakhalin	Russia, China, N. Korea	S. Korea	2.401	2.901-3.401
	Russia, N. Korea	S. Korea	2.364	2.864-3.364
Yakutsk	Russia, China, N. Korea	S. Korea	2.795	3.295-3.795
	Russia, N. Korea	S. Korea	3.083	3.583-4.083
Irkutsk	Russia, Mongolia, China, Mongolia	S. Korea	3.124	3.624-4.124
	Russia, Mongolia, China	S. Korea	3.153	3.653-4.153
	Russia, China, N. Korea	S. Korea	3.027	3.527-4.027

Source: Sang-Kon Lee, Energy, in Choong-Yong Ahn and Chang-Jae Lee, ed., Northeast Asia Economic Cooperation: The first step towards Integration (Seoul: Pakyoungsa, 2003), p. 89.

The government of President Moo-Hyun Roh has shown a serious interest in the option of a Sakhalin gas supply to the Korean Peninsula by pipeline via North Korea. The so-called 'peace pipeline' is also supported by the United Nations.

Compared with the Kovykta gas project, the Sakhalin pipeline gas project is far behind in terms of a feasibility study and marketing, despite Sakhalin II's LNG scheme being well advanced. Even if a political breakthrough is made with regard to the DPRK nuclear crisis, special efforts will be required to move the Sakhalin gas project to the same level of preparation as the Kovykta gas project.

In a recent seminar held in Seoul, the Russian government confirmed that the following pipeline gas supply options are being reviewed:

- Sakhalin offshore gas to South Korea and Chayandagas to Northeast China
- Sakhalin offshore gas to both China and South Korea
- Kovykta gas and Chayandagas to Northeast China and South Korea

The details of these options will be reviewed by Russia's Ministry of Industry and Energy and Gazprom until February 2005, and the development plan of Unified Gas Supply System in East Siberia and Russia's Far East will be finalised in Spring 2005.³²

1.2. North and South Korea's approach to pipeline gas development

1.2.1. South Korea's initiative

In the wake of the collapse of the Cold War era, the energy relationships among the countries in Northeast Asian region have changed significantly. Based on the Northern Policy adopted by the Ro Tae-Woo government, South Korea established diplomatic relationships with the Former Soviet Union (FSU) in September 1990, and with China in August 1992 respectively. This altered political environment opened the door for South Korea to consider the options of energy cooperation with these two countries.

Korea's interest in a trans-national pipeline gas dates back to the late 1980s when Hyundai Group founder Jung Ju-Young began to explore the possibility of Sakha gas development and a gas pipeline to the Korean Peninsula. In July 1992, a Korean consortium led by Korea Petroleum Development Corporation (PEDCO, now Korea National Oil Corp: KNOC) was established, and Daewoo Corp became the driving force from the private sector in pursuing this Russian gas import project.

In November 1994, a preliminary feasibility study between Korea, Sakha Republic and Russia, was signed. The 12 month study cost \$20m, consisting of \$10m in the form of data provision from Russia and a \$10m cash payment from Korea.

The route was as follows – Gas fields in south-western part of Sakha Republic - Yakutsk - Tynda - Blagoveshensk - Khabarovsk - Vladivostok - DPRK – ROK, a 5,143km length, of which the Russian section was 4,383km.

It is worth noting that in 1995, there were only five gas fields with over 100bcm (C1 reserves) in Sakha Republic. At that time, Chayandinskoye's proven reserves were only 209.5bcm, and Chayandagas was the biggest gas field. It can be compared with the Tarim Basin's Kela-2 field, with only around 250bcm proven reserves, which supplies China's 4,000km west-east pipeline. However, Chayandinskoye's reserves significantly increased to 755bcm in 1997 and eventually to 1240bcm in 2002.

³² The Gas Industry News, December 20, 2004.
Pipeline Gas Introduction to the Korean Peninsula
Dr Keun-Wook Paik (January 2005)

Table 18 - Gas fields in Sakha Republic

Unit: bcm

	Discovery / Production	A+B+C1	C2
Sredne-Vilyuiskoye	1965 / 1975	164.6	
Sredne-Tyunskoye	1976	156.2	9.2
Sredne-Botuobinskoye	1970	152.3	18.6
Taas-Yuriakhskoye	1981	102.7	11.3
Chayandinskoye	1989	164.8	44.7

Source: Keun-Wook Paik, Gas and Oil in Northeast Asia: Policies, Projects and Prospects (London: RIIA, 1995), p. 224.

In December 1995 the study was completed and, due to the poor economics of the long distance pipeline development, the verdict was not positive. No further steps were taken.³³

In the same year, through its 1995 energy plan, the Korean government made it clear for the first time that it intended to replace a substantial portion of LNG imports by long distance pipeline gas, and intended to balance the ratio between LNG and pipeline gas over the next decade. According to the report prepared by Kogas for the Korean parliament's Trade and Industry Committee annual inspection in October 1997, pipeline gas introduction would take place in 2006 (see Table 19). At the core of the plan is the fact that the pipeline gas could be supplied to South Korea at a much cheaper price than LNG.

Table 19 - Kogas report on Irkutsk Gas import preliminary FS work

PFS work period	December 1996 – July 1997
Organizations	Gas field study: Korea Resources Institute Gas Pipeline study: Korea Gas Engineering Co., Ltd Economics and Investment Environment study: Kogas Research Centre and Korea Energy Economics Institute
PFS work result	Proven reserves: 500 mt. Potential reserves are 1.15 bt. It is necessary to secure 260 mt more for international project. Estimated investment cost: \$3.0 billion. Pipeline construction: a total of 4,100 km connecting Irkutsk – Mongolia – Beijing – Shandong peninsula – Yellow Seas – Pyeongtaek route has no difficulty in construction. It is not passing through a permafrost region. Estimated investment cost: \$8.0 billion. Gas production capacity and market: 20 mt/y, of which 6 mt for Russia, 7 mt for China and 7 mt for Korea. Imported gas price: around 22-25% cheaper, compared with LNG price. Total investment required: \$11 billion. Project financing possible. Preliminary conclusion: economical and realistic, if further proven

³³ It is China National Petroleum Corp who have taken advantage of what KNOC has done. In 1997, CNPC made a strategic alliance with Sakhaneftegaz, and in 2001 a preliminary FS work on the giant Chayandinskoye was completed.

	reserves are added and a proper project structure is developed.
Future plan	A full FS during 1998-1999, with \$100m cost Agreement among the related parties: 2000-2001 Gas field and pipeline development: 2001-2006 Gas export start: 2006

Source: Keun-Wook Paik, "Natural Gas Expansion in Korea" in Ian Wybrew-Bond and Jonathan Stern, ed., *Natural Gas in Asia: The Challenges of Growth in China, India, Japan and Korea* (Oxford: Oxford University Press, 2002), p. 219.

While KNOC failed to take further steps for pipeline gas development, Kogas saw pipeline gas imports as an opportunity to expand its business domain. Since Irkutsk Oblast had asked Korean companies to develop its giant gas field in 1994, Kogas decided to take an initiative towards Irkutsk region's Kovyktinskoye gas field development. A Korean Consortium composed of Kogas, PEDCO, Kohap, Halla, LG, Hyosung, Daewoo, and Yukong (which joined in April 1996 and the company name changed as SK) was established in mid-1995. Prior to this consortium, both Halla and Kohap were competing with each other to take the initiative for the Kovyktinskoye gas project.

It was the Hanbo group that had made the initial running for this giant gas project. In early 1996, the Hanbo group (later declared bankrupt due to the financial strain from its ambitious steel plant building) set up the East Asia Gas Company (EAGC) as its sole subsidiary, with an initial capital of \$12m, to act as a vehicle for its participation in Irkutsk region gas development. In July 1996, EAGC announced that the Hanbo group had bought 27.5% of equity of Russia Petroleum having exploration and development license in Kovyktinskoye and Verkhnechonskoye gas and oil fields in Irkutsk region. A total of \$44m, of which \$25m was for the 27.5% equity stake and \$19m for a three year loan to Sidanco, was invested.

Due to Hanbo group's bankruptcy in early 1997, EAGC had difficulty in keeping the 27.5% equity stake. Consequently, the 20% was re-sold to Sidanco in November 1997 when BP decided to invest \$571m in Sidanco.³⁴ EAGC kept the remaining 7.5% for and the figure became 8.37% after the 4th emission during 1998-1999. However, it was diluted in 1999 to 7.1% due to its failure to join in the 5th emission. It was early in December 2000 that the remaining 7.1% was sold to BP-Amoco and Tyumen Oil Company (TNK).³⁵

When the Korean press reported of the secret disposal of EAGC shares, the Korean government admitted that there was nothing the government could do to stop EAGC's share disposal. It also argued that it would not affect its plan to join in the Kovykta gas development project.

Kogas consortium did not want to take an equity stake in Russia Petroleum for the following reasons:

³⁴ Soon after the November 2003 FS work completion, Interros announced that its 25.8% equity in Russia Petroleum is on sales. The estimated cost for the equity is at least \$500 million.

³⁵ Considering that the 12.88% of Irkutskenergo's Russia Petroleum was sold at over \$40 million in December 2000, the price of EAGC's 7.1% shares is estimated to be around \$20-30 million.

- Kogas believed that the Korean gas market, with a capacity of 10 bcm pipeline gas import, would provide significant leverage at negotiations with Russian gas producers. The possibility of 10bcm gas market provision in the early stage of this trans-national pipeline development was the key point, and CNPC was respecting Kogas position as the gas market provider. It would have been ideal if the Kogas consortium and EAGC made a compromise by joining forces, but the opportunity was missed;
- The Kogas consortium was slow to grasp the importance of securing an equity position in the giant Kovyktinskoye field as the consortium was suspicious of the real scale of the field's proven gas reserves. Now it is clear that Kovyktinskoye gas field's reserves are large enough to satisfy not only the Irkutsk region itself but also both China and Korea's gas demand;
- The Kogas consortium was reluctant to admit that EAGC's initiative was correct. When EAGC announced its equity positioning in Russia Petroleum, the Kogas consortium, together with the Ministry of Trade, Industry and Energy (MOTIE), lobbied strongly against approval being given. Kogas had virtually no experience in upstream business, and they argued that importing pipeline gas is solely a downstream business. This only confirms that at that time Kogas consortium did not have a clear picture of its equity positioning in the upstream sector in the major trans-national pipeline development.

Kogas consortium's preference was to pursue the feasibility study first and to make a decision later. In 1998, a Japanese consortium led by Japan National Petroleum Corp (JNPC) and Sumitomo Corp took an initiative by proposing a five country feasibility study on a pipeline connecting the Kovykta gas field with China, Korea and Japan via Mongolia. However, due to the failure to reach consensus, negotiations collapsed at the end of 1998,. Neither the PRC authorities nor BP took the role of Japan as a coordinator of the study seriously since Japan was not offering any gas market for the development. In other words, two important players in the negotiations did not see the necessity for accepting the Japanese consortium's(led by Sumitomo Corp and JNOC Corp) proposal to protect their carried interest in the project. A unique opportunity to start a five-country project in Northeast Asia was missed.

The collapse of the negotiations in 1998 meant that the region had little choice but to return to the formula of Sino-Russian cooperation. Without Korea's participation, it would have been a bilateral project. In May 1999, Korea expressed its interest in the Sino-Russian feasibility study on the Kovykta gas project, and its participation laid the ground for a trilateral project.

In November 2000, Kogas, CNPC and Russia Petroleum signed an agreement for a full feasibility study on Kovykta gas development. In January 2001, the Kogas Consortium was restructured, from seven to nine members.³⁶ In June 2002, feasibility work was due to be completed but was postponed until June 2003. A total of \$6.0m (of which 50% was supplied by the government, 50% by Korean consortium) was paid for the Korean portion of the study. Eventually, feasibility work was completed in November 2003. At

³⁶ The members are Kogas 27.3%, LG Corp. 14.8%, KNOC 14.0%, Hyosung 12.8%, Daewoo Construction 7.7%, Daesung Industry 6.7%, Hyundai Corp 6.7%, Daewoo International 5.0%, and Hanwha 5.0%.

present, Gazprom's stance towards the project and the border price issue are the two major stumbling blocks for the project.

A breakthrough of Kovykta gas project can be made if governmental approval is given by the Chinese and Korean governments in 2005, and this looks realistic due to the changing political environment. Even though Roh Moo-Hyun government has paid special attention to Sakhalin pipeline gas option for the settlement of the DPRK nuclear crisis during the first two years of his presidency, the US administration did not show its serious interest in accepting the formula of DPRK's disposal of nuclear in return for economic and energy aid. The US administration's rigid stance towards DPRK regime has prevented progress on the Sakhalin pipeline. This situation is forcing the Roh Moo-Hyun government to reconsider the Kovykta gas option despite Gazprom's UGSS (Unified Gas Supply System) plan. If South Korea's commitment to the Kovykta gas project were to be made without delay, it could lead to an introduction of Russia-China-Korea energy alliance. The issue of energy supply to DPRK can be solved by a sideline pipeline from Dandong to DMZ via Pyongyang with a capacity of 1.5 bcm per year, and this compromise would also solve the problem of energy supply security once and for all.³⁷ This pipeline gas alliance will be very different from the KEDO formula whose driving force was US-Japan-Korea alliance, and its implications towards Northeast Asian region's power balance will not be small.

At the end of 2004, the Russian Government decided to construct the crude oil pipeline to Nakhodka.³⁸ Before this official announcement, Transneft asked for priority to be given to the development of the Taishet-Skovorodino section - 2,000 km at a cost of US\$ 6.0 billion, much less than the estimated total cost, US\$ 11.5 billion - and to the development of the Skovorodino-Daqing section.³⁹ Since the government raised the possibility of a CNPC buy-out of 20% of Yugansk oil assets, there is a very strong possibility of a parallel crude oil and gas pipeline towards Skovorodino. The Kovykta gas pipeline can be constructed alongside this crude oil pipeline, which would save 30% of the pipeline construction cost. However, the difficulty would lie in the timing of this pipeline development.

Korea's Ministry of Commerce, Industry Energy (MOCIE) decided to allow Korea Electric Power Corp (KEPCO) to pursue its own 5.7 mt/y of LNG supply contract in November 2004. Assuming KEPCO pursue this 5.7 mt/y separately, there will be a real difficulty in finding a sizable gas market in South Korea. The Russian government has been very slow to understand this situation, and it remains to be seen how quickly the Russian authority will take steps to save this gas market in South Korea. If a quick response is made, it may still be possible to introduce pipeline gas to both China and Korea by around 2010-2012. If not, another ten years delay from 2010 will be inevitable.

³⁷ UN's Working Group on Energy for DPRK has been evaluating these pipeline introduction options. The group was established and is chaired by Mr. Maurice Strong, Special Envoy to Secretary General of the United Nations to DPRK.

³⁸ China Daily, January, 1, 2005.

³⁹ Nihon Keisai Shimbun, Dec 14th, 2004.

1.2.2. The DPRK's stance towards pipeline gas

The DPRK authorities have shown reluctance to express any interest towards the idea of pipeline gas despite the fact that they have been studying the import option since the mid-1990s.

It took a while for DPRK authority to understand that the KEDO project, which aims at producing 2000 MW capacity electricity, cannot be completed without the transmission line development.

At present, the DPRK authorities are not willing to change their stance towards the KEDO project and to accept the pipeline gas option. However it is likely that they will take the pipeline gas option seriously once the nuclear crisis has been permanently settled.

The scale of benefit in terms of DPRK's economic development from the introduction of a long distance gas pipeline passing through its territory will be very different from that of the KEDO project. Assuming that 1.5bcm/year of natural gas would be allocated to the DPRK as a transit fee plus subsidy, pipeline gas would deliver at least a minimum level of gas and power to a number of major cities. Unlike the KEDO project, which did not allow any role for both Russia and China, this pipeline project envisages a major role for both countries.

To observe the progress of trans-national natural gas pipeline projects in Northeast Asia, the DPRK established a Natural Gas Research Society, DPR Korea (NGRS DPRK), under the leadership of DPRK's Asia Pacific Peace Committee in 1998. NGRS DPRK has sent its delegate to the 1998 Ulaan Baator (4th) and 1999 Yakutsk (5th) Northeast Asian Gas & Pipeline Forum conferences.

Table 20 - DPRK Delegation to Mongolia and Sakha Republic

<p>The 4th International Conference on Northeast Asian Natural gas Pipeline, held in Ulaan Baatar, Mongolia, Aug 16-18, 1998</p>	<p>Prof. Kyung-Bong Kim Mr. W.G. Pak Mr. M. S. Pak Mr. Y. H. Yun Mr. S. J. Ri Mr. R. S. O Mr. U. H. Hyon Mr. H. S. Kim Dr. Busuph Park</p>	<p>DPRK Natural Gas Research Society (NGRS) State Planning Commission & NGRS Association for Cooperation of National Economy & NGRS Institute of National Economy & NGRS State Academy of Science & NGRS Industrial Construction Enterprise & NGRS The Non-Conventional Energy Development Center & NGRS NCEDC & NGRS Kumgangsán International Group</p>
<p>The 5th International Conference on Northeast Asian Natural Gas Pipeline, held in Yakutsk, Russia,</p>	<p>Prof. Kyung-Bong Kim Mr. Won-Kook Park Mr. Ki-Soo Kim Mr. In-Sung Kang Ms. Un-Hi Hyun Mr. Hae-Sung Kim</p>	<p>Chairman, DPRK Natural Gas Pipeline Association Secretary, DPRK NGPA Engineer, DPRK NGPA Member, DPRK NGPA Member, DPRK NGPA Member, DPRK NGPA</p>

July 25-27, 1999	Mr. Myung-Nam Cho Madame. Kyung-Yoon Park	Member, DPRK NGPA President, Kumgangs International Group
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Source: Keun-Wook Paik

In February 2001 Kogas announced a joint study on pipeline gas, and in September 2001 South Korea announced that it had reached a preliminary agreement with the DPRK on a joint feasibility study for a pipeline passing through DPRK territory. Later however, Kogas argued that the firm's work on the DPRK section could not progress since the DPRK authorities had demanded Kogas's preliminary commitment that the pipeline would pass through DPRK territory. Kogas could not take any further step due to this condition.

MOU with a Dutch Consortium

On April 6, 2001, the NGRS DPRK signed an unpublished 18 point MOU with a consortium of three Dutch trading companies (HS International Trading, Tamalone International, and Boscalis International). The MOU gave the consortium exclusive rights to build the North Korean portion of the pipeline from the Russian border to the South Korean border. DPRK expected that the Dutch consortium would act as an intermediary in promoting the pipeline project with ExxonMobil, Japanese companies, and South Korean gas officials. The MOU envisaged the construction of three gas-fired power stations along the pipeline route with a total capacity of 500 MW (2 units of 200 MW + 1 unit of 100 MW).⁴⁰

Agreement: KoRus Project⁴¹

On 3 August 2002, FSI Energy signed an agreement with Chairman Kyung-Bong Kim, NGRS DPRK. The agreement gave FSI Energy exclusive transit rights with regard to the pipeline from Northern Sakhalin to the Korean Peninsula. Under this agreement, FSI Energy needed to identify the source of natural gas supply by 1 June 2003. FSI Energy was seeking the support of Congressman Curt Weldon (Republican, Pennsylvania), chairman of the House Armed Services Committee. A Korea's Weekly *Sisa Journal* has reported on this project comprehensively : ⁴²

FSI Energy is the driving force behind the KoRus pipeline project which aims at supplying Sakhalin gas to North and South Korea by pipeline. In late May 2002, a US delegation composed of 12 congressman and led by Congressman Weldon planned to visit Pyongyang but the DPRK authorities refused to issue visas. On August 3rd, 2002, according to Dr. Roy Kim's interview with the *Sisa Journal*, FSI Energy signed a twelve clause-agreement with DRPK Natural Gas Research Society (led by Prof. Kyung-Bong Kim, former head of DPRK Academy of

⁴⁰ Selig S. Harrison, 'Toward Oil and Gas Co-operation in Northeast Asia : New Opportunities for Reducing Dependence on the Middle East', Woodrow Wilson International Center for Scholars, Asia Program Special Report No. 106 (December 2002), and author's interviews.

⁴¹ Author was told by a DPRK senior officer that the DPRK government believed the introduction of pipeline gas from Sakhalin Islands would be possible regardless of a sizable gas market provision from South Korea. The remarks confirmed that DPRK authority did not fully understand the fundamentals of natural gas development and related the gas trading.

⁴² *Sisa Journal*, February 6/ 13 & March 13, 2003.

Science) with regard to the exclusive right of pipeline construction development for the DPRK section. This agreement is conditional on gas supply source securing until June 1st 2003 and approval from both governments. The story claimed that US Department of Energy secretary Abraham had helped the introduction of US DOE officer to review the project, and FSI Energy had applied for a \$10m grant for the feasibility work.

This KoRus project was officially presented at the KIEP-KEI policy Forum on Northeast Asian Energy Cooperation conference held in Washington D.C. on 7 January 2003. However, the project was not taken seriously by major institutions in the United States and South Korea. The KoRus project failed to identify and secure the gas supply until 1 June 1 2003. The project has no supply source and as a result cannot be implemented.

Both the 2001 MOU and 2002 agreement indirectly confirmed that the DPRK authorities were interested in pipeline gas, but were very ignorant of the pipeline gas business. DPRK authorities were not ready to officially discuss the issues with Washington and Seoul since this would potentially signal willingness to compromise with respect to the settlement of the KEDO project.

It is worth noting that the North-South Korea dialogue in June 2000 offered an opportunity for both Koreas to discuss the pipeline routes from China and Russia. In early 2001 Kogas proposed that the DPRK authorities look into the possibility of laying a gas pipeline from the Kovykta gas field through North Korea. The relevant document was sent to the DPRK government in early February 2001, and a Kogas delegation led by Jong-Sool Kim, then a senior vice president of Kogas, visited Pyongyang in September 2001. A proper feasibility study on the DPRK section was not possible as the DPRK authorities again demanded that the South Korean government make an advanced commitment that the pipeline would not bypass the DPRK's territory, a demand which could not be accepted.

1.3. The Prospects of Energy cooperation between the two Koreas

South Korea is ideally positioned to help revitalise the sluggish energy industry in North Korea. As of 2002, South Korea's GNI scale is over 13 times of that of DPRK (See table 21), and as of 2000, South Korea's crude oil import reached 894 million barrels, while DPRK imported only 2.9 million barrels (See table 22) In terms of primary energy supply, the ratio between South Korea and DPRK was only 3.9 in 1990 but this figure became 12.3 in 2000 (See table 23) Tables 24-26 show that DPRK's energy supply and consumption structure could change significantly, with a significant decline of the role of coal, and a big increase in oil and gas. DPRK's energy situation is currently extremely dire. Even a relatively small volume of oil supply to DPRK would make a big difference.

DPRK was contracted to receive a 0.5mt/y worth of heavy oil until the completion of the KEDO project, based on the 1994 Geneva Agreement. The DPRK remained at the amount until 2002, when the second DPRK nuclear crisis occurred. With this heavy oil supply, the operation of Seonbong Thermal Power Plant was possible during the 1990s. However, even then, the plant could only be run at 30% capacity. Currently the power generation volume from this plant stands at 1,700GWh, less than 10% of DPRK's total power generation volume.

Fully fledged energy cooperation between the two Koreas seems unlikely until the settlement of the second DPRK nuclear crisis. Nonetheless, energy cooperation is moving from a remote possibility to a potential reality. Pipeline gas into the Korean peninsula, LNG and LPG supply to North Korea, electricity supply from either Russia or South Korea to North Korea, coal and mineral resources development cooperation; and joint exploration and development of North Korea's offshore oil and gas resources are all potential areas for substantive cooperation.

Table 21 - Major Economy Index Comparison, DPRK vs ROK (2002)

	unit	DPRK (A)	ROK (B)	Ratio (B/A)
Population	1,000	22,369	47,664	2.1
Economic growth	%	1.2	6.3	-
GNI	US\$	762	10,013	13.1
Trade total	\$bn	2.26	314.6	139.2
Export	\$bn	0.73	162.5	223
Import	\$bn	1.53	152.1	99
US \$ exchange rate	won/\$	2.21 (Jan-June) 153 (July-Dec)	1,251	-
Energy production				
Coal	mt	21.9	3.32	0.2
Power generation installation capacity	GW	7.77	53.8	6.9
Power generation volume	GWh	19,000	306,500	16.1
Crude oil import	mt	0.597	109.10	181
Rice production	mt	1.73	4.93	2.8
Car production	million	0.0048	3.147	656
Copper & Iron	mt	1.04	45.39	44
Cement	mt	5.52	55.51	10.4
Fertiliser	mt	0.5	3.3	6.6

Source: The Korea Petroleum Association Journal, Sep/Oct 2003, p. 82.

Table 22 - DRPK & ROK Energy Facility Comparison

	unit	1990		2000	
		DPRK	ROK	DPRK	ROK
PGIC	GW	7.14	21.01	7.55	48.45
PGV	GWh	27,700	107,700	19,400	266,400
Refining Capacity	mb/d	0.07	0.84	0.07	2.438
Crude oil import	mbbl	18.5	308.4	2.9	893.9
Coal production	mt	33.15	17.22	22.5	4.20

Note: PGIC means Power Generation Installation Capacity, and PGC means Power Generation Volume

Source: National Statistical Office, Korea (2001 Dec)

Table 23 - DPRK's Primary Energy Supply

	Energy supply (mtoe)			Energy Consumption per person (toe)		
	DPRK (a)	ROK (b)	b / a	DPRK (a)	ROK (b)	b / a
1990	23.946	93.192	3.9	1.18	2.17	1.8
1995	17.270	150.437	8.7	0.80	3.34	4.2
2000	15.687	192.887	12.3	0.71	4.10	5.8
90-99	- 4.1%	7.5%	-	- 5.0%	6.6%	-

Source: National Statistical Office, Korea (2001 Dec)

Table 24 - DRPK's Primary Energy Supply Structure

Unit: mtoe & %

	1990	1995	1996	1997	1998	1999	2000
Primary energy (mtoe)	23.946	17.280	15.836	14.746	14.030	15.570	15.687
Coal	69.2	68.6	66.3	69.9	66.3	70.2	71.7
Oil	10.5	6.4	9.1	6.8	10.0	5.9	7.1
Hydro	15.6	20.5	19.7	18.0	18.2	18.7	16.2
Others	4.7	4.5	4.9	5.3	5.5	5.2	5.0

Source: National Statistical Office, Korea (2001 Dec)

Table 25 - DPRK's Final Energy Consumption Structure

Unit: %

	Total (mtoe)	Coal	Oil	Firewood & charcoal	Electricity
1990	14.435	63.2	15.9	7.8	13.2
1995	9.780	67.9	8.8	8.1	15.2
2000	9.060	72.0	6.5	8.6	12.9

Source: KEEI (2002)

Table 26 is the projection made by Korea Energy Economics Institute for DPRK's primary energy consumption until 2020. The projection envisages a significant growth of both oil and gas consumption.

Table 26 - DPRK's Primary Energy Consumption Projection

Unit: mtoe & %

	2000	2005	2010	2015	2020	00-20	00-10	10-20
Coal	11.250 (71.7)	14.863 (74.3)	18.204 (66.1)	25.088 (57.9)	29.266 (44.8)	4.9	4.9	4.9
Oil	1.117 (7.1)	1.345 (6.7)	3.044 (11.0)	9.125 (21.1)	23.817 (36.5)	16.5	10.5	22.8
N. Gas			0.0511 (0.2)	0.5112 (1.2)	3.3214 (5.1)			51.8
Hydro	2.540 (16.2)	2.765 (13.8)	3.181 (11.5)	3.817 (8.8)	4.135 (6.3)	2.5	2.3	2.7
Nuclear			1.643 (6.0)	3.285 (7.6)	3.285 (5.0)			7.2
Others	0.780 (5.0)	1.030 (5.1)	1.438 (5.2)	1.500 (3.5)	1.500 (2.3)	3.3	6.3	0.4

Total	15.687 (100.0)	20.003 (100.0)	27.560 (100.0)	43.326 (100.0)	65.324 (100.0)	7.4	5.8	9.0
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Note:

* The projection assumes that KEDO project will be completed by 2015.

** The projection also assumes that the Siberian gas pipeline would pass through DPRK territory from 2010.

Source: KEEI (author : Kyung-Sool Kim, 2002)

Pipeline gas cooperation

Energy cooperation between South and North Korea is a very real possibility. Unlike the Kim Dae-Jung government which focused on East Siberian gas supply and Sakhalin LNG supply to South Korea, the Roh Moo-Hyun government has shown interest in a Sakhalin pipeline gas to the Korean peninsula. The 'gas for peace' formula has been laid out by National Security Advisor Jong-Il Ra. The FT reported that :

...thermal power stations drawing from Russian gas would provide a peaceful alternative to Pyongyang's nuclear programme... This is one of the possibilities we are looking at... Gas could be drawn from either Irkutsk or Sakhalin. Advisor Ra added that Seoul's plans for a gas pipeline were at early stage and had not been discussed in detail with its allies or North Korea.⁴³

If the six party talks finds a way of resolving the security issue, the option for gas for peace could be a real alternative for the KEDO project.

At present both Kogas and MOCIE are not supportive of the pipeline gas passing through DPRK territory. They prefer East Siberian gas flowing to north China and then the Yellow Sea to South Korea, bypassing DPRK territory entirely.

The United Nations is more open-minded to pipeline gas passing through DPRK territory. In an interview with a Korean newspaper Dong-Ah Ilbo, Mr. Maurice Strong, special envoy to the Secretary General of the United Nations with regard to the DPRK issue, said:

'Energy is a humanitarian issue. DPRK urgently needs energy and it is only possible with the international community's support. To tackle the DPRK's long term energy shortage problem, Russia's natural gas could be an option. In particular Sakhalin gas project is worth taking note of as it can be done with the shortest pipeline route with a short working period. For this project, an energy specialist group is being established and feasibility work is being studied.'⁴⁴

⁴³ Ward, Andrew, 'Deal for gas pipeline could solve Korean nuclear crisis', Financial Times, 31 March, 2003.

⁴⁴ Dong-Ah Ilbo, 24 Nov, 2003. This remark was reconfirmed by his interview with NHK on 4 March 2004, that natural gas pipeline to the Korean peninsula passing through DPRK can be studied assuming that DPRK nuclear crisis would be resolved. See, JoongA-ng Ilbo, 5 March, 2004.

Reportedly, during a recent visit to Pyongyang (May 2004), Mr. Strong met DPRK Military Commission Chairman Jong-Il Kim, and both sides agreed that the United Nations would study the options of long term energy and economic aid to DPRK. Mr. Strong made it clear that the DPRK authorities should provide the UN with economy-related information if the DPRK wanted to win UN-led aid, and Chairman Kim unexpectedly agreed to provide this information. Energy specialists for the UN group will mainly come from Japan and Korea, while the economic specialists will come from the United States. The six party member countries will also be asked to send specialists..⁴⁵

These reports suggest there is a strong chance that the inter-Korean cooperation on pipeline gas could be a reality. When the option of Sakhalin gas supply to the Korean Peninsula was floated at the beginning of 2003, there was a very strong resistance from Kogas, the main market provider in South Korea, and the conservative Ministry of Commerce, Industry and Energy (MOCIE). However, the adoption of a compromise route for Kovykta gas (Kovykta – northern line – Skovorodino – Heilongjiang and Liaoning province) and the delivery to Incheon via the Yellow Sea with a separate branch line constructed from Dandong to DPRK means the branch line development would not affect the main trunk pipeline development at all.

LPG and LNG supply cooperation

In South Korea, the completion of a natural gas trunk pipeline network was good news for natural gas expansion, but very bad news for LPG business. The LPG business in South Korea has already reached saturation stage and urgently needs to find a new market for the industry's survival. LPG supply to North Korea offers a very attractive opportunity for market development.

In April 2004, South Korea's LPG firms decided to supply LPG to the Kaesung Industrial Complex. Although detailed plans are not available yet, the project is thought likely to handle a supply of 250 tonnes of LPG per day, 6,500 tonnes of LPG per month, and envisages a 200-500 tonne storage facility within the Kaesung Industrial Complex. The LPG industry projects that LPG sales will initially be 200tonnes per month, 1,000 tonnes per month once the project is on track, and in 2006 the scale will reach to 4,000 - 6,000 tonnes per month..⁴⁶

In December 2003, the Korea Energy Economics Institute (KEEI) published a study on DPRK's LPG demand and the potential for LPG cooperation between DPRK and ROK. The scale of LPG demand under the high growth scenario is predicted to reach 1.26mt in 2020 and the study confirmed that there is ample space for LPG development in the DPRK.

It is also worth noting that Kogas explored the possibility of supplying LNG gas to the Kaesung Industrial Complex much earlier. In August 2001, the Chosun Ilbo reported that Kogas had lobbied to supply 18,000 tonnes of natural gas (5.9 billion Korean won or \$4.6m) to North Korea from the beginning of 2003, gradually increasing the supply up to 0.71mt, worth 210 billion Korean won or \$161.5m by 2009. Kogas had undertaken a

⁴⁵ Joong-Ang Ilbo, 19 May, 2004 & June 20, 2004.

⁴⁶ The Gas Industry News, 22 April, 2004.

feasibility study on supplying natural gas to the industrial complex in Kaesong, a DPRK city adjacent to the 155m demilitarised zone (DMZ).⁴⁷

The pipeline development would have cost in the region of 50-60 billion and Kogas suggested that some of the funding should come from the Inter-Korean Cooperation Fund. According to the feasibility study, the best supply network would involve a pipeline connecting the Grand Unification Bridge in the South with the Kaesong Industrial Complex across the DMZ. The two Koreas have been promoting the construction of a large-scale industrial estate in an area contiguous to Kaesong in their joint efforts to expand inter-Korean economic cooperation.

According to the *Chosun Ilbo*, in July 2001 the South Korean Ministry of Unification gave a green light to Kogas to contact the DPRK. In the same month the Ministry of Commerce, Industry and Energy (MOCIE) minister Jae-Shik Chang said that the government would be able to review the supply of electricity to North Korea if the North was positive about inter-Korean economic cooperation. However, the minister's remarks invited criticism from the opposition party (GNP) and the United States.

MOCIE said however, that it had never reviewed the option of supplying natural gas to the Kaesong Industrial Complex, and that the Kogas's feasibility work would not necessarily be adopted as government policy. This was carried out by a local engineering firm.

This news confirmed that, without a breakthrough in the political tensions, even LNG supply to the DPRK is not an easy option. At the beginning of 2003 when the concept of Sakhalin gas supply to the Korean Peninsula received coverage by the Korean media, both Kogas and MOCIE floated the concept of LNG supply to DPRK again. Both argued that a pipeline passing through DPRK territory would not be acceptable due to concerns over energy-supply security, but that LNG supply from ROK to the DPRK could be considered.

As a LNG supply option would require an extension of pipeline from South to the North, the LPG option would be somewhat easier to handle. In the short term perspective, LPG option is easier to be accepted by both North and South.

Electricity supply cooperation

In early April 1999, KEPCO (Korea Electric Power Corp) president Chang Young-Shik announced that DPRK leader Jong-Il Kim had asked Hyundai Group founder Ju-Young Chung to build a 100MW capacity power plant nearby Pyongyang in late October 1998. Besides this, KEPCO was also planning to pursue another independent power plant development in a port city Haejoo (Hwanghae Namdo), once the Haejoo Industrial Complex (HIC) plan was agreed between Hyundai Group and the DPRK authorities. Mr Chang added that the state firm was also considering the option of supplying electricity to HIC by constructing a 80km power transmission line between Moonsan and Haejoo, rather than developing an independent power plant in Haejoo.⁴⁸

⁴⁷ Meil Kyungje Economic Report (Weekly), October 2001, p. 10.

⁴⁸ Dong-Ah Ilbo, April 3, 1999.

After the historic summit meeting between President Dae-Jung Kim and Chairman Jong-II Kim in June 2000, the issue of electricity was officially discussed during the 4th ministerial meeting held in Pyongyang. In this meeting, the DPRK authorities asked ROK to provide them with 2,000MW worth of electricity, of which the immediate provision of 500MW electricity was given priority.⁴⁹ Considering that the cost of a 500MW power plant is around 600-700bn Korean won (roughly \$0.5-0.6 billion), the ROK authorities could not give a positive response.

During the 3rd six party meeting in Beijing in late June 2004, the DPRK authorities asked for 2,000MW worth of electricity supply in return for the suspension of their nuclear programme. If the electricity supply is calculated in terms of heavy oil supply, the volume would reach 2.7mt.⁵⁰ The total volume of heavy oil supply to DPRK during 1995 and 2002, based on the 1994 KEDO agreement, was 3.56mt and in money terms, the total cost was \$511.3m, of which \$347.5 was covered by the United States.⁵¹ Until the political situation has progressed, it is very difficult to make a positive response to such expensive requests.

The DPRK authorities have also actively explored the option of importing power from Russia through power transmission lines. Chairman Jong-II Kim has met President Putin three times since 2000, and the two leaders discussed power cooperation at each of these meetings.⁵² In parallel with the summit meetings between the two leaders, a number of working level meetings have taken place.

- In October 2001 a memorandum was signed between Vostokenergo and a DPRK delegation led by Power and Coal Industry deputy minister Nam-Chil Park in Khabarovsk, after discussions over Russian electricity supply to the DPRK (based on available electricity (2-4%) from Primorskii Krai. Both parties also agreed to have a second DPRK-Russia working level meeting in Vladivostok to discuss technical issues, such as the development of a transmission line between Khasan and the DPRK, voltage conversion facility construction, and the electricity supply volume and price.
- In February 2002, Chairman Jong-II Kim asked about Russia's electricity supply to DPRK during his meeting with the Russian Ambassador and then RFE region's presidential representative (plenipotentiary) Constatin Fulikovsky when the later visited DPRK. Following this, Power and Coal Industry Minister Tae-Rok Shin met Vostokenergo director general Victor Minakov's deputy to discuss the signing of an

⁴⁹ Joong-Ang Ilno, Decemebr 19, 2000.

⁵⁰ Meil Kyungje Shimmoon, June 25, 2004.

⁵¹ Of which 0.15mt in 1995, 0.5 mt during 1996/2001 annually, and 0.411 mt in 2002. Ahn Choong-Young and Lee Chang-Jae, ed., Northeast Asia Economic Co-operation : First Step towards Unification (Seoul : Pakyoungsa, 2004), p. 183 (written in Korean)

⁵² In July 2000, when President Putin visited Pyongyang, the DPRK-Russia Economic Co-operation Co-operation Committee discussed energy co-operation. In September 2000, Power & Coal Industry Minister Tae-Rok Shin visited Russia and discussed the related projects. In August 2001 when Chairman Jong-II Kim visited Russia, the countries adopted a Moscow Declaration including the refurbishment of DPRK's thermal power plants and officially announced power sector co-operation between the two countries. In August 2002, the third summit between Chairman Jong-II Kim and President Putin was held in Vladivostok. Chairman Kim asked Russia to supply electricity. Both leaders also discussed the issue of nuclear power plant development in the border area of DRPK and Russia and the joint use of the electricity.

electricity supply agreement. (In April 2002, Minister Tae-Rok Shin was replaced by Kwang-Hong Oh.)

- In April 2002, DPRK Cabinet Deputy Premier Chang-Deok Cho visited Russia and proposed the exchange of 400MW scale electricity in return for joint logging and construction manpower provision. He also discussed a power transmission line project linking southern Primorskii region with the DPRK.
- In September 2002, a memorandum among ACE Engineering Inc (S. Korea), Korea National Energy Committee (DPRK), and Vostokenergo and Energy System Institute (Russia) was signed for the preliminary FS on Northeast Asian region's Electric Power Interconnection.⁵³

The concept of electricity supply from Primorskii Krai to the DPRK is as follows.⁵⁴

- The basic concept is Russia – DPRK Interconnection line Development
- Section: Vladivostok – Khasan – Chongjin
- Transmission line capacity: AC 500 KV
- Length: 375 km
- Power Generation Installation Capacity: 500 MW & 3.0 billion KWh
- Capital Cost: \$130-150m

Both Primorskii Krai Administration and DPRK authority are anxious to initiate this project development, but both parties do not have the financing source. On top of this pilot project, there is also a relatively big project - the so-called Podkovalnikov commissioned study which covers the inter-connection of Amur & Khabarovsk – Primorskii – DPRK and ROK.

Transporting surplus electricity from Russia requires a large amount of investment, and the DPRK authorities are expecting the ROK to take part in the project. It is not surprising that Korea Energy National Committee Secretary General Park Seong-Hee argued during the Northeast Asia Power Network Connection Symposium held in Seoul in May 2004 that “the power network connection project among the six countries in Northeast Asian region should move to the implementation stage, and the project will not only help to ease the energy shortage problem but will also realise cooperation among the states in the region”. He added that “the above mentioned Russia-DPRK inter-connection project reached the implementation stage”.⁵⁵

The core problem facing this power project lies in the financing. Who is going to finance it? The DPRK authorities may expect South Korea to be the main financier, but this will be difficult to achieve until a breakthrough in the North and South relationship is made.

⁵³ In 1997, Kap-Koo Yoon, head of ACE Engineering Inc made the presentation on ‘Peac Network Project’ for the first time during the Autumn Seminar organised by Korea Electricity Society.

⁵⁴ Victor Kalashnikov, ‘Electric Power Interconnections in NEA : Perspectives from the Russian Far East’ presented at an International Workshop on Upgrading and Integration of Energy Systems in the Korean Peninsula : Energy Scenarios for the DPR of Korea, organised by Landau Network – Centro Volta, Como, Italy, 19-21 Sep, 2002.

⁵⁵ Dong-Ah Ilobo, 18 May, 2004. Primorskii Krai governor Darkin confirmed the export scheme of Russian Far East surplus electricity export to South Korea via North Korea is almost completed. See, Jong-Ang Ilobo, 5 July, 2004.

It is worth noting that in early December 2004 both the North and South authority agreed that the method of electricity supply to Kaesung Industrial Complex. Korea Electric Power Corp has already completed the site investigation and expects to supply the electricity from late January 2005. The initial scale of power supply will be 15 MW but it will increase to 100 MW by 2007.⁵⁶ The project scale is small but it is a very significant development in energy cooperation between the two Koreas.

Coal and mineral resource development cooperation

In 2003, South Korea's Mining Promotion Corporation and North Korea's Samcheoli Company agreed a joint investment in the development of graphite deposits in Jeongchon, Hwanghae South Province in DPRK. At present, the two sides are also planning to pursue joint development of iron ore deposits in Moosan, Hamkyung North Province, gold deposits in Woosan, Pyongan North Province, and Bookboo coal deposits in Eundeok, Hamkyung North Province. A total of eight private companies from South Korea are interested in taking part, due to the large deposits in place. For example, the proven reserves of iron ore in Moosan are estimated to be 1bn tonnes (the projected production capacity is 8mt per year), and the proven reserves of gold in Woosan are 1,000tonnes.⁵⁷

Coal is a main energy source in the DPRK and its important role is unlikely to change in the foreseeable future. In the DPRK, there are quite significant coal reserves but the quality of coal is not high. This is the reason why less than 40% of coal production is allocated for power generation and the steel sector. DPRK's coal production was 37.5mt in 1985 but production declined to as low as 18.6mt in 1998, even though the figure rose to 23.1mt in 2001. The production level could significantly increase if a new investment is made. Currently domestic coal supplies almost 90% of fuel for industry, 45% of energy for power generation, and 80% of the energy for household usage.⁵⁸

In the DRPK there are over 100 centrally-controlled mines, of which 70 are anthracite mines, the remaining 30 being bituminous mines. Besides this, there are regional based 500 minor mines.

Crude oil exploration cooperation

Until the early 1990s, the DPRK used to receive 2 mt/y of crude oil from the FSU and China but this decreased to well below 1mt/y during the second half of 1990s. This was due to the fact that crude imports from the FSU were completely suspended and China cut its supply to only one third of the amount it provided during the 1980s. From the DPRK government's viewpoint, the way to solve the energy shortage was to make an oil

⁵⁶ Yonhap News, 3 December, 2004.

⁵⁷ Meil Kyungje Shinmoon, 29 June, 2004.

⁵⁸ The share of coal in energy consumption is electricity generation 39%, household 15%, railway 2%, metallurgy 8%, industry 33%, and other 3%. Coal production share between anthracite and brown coal is divided into 80 vs 20 ratio. See, Jong Jin-Chang, 'Clean Coal Technology in DPR Korea', presented at an international workshop on Upgrading and Integration of Energy Systems in the Korean Peninsula : Energy Scenarios for the DPRK of Korea, organised by Italian Ministry of Foreign Affairs, Landau Network-Centro Volta, World Information Service on Energy, and Fondazione Opera Campana dei Caduti, , Como, 19-21 September, 2002.

discovery offshore. Since the 1960s, Pyongyang authority has made a huge effort to explore its offshore.⁵⁹

North Korea achieved its dream of becoming an oil producer in 1998. Even though the scale of annual crude oil production from the Sook-Cheong County's Anju Basin is very small (0.3 mt/y), to the North Korean authorities it is a significant volume.⁶⁰ Besides the West Korea Bay exploration, the authorities have initiated the exploration in Anju Basin by inviting Russian specialists with experience in West Siberian oil development.

The Chosun Ilbo reported that overall supervision of oil development is being led by DPRK premier Sung-Nam Hong. Under his leadership, both the Oil Bureau (headed by Mr. Jung-Shik Ko) and KOEC (headed by Mr. Jung-Shik Ko) are responsible for the oil exploration and development.⁶¹

In 2000, reportedly both UK's Soco International and Sweden's Taurus Petroleum proposed to Hyundai Corporation and Korea National Oil Corporation (KNOC) to form a consortium for oil and gas exploration in the Yellow Sea.⁶² Hyundai estimated the Block B and C's reserves at around 100m – 1bn barrels, the estimate being based on two discoveries from the ten drilling wells. The firm believed that the economics of exploration in the west Korean Bay would be justified given a minimum discovery of 40-50m barrels worth of reserves. The firm wanted to apply to the Korean government for exploration rights. No significant step was taken after the summit.

In late August 2002, Singapore-based Sovereign Venture Pte Ltd. announced that it had found oil and gas reserves from the contracted area in northern Hamkyung province and expected to be able to recover a minimum of 1tcf of natural gas and 10m barrels of oil reserves from the concession area.⁶³

In South Korea, KNOC is responsible for continental shelf exploration and development. In the DPRK, its counterpart is KOEC, which has responsibility for oil development and oil concession matters.⁶⁴ KNOC and KOEC have never discussed the Yellow Sea boundary issue of the question of West Korea Bay exploration. Ideally, KOEC, KNOC and CNOOC should discuss together the Yellow Sea boundary issue and the question of joint exploration (regardless of the settlement of the boundary issue). In particular, joint exploration in the Yellow Sea and any discoveries would offer a unique opportunity to settle the boundary issue.

⁵⁹ For the details of DPRK's exploration effort, see Keun-Wook Paik, 'North Korea's Approach for Oil Exploration & Production' presented at an International Workshop on 'Seabed Petroleum in the Yellow Sea : Geological Prospects, Jurisdictional Issues, and Paths to Cooperative Development', co-organised by Woodrow Wilson International Center for Scholars and China Institute of International Studies, April 16-17, 2004.

⁶⁰ In 1991 the import volume of crude oil was 1.89 mt but the volume recorded only 0.61 mt in 1998.

⁶¹ Chosun Ilbo, May 26, 2001.

⁶² Meil Kyungje Shinmoon, May 13, 2000.

⁶³ <http://www.rmfddevelopment.com/political/NorthKoreaOil.htm> For an interesting article on DPRK's potential oil reserves, see <http://www.hartford-hwp.com/archives/55a/161.html> and http://210.145.168.243/pk/073rd_issue/98120902.htm

⁶⁴ Until the beginning of 2004 there was no organization representing the oil developing issues within the Cabinet, except some of the energy specialists working within the advisory committee within the governmental structure. Now KOEC is converted into Ministry of Oil Industry.

On 19 May 2004 a Korean newspaper, Dong-Ah, reported that the DPRK's Oil Industry Ministry has asked the Korea National Oil Corporation to take part in an oil and gas exploration project off North Korea's west coast. The US Energy Information Administration said "West Korea Bay is geological analogous to China's Bohai Bay". There could be a chance to make a discovery if a comprehensive exploration is done in the West Korea Bay. North Korean sources give this site the potential of Nampo 5 to 40bn barrels of oil, but this is considered a highly speculative judgement.⁶⁵

Global GeoServices of Norway reported in October 2003 that it planned to do seismic surveys in DPRK's offshore, but KNOC said its contract has expired on 30 April. Concessions previously held by Taurus Petroleum of Sweden, Soco International of the UK, and Beach Petroleum of Australia have lapsed. Petronas of Malaysia took over Block A, previously held by Soco.⁶⁶ A rumour is that Petronas decided to withdraw from the project due to the invisible pressure from the Chinese authority.

In mid-May 2004 KNOC was considering participation in an exploration project off North Korea's west coast.⁶⁷ However, the behind-the-screen approach backfired when the on unexpected media coverage of communications between KNOC and KOEC, hindering further progress on cooperation between the two parties.

DPRK authority stance towards the collaboration between KNOC and KOEC was indirectly explained by the British Newspaper report. The Observer reported that

"Aminex Plc clinched a deal with the government of North Korea to explore and develop all the country's potentially oil-bearing territory, with a decisive say in production.... The deal – signed secretly in Pyongyang during the summer in the presence of the British ambassador – gives Aminex 20- year rights over the industry, via a joint venture with the government. It has also negotiated the right to receive royalties, revenues and the pick of the best acreage should it prove productive"⁶⁸

A more detailed interview story by the Financial Times exposed the characteristics of the deal Aminex has signed with Pyongyang authority.

"The North Koreans proposed to draw the contract up under Swiss commercial law. It was finally signed in Pyongyang in June in the presence of the British

⁶⁵ An officer from the Ministry of Commerce, Industry and Energy (MOCIE) said that DPRK authority proposed a working group meeting in Kumkang mountain to review the proposal. A KNOC official was quoted as saying that the company was seeking talks with North Korean officials in June or July.

⁶⁶ Dong-Ah Ilbo, May 19, 2004 ; Oil and Gas Journal, 'Exploration off N. Korea might include S. Korean participation', June 7, 2004, P. 42

⁶⁷ North Korean sources placed potential off Nampo 5 to 40 billion bbl of oil, but this is considered highly speculative. In October 2003 Global GeoServices of Norway reported that it planned to acquire seismic surveys offshore, but KNOC said its contract has expired. A KNOC official was quoted as saying the company was seeking talks with North Korean officials in June or July. See, Dong-Ah Ilbo, May 18, 2004 : Oil and Gas Journal, "Exploration off N. Korea might include S. Korean participation", June 7, 2004, p. 42.

⁶⁸ The Observer, "British company strikes first deal for oil prospecting in North Korea", September 19, 2004.

ambassador... Under the agreement, Aminex will provide technical assistance such as analyzing seismic data and introducing foreign investment in return for a share of future production and royalties. The company also has the right to cherry-pick and drill wherever it considers promising and is eyeing an area off the western coast".⁶⁹

If these reports are the case, the deal is extremely good for Aminex but terribly bad for Pyongyang authority. This Aminex deal indirectly confirms that Pyongyang authority's frustration in attracting a reliable western energy firm for its offshore exploration. Unfortunately Aminex deal will serve as obstacle rather than facilitator for DPRK's offshore exploration.

Until comprehensive exploration work is done the real scale of the DPRK's offshore oil and gas reserves will remain unknown. However significant investment from the West, which is needed for effective exploration work, is very unlikely until the nuclear crisis is resolved.

1.3. The implications of energy cooperation between the two Koreas

Real progress in energy cooperation between the two Koreas depends upon the resolution of the second nuclear crisis. No party in the region is interested in being involved or witnessing another military confrontation. Even the DPRK authorities say that that they are willing to give up their nuclear programme as long their security is guaranteed. A string of six party meetings have been held in Beijing in an attempt to resolve the crisis peacefully.

If a breakthrough is made after the 2004 presidential election in the United States, the energy supply issue will be at the centre of any economic aid package to the DPRK. Energy cooperation between the two Koreas could then reach a significant level. Energy cooperation is not an issue confined to the two Koreas, however, but extends to all parties in the Northeast Asian region. A successful settlement of the crisis will open the door for the systematic development of energy infrastructure not only in DPRK but also in Northeast Asia, cooperation leading to a Northeast Asian Energy Community.⁷⁰

At the beginning of 1990s, Professor Masaru Hirata, the driving force of North Asian Gas and Pipeline Forum proposed a large-scale Pan Asia-Pacific Natural Gas Network.⁷¹ The current behind-the-scenes competition between Japan and China with regard to crude oil pipeline development from East Siberia to Northeast Asia is only one small part of a regional energy infrastructure. South Korea has already established a 2,440km nation-

⁶⁹ Friederike Tiesenhausen Cave, "Aminex makes rare foray deep into the 'axis of evil'", Financial Times, October 6, 2004.

⁷⁰ Through Khabarovsk Communiqué (2001 October) and Vladivostok Statement (2003 April), Korean government was the most active in this initiative. Japan has promoted the so-called ASEAN + 3 (Japan, Korea and China) initiative (Hiranuma Initiative). Japan's initiative is not extended to the Russian Federation.

⁷¹ After reviewing Prof. Hirata's proposal, author touched the issue of Northeast Asian Energy Charter Treaty for the first time. See, Paik Keun-Wook, 'Towards a northeast Asian energy charter', Energy Policy, Vol. 20, No. 5 (May 1992), pp. 433-443.

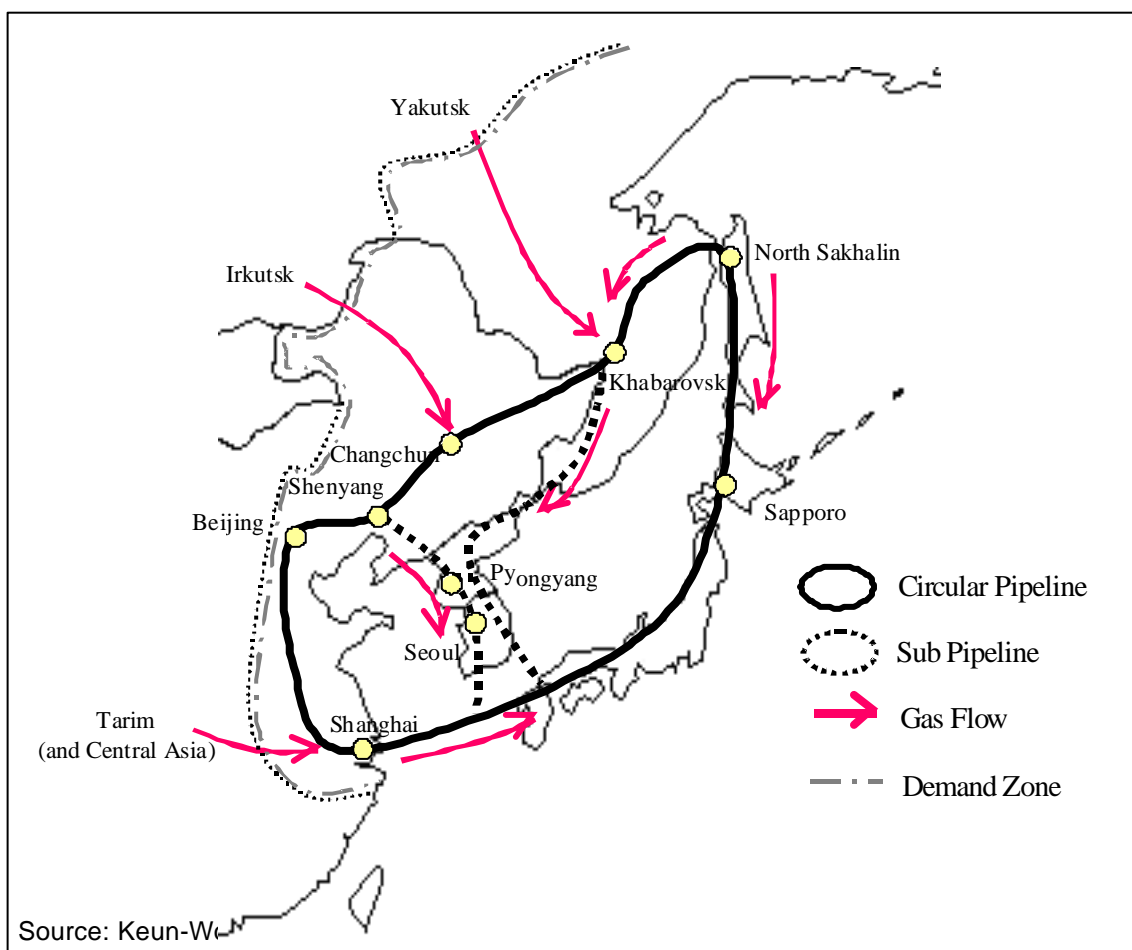
wide trunk pipeline network and this domestic trunk pipeline played a pivotal role in natural gas expansion in Korea. In China, China National Petroleum Corp (CNPC) is planning to complete a 20,000km onshore trunk pipeline by 2020, and China National Offshore Oil Corp (CNOOC) is planning to build a 3,759km coastal pipeline network (of which 2,259km onshore and 1,500km offshore) before 2010. If the CNPC trunk and the CNOOC network are connected, China will have a nation-wide gas pipeline network in place by 2020.

In 2003 Russia announced a blueprint for energy infrastructure development in the western part of the Federation. In addition to this 'Energy Strategy of Russia up to 2020', a federal programme, 'Economic Development of the Far East and Zabaikal up to 2010' has also been written. The intention is to establish a trunk oil and gas pipeline network in East Siberia and the Far East. The only issue being that although Japan has spent almost 15 years feasibility study on a trunk pipeline introduction to Honshu, the main island of Japan, no action has been yet taken.⁷²

Even if the trunk pipeline is not built in Japan, pipeline development in the Korean peninsula, China and Russia will form the basis of a Northeast Asian Natural Gas Pipeline Grid in the future. Ideally, the network should be comprised of Russia, China, Korean Peninsula, and Japan, as shown in the map. Such a larger circular pipeline could also include two inner circular pipelines to ensure minimal disruption to gas flow. However, without Japan's trunk pipeline, the greater circular pipeline will not be completed.

⁷² Keun-Wook Paik, 'Geopolitics of Pipeline Development in Northeast Asia : The Reality and the Implications' presented at 11th LawAsia Energy Law International Conference on Towards Energy Co-operation in the Asia Pacific Region', organised by LawAsia Energy Section, Seoul, June 22-25, 2004 ; Victor D. Kalashnikov, Russian Far East Energy Sector Development and Co-operation Strategies towards Northeast Asia, presented at 2004 COE Summer International Symposium on Siberia and the Russian Far East in the 21st Century : partners in the Community of Asia' organised by Slavic Research Centre, Hokkaido University, Sapporo, July 14-16, 2004.

Map: The proposed Greater Circular Pipeline in Northeast Asia ⁷³



⁷³ The concept of this pipeline was initially suggested by author's paper 'Sakhalin-Hokkaido Gas Pipeline Introductions and Its Implications towards Circular Pipeline Development in Northeast Asia', presented at an international conference on Advancing the Japan Pipeline Project for Introducing Sakhalin Natural Gas, organised by Hokkaido Sakhalin Natural Gas Pipeline Study Committee, 2nd April 1999. However, the concept was drawn as a map by Mitsubishi Research Corp in early 2000, and Dr. Kengo Asakura introduced this map in his article on Trans-Korean gas pipeline could help Asia energy security, environmental problems (Oil & Gas Journal, May 15th, 2000), p. 75. Author used the map without this clarification in his paper titled "Revitalising North Korea's Energy : Based on Pipeline gas option", presented at LNCV's conference on Korean Peninsula : Enhancing Stability and International Dialogue, 1-2 June, Rome (<http://www.mi.infn.it/~landnet/corea/proc/033.pdf>). To prevent any further confusion, author decided to clarify this issue in this paper.

According to IEA's *World Energy Investment Outlook 2003*, the projected investment in Russia and China's energy sector will reach to \$1,050bn (of which \$328bn is for oil and \$332bn is for gas) and \$2,253bn (of which \$119bn is for oil and \$98bn is for gas) respectively until 2030. Massive investment is needed to develop this type of energy infrastructure development. In China the development of a nation-wide pipeline network prepared by CNPC, and coastal pipeline network being planned by CNOOC, and a number of LNG terminals in the coastal areas will be the beneficiaries of these major investment. In Russia, the development of oil and gas fields in East Siberia and Far East region and the related trunk oil and gas pipelines will require the big scale financing.

Korean Peninsula is very well located to have an extension of the major oil and gas pipeline infrastructure from Russia and China to be extended once the political settlement of current DPRK nuclear crisis opens the door for an active energy cooperation between North and South Korea.

In Northeast Asia, however, there is no regional co-operative framework that could protect the large scale of investment. Most of the cross-border energy trade and investment projects inevitably incur the problem of incompatibility between the laws and regulations among nations and different investment environments. Negotiations for cross-border energy trade often means a long process of co-ordination between producers, transit countries, consumers, investors, central and local governments, etc. This is why Northeast Asian region really needs to introduce regional co-operative framework.

Multilateral cooperation in Northeast Asia is not a remote possibility but will be a reality in the foreseeable future.