Shale Gas Revolution and Desperate “Eastward” Energy Policy of Russia

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I. INTRODUCTION

North America's shale gas revolution has fundamentally changed North America' s energy market, thereby bringing new opportunities and challenges to the Northeast Asian LNG market.

For North America, due to the increase in shale gas production, the export-import structure of gas in the US has been reversed, and the possibility of energy independence has increased. In the meantime, Canada, being almost fully dependent on the US for gas export, can not help but explore new markets, which is in fact the Asian market.

For major Northeast Asian gas importers, such as Japan and Korea, which are heavily dependent upon the Middle East and East Asia, Russia's East Siberia is considered a new alternative for the purpose of diversifying LNG import sources for the past decade. Therefore, Northeast Asian countries tried their best to secure East Siberian gas through enhancing their bilateral relationships with Russia. However, due to the recent shale gas revolution in North America, the Northeast Asian region now encounters new opportunities in LNG contracts, which is totally different from the situation in the past.

In the meantime, once the negotiation on gas prices between Russia and China is settled, 38bcm of Russian gas will be introduced to China, In this regard, Korea and Japan should pay attention to the possible revamp in the Northeast Asian energy market and the impact related to securing energy supplying sources.

Under these circumstances, the introduction of American shale gas with a cheap price and favorable conditions Ci.e., Henry Hub price, without the clauses of take or pay and destination, etc.), or Canadian gas with relative advantages in terms of transportation distance and gas reserves, is predicted to exert a significant impact on the Northeast Asian LNG market.

Given that Northeast Asia has been significantly dependent on the Middle East or neighbouring East Asia in terms of energy security, if the region become the beneficiaries of North America 's shale gas revolution, the most notable thing would be that America and Canada, which have been alliances in political and military contexts, will become alliances of Korea and Japan in energy security as well. It can be referred to as a grand paradigm shift.

Apart from North America, Australia and East Africa have huge potential in gas production, which can enhance the buyers' power in the Northeast Asian LNG market.

For Korea, the implication of East Siberian gas is not simply limited to the area of energy security, since the PNG project (gas pipeline linking Russia and South Korea via North Korea) based in East Siberian gas fields are considered as important methods to secure peace and prosperity on the Korean peninsula and in Northeast Asia. However, this project is thought to have missed a good time to be commenced, and Russian gas is losing its price competitiveness s compared to North America and Australia.

In conclusion, it is necessary to establish new rules and policies in the Northeast Asian energy market and within the regional situation as a whole. Initiatives on the LNG trading hub in the Asian region should be pushed forward through closer regional cooperation. In particular, Korea, Japan, and China, as major consumers, have to share common interests and make the maximum use of the favorable conditions of the shale gas revolution. Furthermore, the scope of cooperation should not be limited to Northeast Asia, which includes Korea, Japan, China, etc., but be expanded to the Asia Pacific region including North America.

II. SPECIAL REPORT BY Oh Sung-hwan

1 . The Revolution of the Energy Industry following the Introduction of Future Energy

Shale gas, as one of the energy resources for the future, is attracting global attention and expectations. Shale gas has huge deposits (i.e., adequate), is relatively cheap, affordable), and exists all around the world evenly (i.e, reliable). Shale gas is the newest version of energy resources, which could overturn the traditional concept of energy security.

Maria van der Hoeven, the Head of IEA, said that during the past 15 years the growing demand in China' s energy market has had the biggest impact on the world oil market. Meanwhile, in the next five years, she predicted that the increase in North America' s energy supply will be a crucial factor in the formation of the world energy market. Moreover, the concept of oil peak has also nearly vanished at present.

According to the Energy Research Institute of the Russian Federation, although energy demand in developed countries is currently decreasing, gas consumption in the world gas market is continuing to grow due to the increase of energy demand in newly developing countries, which can offset the

decreased amount. In this regard, the Institute predicts that the advent of the Golden Age of natural gas is around the comer at least for 30 years from now on. From a long term perspective, the share of oil and gas in the world energy mix will not change significantly. For example, oil and gas accounted for 53.65% of the global energy mix in 2010 and are expected to account for 51.4% in 2040. However, the share of untraditional energy resources such as shale gas, oil sand etc is forecasted to increase more rapidly than traditional energy resources due to the fast speed of technology development

In the meantime, the IEA analyzes that gas demand for transportion has increased due to the shale gas boom and China's enhancement of environmental policy, and recognizes the importance of this phenomenon. In this regard, Maria van der Hoeven, the head of IEA, also recognizes that natural gas has become one of major power generating energy resources and predicted that natural gas will play an important role as a fuel for transport in the next 5 years. However, she added that the increase of demand in world gas market may be delayed by the factors such as the continued delay of economic recovery in Europe and certain sign of revival of coal in the fuel market for power generation, as a result of the rebounding gas prices in the US.

At present, North America has become the only region in the world that is developing shale gas for practical purposes due to accumulated investments and research on drilling methods such as fracturing, under the patronage of the US government since 1980, while according to many experts, it would take at least 10 years for other countries to successfully develop shale gas.

Russia firmly holds onto its negative stance on shale gas development.

President Putin expressed his own opinions about shale gas in the Second Gas Exporting Countries Forum, which was held in Moscow in July 2013, as follows: "Currently shale gas is actively developed in America, but in terms of prices, shale gas is not competitive compared to conventional gas. Moreover, it is likely to demage the environment. The impact of shale gas is often over-estimated by some people. Although Russia has huge deposits of shale gas, Russia is capable of supplying consumers all over the world with its own conventional gas alone. If the technology for shale gas is further developed, shale gas development in Russia can be realized. But, for the time being, there is no need to develop shale gas in Russia."

In the meantime, even within the Russian government supportive opinions for shale gas development have been often raised. In May 2010, the Energy Committee of the National Duma expressed concerns that a sharp decrease in demand for Russian gas is likely to take place due to the shale gas development in North America, Europe and China. Thus, the Duma emphasized the necessity for R&D on shale gas development. However, Former Minister of Energy Sergei Shmatko responded at that time that the impact of shale gas on the world energy market would be insignificant. Further, in February 2012, Alexei Miller, CEO of Gazprom made it clear that Gazprom will not participate in the global competition for shale gas development. In early 2013, Gazprom declared that it will concentrate on the development of traditional gases including the development of the Arctic Ocean without developing shale gas.

2 . EpicenTer of the Shale Gas Revolution: North America

In 2009, the US became the world' s largest gas producer by exceeding Russia, and still maintains its status. The output of American natural gas in 2009 amounted to 584bcm, and Russia's output

was 527.7bcm. In 2012, America's gas production amounted to 681.4bcm, whereas Russia's output was 592.3bcm, accounting for 20.4% and 17.6% of the world natural gas market respectively. According to the EIA, due to the rapid increase of gas production America 's gas import has been decreasing since 2011. In 2012 the US imported only a small amount of gas from traditional gas suppliers such as Canada and Norway, which amount to 5 6% of its total gas consumption .

In the meantime, the IEA forecasts that in 2020 the US would be the largest oil producer by exceeding Saudi Arabia and Russia. and in 2035, the US is predicted to be an energy independent country.2)

Table World Natural Gas Production (2011) (bcm)

Country	2007	2008	2009	2010	2011	2012	2013
1 us	545.6	570.8	584.0	603.6	648.5	681.4	20.4%
2 Russia	592.0	601.7	527.7	588.9	607.0	592.3	17.6%
3 Iran	lll.9	116.3	131.2	146.2	151.8	160.5	4.8%
4 Qatar	63.2	77.0	89.3	116.7	145.3	157.0	4.7%
5 Canada	182.7	176.6	164.0	159.9	159.7	156.5	4.6%

(Source: BP Statistical Review of World Energy June 2013)

2) Economist, Vol. 1186, May 6, 2013, "Northeast Laugh and Russia, Middle East Cry"

At present, the US is estimated to produce 91% of the total output of shale gas in the world. The US has the second largest shale gas reserves (24.41tan), and owing to the progress in exploration technology, the success rate of its exploration of shale gas is estimated to reach up to 20%. In regard s to this level of success rate, profit arising from shale gas development can offset the cost. Currently, the shale gas boom in America is creating new i:;henomena such as a massive population influx and formation of new cities, which reminds us of the Gold Rush in the past. This atmosphere encourages landlords to develop more shale plays. According to the EIA, thanks to the oil and gas development in the US, oil production increased every month by 39%, and gas by 25% between 2007 and 2012. During the same period, employment in relevant industries increased by 40%, while the growth rate of employment in the whole industry of the private sector remained at 1%.

The US is predicted to become a net export country of natural gas by 20'22 due to the rapid increase in shale gas production, whereas until 2005 it was expected that import from overseas gas market would increase rapidly.

Now, the US is trying to replace existing facilities for LNG import with LNG export facilities to deal with the oversupply of gas. In particular, the US is planning to build extra LNG export tenninals for liquefaction and compression. Accordingly, the US is projected to equip facilities for LNG export with a daily capacity of 60-80bcf between 2020 and 2025. In 2012 the total volume of LNG in the world LNG trade market amounted to 240 million tons. In this context, in the future the US is going to enjoy its dominant status in the world LNG market as it is predicted to supply 150 million tons of LNG, by itself, for the market.

Meanwhile, the IEA announced in March 2012 that the US crude oil import from the OPEC marked

the lowest figures in the last 25 years due to the development of shale plays in the US. For example, in 2010 crude oil was hardly produced in Eagle Ford, Texas; however, as a result of the development of shale plays, in March 2013, crude oil produced in Eagle Ford accounts for 22% of oil produced in Texas, and 7% of the that in the US.

The US is well equipped with infrastructure for shale gas development including advanced pipeline networks and drilling experiences accumulated since a long time ago. This can be regarded as fairly big advantages in the light of the fact that most countries are not equipped enough with the necessary infrastructure. Actually, most countries apart from the US and Canada have little experience in drilling shale layers, and without real drilling practice, it would be difficult to understand the geological characteristics and obtain know-hows .

Now, the Northeast Asian LNG market is expecting more favorable conditions for LNG contracts, thanks to the relatively cheap price of American gas. Suppose that oil price is $100, and Henry Hub price maintains under $6.60/mmBtu, North America LNG is capable of compete with the oil-indexed Middle East LNG in the Asian market in terms of price competitiveness.

In May 2011 the OOE approved export for the Sabine Pass LNG terminal based in Louisiana, which is the first case of export approval on shale gas made by the US government. The US government's principle was to issue export permits to all countries with which it concluded an Ff A without exception, and the government has some reservations about non-Ff A countries. However, by including India at that time, the US extended its scope of permission to non-Ff A countries for the first time. Afterwards, in May 2013, the export permis sion to the Freeport LNG terminal based in Texas, was approved by the DOE. Upon this permission , the US also allowed export to a non-Ff A country. Since then, the US approved the Lake Charles LNG terminal in Louisiana and the Cova Point in Maryland in August and September 2013 respectively. Consequently, the US is strengthening its active export policy on shale gas.

Korea's KOGAS, the world's largest single buyer of LNG, received the US government's awroval and signed a contract with an American company, Cheniere Energy, to purchase 3.5 million tons of natural gas for 20 years from the company's Sabine Pass export plant from 2017.3) Japan, although being a non-FfA country, is also going to introduce US gas from tlrree projects: Free port, Cameron and Cova point proj ects, all approved by the US government. As a result, Japan is predicted to secure around 20% of its total LNG import with shale gas from America after 2017.

3) In addition, SK E&S LNG contracted to use Freeport to liquefy 2.2m tonnes of LNG per year for the next 20 years(Today Energy News, Sep 10, 2013)

The Lake Charles LNG export terminal m Louisiana is capable of exporting to all foreign countries including non-FrA countries with a maximum volume of 2.0 bcf/d in the next 20 years. The DOE explained that the Lake Charles LNG project would not violate the public interests of the US, and went through a review of its economic and environmental impact, influence on energy security etc., for this approval, and in this reviewing process nearly 0.2 million opinions and comments from various circles were collected.4l Thanks to the approval of the Lake Charles LNG export project, the US is capable of exporting 5.6bcf of gas, which accounts for approximately 8% of its total LNG output.

The US aim of the ongoing Panama Canal expansion project is to advance into the Asian LNG market. The project is planned to be completed by the end of 2015, although some unexpected delay

has occurred. If the Panama Canal is widened enough to allow the passage of LNG tanks, the distance from the US to the Northeast Asian region will be significantly shortened, from 25,750km to 4,500km. After the completion of the Panama Canal, the cost of export from the US to Japan, for example, is expected to be lowered to around $1.50/mmbtu. According to the BG group's estimation, the Sabine Pass project's LNG shipping cost to Asia through the Panama Canal is predicted to amount to $11.20/mmbtu.

Canada is heavily dependent upon the US in terms of exporting natural gas. Canada has been exporting 92% of its natural gas to the US without difficulty. However, Canada is facing challenges due to the recent rapid decreaseSl in its gas export to the US and the active export policy of

4) US needs the approval by the Ministry of Energy (DOE) to export energy. To export to non-ITA countries, the public benefit should be considered as additional condition by DOE.

5) Amount of gas exports to US : 64 Million Tonnes(mt) (2008), 53(mt) (2009), 45(mt) natural gas of the US, which will begin to be realized in 2015, thereby actively seeking new LNG markets for export. In this regard a quite interesting phenomenon occurred in which the new competitive relationship between US and Canada is formulated to secure new exporting market, as both countries are competing against the same consumer, the Asian market. Consequently, Canada invested 60 million USD to develop an LNG export project in western Canada. At the same time, the US also plans to invest 50 million USD to convert existing LNG import facilities into ones for export.

Currently the US LNG export pricing is linked to the Henry Hub pricing mechanism. Therefore, Asian buyers whose long-term contracts with Middle Eastern suppliers based on oil-linked pricing could not only benefit from lowered gas prices and diversified importing routes, but also enj oyed increased flexibility in the US LNG volume according to their needs. In this regard, if Canadian LNG export pricing is linked to gas-to-gas pricing mechanism, it would not only provide diversified gas prices and supplies toAsian consumers, but also give Canada more favorable conditions in competing with the US in the Asian LNG market.

3) The Paradigm Shift of Energy Security

On the basis of the above-mentioned contents, the paradigm shift of energy security, which was caused by the shale gas revolution, may be largely defined by the following three major factors of change.

(2011) Consulting Strategy Technology Management Institute, Shale Gas Development, Implementation Forecast and its impact on major industry volume, p.6

Globalization of the World Natural Gas Market and the Share of LNG

Firstly, due to the shale gas boom, the world natural gas market will become globalized, and the share of LNG will increase compared to PNG. The natural gas market traditionally existed under locally isolated conditions. For example, the gas price in the l\1iddle East only amounts

$0.75 per 1,000 cubic feet, whereas Asian price is $17. However, the natural gas market will gradually be integrated into a single market in the same way the oil market was developed, as the deviation in local gas prices is expected to be reduced significantly when global gas supply meets demand by expanding shale gas in North America as well as traditional gas in Australia and

East Africa. According to some estimates, the global gas price will be stablized at a level between $4 and $7 per 1,000 cubic feet.6l Recently, the relatively cheap shale gas price has facilitated the trading of LNG around the world. As a result, the locally isolated gas market is predicted to transform into the globalized market.

With regard to the LNG market, it will develop more rapidly than the PNG market. When it comes to the current trade volume of global natural gas, PNG accounts for 68%, and LNG accounts for 32%, a 1/3 of the total production. However, in the global LNG market newly emerging major gas supply countries such as North America, Australia and East Africa, will create new demand markets, which is predicted to increase up to 40% by 2016. Australia plans to operate 7 LNG terminals by 2016 thereby driving export policy. Indeed, Australia is expected to become the largest LNG exporter in the world in the next 10 years, exceeding Qatar. Recently

6) San Antonio Business Journal, Aug 28, 2013

Mozambique, which is rapidly growing as a big supplier in East Africa, is capable of exporting up to 50 million tons per annum.

Meanwhile, the shale gas boom is expected to impact not only the oil and gas industry but also other sources of energy such as renewable and nuclear energy. These two energy sources will naturally lose momentum for development. For example, although the Obama administration approved construction of a new nuclear power plant in February 2012 for the first time in the past 34 years, the US has decided to suspend 4 reactors among 104 reactors in operation. Many experts predict that the nuclear industry in the US will be decreased due to the shale gas boom.

Transformation of the Energy Supply Market following the Instruction of the US as a Major Encounter

Secondly, since the US has made inroads into the energy supply market, the market itself could experience crucial disturbance or aftermath, due to the gigantic size of the US energy market. America' s oil production is marking the highest record since 1992. The IEA forecasts that in 2020, the US will exceed Saudi Arabia and the Russian Federation, and become the largest oil producing country. The IEA also predicted that in 203.5, the US will achieve high energy self-sufficiency, and finally become an energy-independent country. Victor Gao, former Vice President of the CNOOC, describes the implication of the US government' s ambitious pursuit of energy independence as "America' s second independence."7) He

7) Global Energy Cooperation Center(GECC), 2nd International Shale Gas Conference, volurne2, Victor Gao, "Energy Revolution and Its Global Implications" Sep. 10, 2013, Ministry of Foreign Affairs(MOFA) assumed that if there were no shale gas, China and the US would eventually compete for the same barrel of oil, resulting in eventual confrontation or even war over energy. In his opinion, this is why China has all the reason to fully and whole-heartedly support America's energy independence. Furthermore, Gao insists that the faster and the better America achieves Energy Independence, the better it is for China.

It means that US energy dependency on the :Middle East will be significantly reduced. From the :Middle East perspective, it will also face energy security challenge. Middle East countries have to secure new exporting countries.

However, the US is still importing a significant amount of oil from the Middle East, to this day, so

there remain questions on how fast and how much the US is going to reduce its energy dependence on the Middle East. For example, if we assume that the US imports 10 million barrels of oil from the Middle East every day, but all of a sudden the US suspends all imports, then where should the huge amount of oil from the Middle East go? It is highly unlikely that the Middle East will find new alternate export markets. If the Middle Eastern oil has no where to go, it will cause a sharp drop in oil prices in the world market, and will naturally damage the US shale gas industry as well. For the US, such a situation would be one of the worst scenarios that should be avoided, Thus it is necessary to take control on the tempo of production. Moreover, some argue that the reduction of US oil dependency on the :Middle East will incur significant change in the US policy toward the Middle East, including serious reduction of the US military stationed in the Middle East. However, US policy on the Middle East is not simply affected by oil, and many investments have been made by the US and European countries in important Middle East countries including Qatar, which should be protected by the US military. Therefore, counter-arguments predict that the l\lfiddle East will remain as one of the top priorities. According to David L. Goldwyn, a donor US State Department special envoy for international energy, suddenly having a great wealth of domestically produced gas and, increasingly, oil will not allow the Unkted States to take less interest in international affairs, including those of politically challenging countries that produce oil and natural gas in the Middle East and elsewhere. This means the United States will still care deeply about keeping sea lanes open for all kinds of trade and about diversity of global energy supply.

US self-sufficiency in natural gas has been a domestic bonanza. The country's balance of trade has improved, gas is now competitive in price with coal, and despite the absence of a carbon price or cap, US carbon dioxide emissions in the first quarter of 2012 fell to levels not seen since 1992, in large part due to the decline in coal-fired electricity generation as utilities substituted gas for coal.) If the US significantly reduces its dependency on fossil fuels such as oil and coal by successful development of shale gas, US will face more favorable conditions in its fulfillment of obligations to reduce greenhouse gas emissions. Further, the US will be able to take advantage of this favorable conditions by adopting a more assertive leadership role once again in the multilateral arena.

In the meantime, if North America's shale gas boom expands to countries such as China and Europe in the mid and long term, its impact will be much more serious. For example, it has been generally assessed that in China, full-scale shale gas development would be difficult for the time being due to concerns such as the shortage of technical personnels in the field of exploration, lack of pipeline infrastructure, insufficiency of knowledge and experience in geological structure, scarce water resources, environmental pollution etc. However, shale gas development in China will not be delayed forever. The :Ministry of Land and Resources of the People's Republic of China predicts that shale gas production will increase up to 6.5bcm equivalent to 6.4% of its total natural gas production by 2016.

CNPC is exploring and developing about 83 gas fields in China including Sichuan, Shaanxi, Chongqing partly through cooperation with Shell, and while SINOPEC is in the middle of exploration and development in 23 gas fields, cooperating with Devon. It is expected that the China's natural gas demand will increase about 10% per annum by 2016. Further, CNPC and CNOOC invested 15.2 billion US dollars in purchase of American and Canadian shale gas development companies' stocks for the past 2 years to obtain advanced technologies and experiences. These cases, as some argue, strongly show that Chinese NOCs have special interests in securing approaches to technologies and experiences by making joint ventures with major American firms in order to shorten the necessary period of time to acquire knowledge of unconventional shale gas production . Actually, bilateral

shale gas cooperation is gaining strong momentum in both the US and Chinese governments as well as from the business communities of the two countries.HJ

10) The share of China's natural gas in the energy mix has increased from 2% to 4%, and will continue to increase up to 8% by 2015 and 10% by 2020.

11) Jane Nakano, David Pumphery, Robert Price, Molly Walton,"Prosprects for Shale Gas Development in Asia", A Report of the CSIS Energy and National Security Program(Aug, 2012) p9

If China starts to practically engage in shale gas development, Russia' s gas exporting policy will be seriously affected, as China is expected to be the largest and most important market for Russia to implement its future gas export plan.)

Global Competition in the Northeast Asian LNG Market and Establishment of the Bases for Easing the Regional Gas Premium

Thirdly, shale gas will cause global competition in the Northeast Asian LNG market. Thanks to its relatively cheap prices, it could provide bases to ease Northeast Asian premium. For example, Korea and Japan have established strong alliances with the US traditionally in the fields of world politics security and military security. On the other hand, in terms of energy security they are heavily dependent on the lVIiddle East and neighbouring resource-rich Asian countries. However, thanks to the emergence of shale gas, Korea has established a strong alliance to the field of energy security, thereby resulting in totally different and new situation. For Korea and Japan, the concept of alliance is expected to expand even to the area of energy security, which means that a grand energy paradigm shift will occur from the energy security perspective. For Japan, a recent approval by **DOE** for Freeport LNG Terminal project and Lake Charles LNG Terminal project will help Japan 's energy security, and its economic recovery. For referen ce, in Japan, with the suspension of nuclear power plant after the Fukushima accident in 2011, its dependency on fossil-fuel based power generation increased up to 88 percent, which is the highest record in its history. And the increasing amount of importing LNG for power generation negatively affected Japan's trade balance in favor of deficit. But, thanks to the approval of shale gas import by US, they certainly can expect the benefit in improvement of trade balance, and in reducement of the excessive dependency on the Middle East, thereby helping to promote energy security in Japan.

For example, Japan's LNG imports amounted to only 3.4 trillion yen in 2010, but imports increased up to 6 trillion yen in 2012, an increase of two folds in the two years. In 2012 Japan's trade deficit was around 7 trillion yen, of which a great portion of the deficit was the result of the surge in LNG imports.

On the other hand, in the Northeast Asian gas market there has been no alternative except Russian gas until several years ago,13. But, due to North America' s shale gas boom, Northeast Asian countries are going to lose their strong sympathy on the Russian East Siberian natural gas development project. This project has been one of the biggest interests by Northeast Asian countries for the last decade. Consequently, this situation could lead the Northeast Asian countries to gain more leverage in the negotiations with Russia. In fact, Russia's gas export market is suffering a dilemma: first dilemma is a continuous decrease of European countries' demand on Russia's gas. Russia actually exported 64% of its total gas export to Europe. The second dilemma is a decrease of the world gas price due to North America's shale gas boom. The third dilemma is the increase of global competition between Russia and other major gas producing countries such as Qatar and

Australia. These countries are trying to expand their gas production.

In the meantime, apart from non-traditional gas, there will be some big changes with regard to the list of traditional gas exporting countries to Korea. Currently, Korea imports around 18% from Indonesia, and 12% from Malaysia, but these countries cannot remain as big exporting countries anymore in the near future due to decreasing reserves of natural resources, complicated drilling method, long period of time for development etc. These countries will be transformed from LNG exporting countries into LNG importing countries. On the contrary, Korea will import from Australia around 20% of its total gas import volume by 2017(Currently, Australian gas accounts for only about 2%). East Africa is also expected as a potential emerging big exporting region in the mid and long term. For example, there are Tanzania and Mozambique. In these countries, civilians consume only less than 10% of its total gas product. This means more than 90% of its gas production will be distributed to the world export market.

Countries in Northeast Asia need to look for vanous importing routes including the US, Australia and Mozambique while they promote joint efforts to lower Asia's gas premium.

Before coming to a close, along with the aforementioned three big paradigm shifts in the global gas market, the immense influence of shale gas on the global oil market should not be overlooked . The IEA Executive Director Maria van der Hoeven assesses that the increase of North America' s oil production offsets the shocks of the oil supply market which has been tight during recent several years. This means that the shale gas boom has relieved the situation of the oil market. Moreover, with the world economic growth rate forecasted to be 4.5% according to the optimistic projection, she predicts that the world oil demand is expected to increase by 8% between 2012 and 2018, but that this demand can be fully covered by the increase of the non-OPEC member countries' productions, which is predicted to increase more than 10% from 2012 to 2018. Some productions indicate that in the next 5 years most of the newly emerging demand in the world oil market can be covered by America's shale oil. According to this forecast, OPEC member countries will have increasingly less room for maneuver with regard to the volume of oil production.

The increase of oil production in the US nourishes different opinions among OPEC member countries. America, which is marking the highest records in its history of oil production since 1992, declared its plan that the US will significantly reduce its oil dependency on OPEC in the future. According to EIA, US oil imports decreased 21% in 2012 compared to 2011, and oil imports in January 2013 decreased 5.9% compared to the same period in the previous year. If this tendency continues, 2013 is predicted to mark the highest record of self-sufficiency on oil. In particular, the staggering increase of US oil production s reorganizes the world oil market. It contributes not only domestically, to the US energy self -sufficiency, but also internationally, to the stable maintenance of world oil prices.

4. The Impact on the Northeast Asian LNG Market

Notwithstanding the fact that LNG imports of four countries including Korea, Japan, China and Taiwan account for 63% of the total volume of the world's LNG trade, the reg:i:m has be.en paying a five-fold higher gas price than the United States). Such paradoxical phenomenon that Asian countries are experiencing is referred to as the 'Asian Premium' .

For example, in October 2012 Henry Hub gas price was $3.21/mmBtu while JCC, the LNG price for Asian countries, reached$17.12/mmBtu. This shows how *big* the gap is between the

two regions. The reason why the Asian Premium occurs is mainly due to the absence of an LNG trading market in Asia and long term contracts for LNG purchase indexed to oil prices .

With regard to this Asian Paradox, IEA said in its report that Asia has no effective regional gas market where prices are determined by the regional market supply and demand, and no LNG hub to facilitate the exchange of natural gas and the development *d* a transparent price signal to steer investments in natural gas infrastructure. The agency also noted that the absence of these mechanisms result in higher gas prices in the region and thus, developing LNG trading hubs is needed in the region to reduce the Asian Premium.

According to recent statistics, the oil-indexed pricing in the Asia-Pacific region decreased from 95% in 2005 to 88% in 2010, which in fact shows small signs of improvement in terms of the Asian Premium.

In accordance with shale gas development, the US is pursuing an LNG export policy to make inroads into Asian markets, and thereby current rigid terms and conditions of LNG purchasing contacts in Asian markets are predicted to become more flexible. As mentioned in the previous section, Korea's KOGAS signed a contract with Cheniere to purchase 3.5 million tons of LNG per annum in the Sabine Pass liquefaction starting from 2017 for 20 years on the basis of the Henry Hub price.16) This contract was the first approval for ING export made by the DOE to KOGAS along with the BG Group, Gas Natural Fenosa, and Gail Gas. In this regard, it is noteworthy that this contract was unprecedented, being the first US export permitted to the Asian LNG market in appliance with the Henry Hub pricing mechanism. In addition, KOGAS signed a contract with the TOTAL to resell 0.7 million tons of LNG among 3.5 million tons secured from the US. The implication of this contract is significant given that previously, under the contract in compliance with the JCC, an Asian LNG buyer was prohibited to resell to third parties, and was locked to one destination. The Japanese also wants to index LNG against the Henry Hub prices in the USA This condition is becoming fashionable throughout

Japan, as the largest LNG importer in the world, endeavors to overcome the oil indexed LNG pricing mechanism, and stabilize the LNG import price. In this context, the :Ministry of Economy, Trade and Industry (METI) launched the LNG Future Market Association in November 2012. This association is comprised of major stakeholders in the LNG market such as INPEX, Sumitomo, Marubeni, Mitsui, Mitsubishi, The Tokyo Commodity Exchange, Japan Commodity Clearing House and Institute of Energy Economics, Japan etc. According to the report published by METI earlier in April 2013, the association proposed the Japanese government to establish an LNG spot market with a payment in kind by early 2014, and set up tentative price standards on the spot market through the collecting and disclosing of its data for six months. Given the currently increasing risk in the short term and in kind LNG trading, this proposal is useful for risk hedging, and if the index in the spot market approaches the supply and demand equation in the real LNG market, then this index could earn credit from the market and be used as a price indicator, thereby contributing to the stabilization of LNG price.20)

Furthermore, the report made a suggestion to encourage other Asian consumers including Korea and Taiwan to join the association, and reflect their opinions and hopes, thereby raising the liquidity of the spot market.

In this connection, Singapore, where the market price of Asian petroleum products is decided, established a plan to operate large LNG storage facilities, and expects to introduce shale gas from

the US. Therefore, Singapore seems to have big potential to be connected to the LNG spot market, or function as a common market. In particular, the IEA believes that Singapore is the most likely hub in Asia for natural gas trades with the capacity of reducing government interventions. By the report of Bloomberg, Singapore has a new LNG terminal with up to seven storage tanks and a capacity of 20 million tons that will begin receiving LNG from Qatar.21)

In the meantime, as one of the important prerequisites to reduce the Asian premium , it is important that gas trading circumstances within the region are formed and infrastructure secured. For Korea, KOGAS' s construction technology in LNG import terminal and LNG storage tank is recognized worldwide as the best ones, and it is expected to play important roles in the process of the formation of LNG spot market. Lately in 2011, 60 LNG tanks in three LNG import terminals such as Incheon, Pyeongtaek and Tongyeong are under operation. In 2010, Korea's LNG storage capacity amounted to 8.7 mcm, which can cover 42 days under average gas demand, and 22 days in the peak period.22) At present, the 4th LNG import terminal in Samcheok, with 14 tanks, is under construction and projected to be completed by 2014. In addition, the Swagato Chakravorty, "Asian LNG trading Hub: Singapore Could Change Asian LNG Pricing" Energy and Capital, Feb, 11, 2013 construction of the 5th LNG import tenninals is being reviewed to secure a stable supply for the metropolitan region in which gas demand is concentrated. For China, there are currently 6 LNG import tenninals m operation, and 10 more tenninals are planned to be constructed.

Eventually, the Northeast Asian region, despite its massive volume of gas consumption and gas trade, is experiencing a dilemma of not only the Asian Premium but also very limited gas trade within the region. Thus the Asia LNG Market Forum, which was held in 2012 in Shanghai and where the CEOs of five major LNG importing countries including China along with Korea, Japan, Taiwan and India convened, became in fact a starting point for the discussion on reducing the Asian Premium.

At present, initiatives for the launch of a Northeast Asian trading hub, apart from the abovementioned Japan's endeavor to create a LNG spot market, are in the middle of review by nations and cities including Korea, Shanghai in China, Singapore etc. Any city in Korea, Japan, China, or Singapore could be a possible location for the Northeast Asian gas hub, but joint research to enhance the integration of gas hubs and the connectivity among the countries in the region need to be conducted, thereby increasing the synergy effect within the region. The ideal condition for the gas hub would be a place with enough storage facilities and trades of both LNG and PNG. In short, a massive-scale gas flow should be formed constantly.

If the gas trade between China and Russia is achieved, Shanghai could be a good candidate city for the Northeast Asian gas hub. Korea could improve the ability to control seasonal gas demand thorough gas swaps with Shanghai.

Now, various ways for cooperation in regards to the Northeast Asian gas hub are being discussed in industries and the academia of Korea and China. For example, some discussions on joint projects between Korea and China are ongoing such as the joint development on shale gas in China, joint operation of LNG terminals in China, joint application for tenders on energy and natural resources development in third countries, and the take over by overseas companies through the establishment of joint ventures. In particular, the joint project for connection of gas transport infrastructures between Korea and China, is becoming more persuasive. For implementing this project, concrete ideas such as connecting underseas gas pipeline between China and Korea, or transferring North America' s shale gas, purchased by Korea, to China through large size LNG ships were raised for further discussion.

Eventually, the gas hub in Northeast Asia could serve as a long-term and systemic solution to resolving high gas prices in the region. Existing rigid conditions on the LNG long-term LNG contract, imposed by a supplier to a consumer such as 'Take or Pay'or 'Destination Clause' should be promoted.

Meanwhile, since the North American gas industry, taking advantage of its relative advantage in price and flexible conditions, is seeking the Northeast Asian LNG market, the establishment of an Asian gas hub must be regarded as favorable conditions by North America, and this also meets the country's interest.

Therefore, with regard to the Asian gas trading hub, Korea, Japan, and China, as major consumers, have to share common interests and make the maximum use of the favorable conditions of the shale gas revolution.

Furthermore, the corporation should not be limited to Northeast Asia, which includes Korea, Japan, China, or Russia, but be expanded to the Asia-Pacific region including North America.

On a different note, Russia, which advocates traditional gas suppliers, is standing against the initiatives of Northeast Asian gas consumers, such as trying to mitigate the Asian Premium, and establishing a gas hub.

Russian President Vladimir Putin urged to unite traditional gas supplying countries in the Summit of "2nd Gas Export Country Forum'', which was held in Moscow on July 1, 2013. According to the ITAR-TASS report, President Putin called gas supplying countries for a unified response as follows: "Consumers impose economically unacceptable conditions for LNG supply to us, and try to change the principles of LNG supply based on long-terrn contracts, and abolish the oil indexed gas pricing mechanism. That is to say we are facing serious challenges."24)

This Moscow Forum was held for the second round after the one at Doha, Qatar in 2011. The forum was attended Heads of states or relevant Ministers from member countries such as Russia, Qatar, Iran, Venezuela, Egypt, Lybia, Nigeria, UAE, Oman, Trinidad and Tobago, Equatorial Guinea etc., and Heads of delegations from observer countries such as Kazakhstan, Norway, Netherlands, Iraq etc. The participating countries' share of export in the world gas market accounts for 45%.

President Putin strongly spoke for the stance of gas supplying countries through an interview during the Forum as follows: "Given that the world gas demand in 2018 is expected to increase 16% compared to the current demand, and amount to 4tcm, gas supplying countries should enhance international cooperation, to protect their own interests. In particular, some consuming countries are claiming for changes about the basic principles on gas supply such as long-term based contracts and the oil linked gas pricing mechanism. However, it is likely to impede investment from gas supplying countries, and cause problems in each country's gas supply and demand in the long term."

"Currently, trade in the spot gas market is increasing, but this trade can not replace the long-term contract based on the 'Take or Pay' principle. Given that it is necessary to share appropriate risks between the supplier and consumer for a fair gas trade, only long-term contract could guarantee energy security of each Parties. The European Union's Third Package is a relic of premodern days, and this Package significantly damages the countries, which have been contributing to the development in the European gas industry for the last several decades.

II . Russia's Role in Energy Cooperation in Northeast Asia

1. Russia's Gas Export and Northeast Asian Energy Policy

1) Northeast Asian Gas Market

The Northeast Asian region, which accounts for about 25% of the total **GDP** and the population of the world, respectiv ely is the world's largest energy consumer. Four Northeast Asian countries (China No. 1, Russia No. 4, Japan No. 5 and Korea No. 10) are listed among the top 10 largest energy consumers in the world, while the region includes one of the largest energy provider s, Russia with 8.8 billion barrels of crude oil and 32.9ton25l of natural gas.

In Europe, due to its recent continuous economic downturn, the projection of the economic growth rate and energy consumption is being consistently assessed as negative. On the contrary, in the light of rapid growth of population and fast development of industry in the Asian region, the region is expected to continue to increase its energy consumption, which will be driven mainly by China and India in the next 30 years. Accordingly, the status of the Asian region in the world energy market continues to rise.

According to the EIA, global gas demand is predicted to increase 9% per annum by 2016, with the rapid economic growth in East Asia, as China is forecasted to increase its gas demand 10% per annum on average by 2016. In addition, the Institute of Energy Economics Japan(IEEJ) predicts that the share of natural gas as a percent of total energy use in Asia will increase substantially from 16% in 2008 to 21% by 2035.

With regard to LNG trade, LNG importing countries are expected to increase continuously from 2011 to 2026, and among them China and India are assessed to emerge as key ING consumers. In fact, 60% of the increased portion in the world LNG trade is predicted to be attributed to Asia, and the share of China and India may account for 76% 87%.

2) Overview of the Russian Federation's Energy Status

In 2012, the revenue from raw materials including oil and gas accounted for 50.2% of the Russian government' s total revenue, and in 2011 it was around 48%.

Due to its high dependency on the energy industry, Russia is vulnerable to the fluctuation of the prices of the world's raw material market including oil and gas. Therefore, Russia needs to secure energy export and import routes in order to ensure the country's sustainable economic growth.

As the demand in Europe is decreasing due to the region's econonuc crisis, and the price in the Europe's ING market is lowered due to the North America's shale gas revolution, Russia is actively looking forward to new opportunities in the Asian market, and trying to reduce its dependency upon Europe in the long run.

In the mean time, despite the boom in the world's gas market, Russia, with its largest gas deposits in the world, ironically is facing the situation of becoming an outsider in the world gas market.

According to the Ministry of Economic Development of the Russian Federation, the increasing competition among the suppliers such as Russia, the US, and the Middle East in the world's

natural gas market, is predicted to bring serious impact on Russia's energy market. If Russia is not able to tackle its high gas production costs, it is likely to lose its competition in the world's natural gas market.

In 2009 the US became the largest gas producing country by exceeding Russia. Moreover, according to the BP's survey, Iran, with gas reserves of 33.6tcm, turned out to have the largest gas reserves in the world by exceeding Russia as well.26)

In April 2013, the Ministry of Economic Development of the Russian Federation published the report that the competition in the world's gas market by the increase of North America' s shale gas export, would pressure Gazprom to lower the price of gas exports by 2016.

Energy Research Institute of the Russian Academy of Sciences predicts that the period of next 10 to 15 years from now would be a critical time for the Russian gas industry as shale gas production is expected to increase sharply . Thus, based on the premise that extraordinary circumstances do not take place during this period, Russia's oil and gas export is predicted to decrease by 20%. Accordingly, this would lead to the reduction of investment in the energy sector, and afterwards, in 2040 the share of investment in the energy sector in Russia's total amount of investment, is forecasted to account for 11.2%, which means half the amount of 2010.

According to the report of the l\lfinistry of Economic Development, the average price of Russian gas supplied to Europe amounts to $399.9 per 1,000m', but is forecasted to decrease gradually down to $329 per 1,000m' by 2016. In this regard, as the REC Daily suggested, given the new circumstances that the gas price based on Henry Hub in the spot market amounts to $157 per 1,000m', whereas the price of National Balancing Point is $363 per 1,000m' , many experts assess that it is inevitable for Gazprom to show an accommodating stance in pricing mechanism for gas export in order to remain competitive.

In fact, as 'Energy Strategy of Russia 2010(1995)' and 'Energy Strategy of Russia 2020(2003)' were prepared before North America's shale gas boom, there was relatively less difficulty in understanding the real situation in the energy market, predict the near future, and make a decision on energy policy. However, with regard to 'Energy Strategy of Russia 2030, which was approved in November 2009, there are some in the Russian government and the academia, who are concerned that it does not reflect the key factors including the shale gas revolution in the world energy market, thus, a huge gap is likely to form in the near future.

3) Russia's Gas Exports and "Eastward" Energy Policy

Russia's East Siberia, where there exists a great deal of large-scale gas fields including Kovykta (with reserves of approximately 2tcm) and Chayanda (with reserves of approximately 1.3tcm), is endowed with huge gas reserves, which account for 20% of Russia's total reserves. During the past several years, numerous Russian people have insisted on the need for Russia to make inroads into the energy market in the Asia-Pacific region.

However, the problem in East Siberia is that the infrastructure is yet to be equiwed for export, and even facilities for domestic supply are not sufficient. Due to the weak infrastructure, gas production is yet to be realized, and a considerable amount of gas produced is flared on the spot, or reinjected to maintain the pressure of the geological stratum.

The Russian government has been preparing the so-called 'Eastward' energy policy since a decade ago to fix these difficult situations. In August 2003, the government issued 'Energy Strategy of Russia 2020', addressed toward the Asia-Pacific region as a new export market. Through such effort, Russia aimed to promote the energy export structure which was heavily dependent on Europe, aiming to take up 30% of the Asia-Pacific oil market, and 15% of its gas market by 2020.27) As the first step, in December 2004, the Russian government launched the proj ect of the Eastern Siberia-Pacific Ocean Pipeline(ESPO), connecting between Tayshet of East Siberia and the coast of Perevoznaya of Primorye Province, with a distance of 4,118km.28l

Afterwards in September 2007, Russia, in parallel with the ESPO, officially approved the Unified Gas Supply System(UGSS) in the east to explore new opportunities in the Asia-Pacific energy market by extending the existing gas pipeline in operation in West Siberia to the Northeast Asian region. The Eastern UGSS's plan is to establish four major gas production centers in Krasnoyarsk, Sakha, Irkutsk, and Sakhalin within the East Siberian and Far Eastern regions, and then by connecting monolithic gas pipeline to supply to the local people along with the consumers in Asia- Pacific countries including China, Korea etc.

When the Eastern UGSS was approved, there are many points yet to be fixed or cleared. Consequently, according to the construction plan on the Eastern UGSS approved by Gazprom in 2012, the export of Russian gas to Asia including China and Korea will be realized through the 'Chayanda gas field-Khabarovsk-Vladivostok pipeline.

In the meantime, despite various development projects on East Siberia announced by the Russian government, oil companies have shown rare interests in East Siberia since 2008. In fact, during 2008 and 2012, the number of mining fields newly sold in lots has not even reached 20. This low level of interests shown by oil companies on new mining fields on East Siberia was attributed to the geological uncertainty on the new mining fields unlike ones that are already sold out, increase of investment costs in the initial stage due to insufficient infrastructure, and the uncertain prospect on gas sales. As this tendency continued, there have been many setbacks and delays in the development plans of East Siberian natural gas pursued by the Russian government, apart from the Sakhalin gas fields, which are in the middle of production. According to the original plan by the Russian government, Chayanda and Kovykta projects should be completed by 2016 and exports of both projects should start from 2017. However, Kovykta gas field project is expected to start production at the earliest after 2019, and the development of the Krasnoyarsk gas field is also forecasted to be delayed inevitably.

Consequently, President Putin called for overall reviews on Russia's gas policy and the Eastern UGSS, by raising reasons such as the shale gas boom in a meeting of the presidential energy commission, held in October 2012. Accordingly, the progress of all negotiations, which are conducted by Russia with China, Korea and Japan, respectively, is expected to be strongly affected by the outcome and contents of the Eastern UGSS, which will be approved by the Russian government.

One thing worth noting is that under the country's financial circumstances, the most important issue for Russia would be to secure financial resources in the Russian Far East. Actually, the development of the region will be very difficult without foreign loans. In this case, Russia could request an advanced payment or the provision of a loan when concluding a contract with Asian-Pacific buyers. For example, on March 22, 2013, China signed a contract with Russia to provide a two billion loan and an advanced payment for Russian oil.

In this regard, there are some critiques from Western viewpoints that Russia's position on the Eastern UGSS could be assessed as an example of its duality. According to them, although the Eastern UGSS, which will develop new gas fields in the Far Eastern region, needs to be pushed forward as a priority, but Russia is reluctant to invest in the region because of its financial deficiency. On the contrary, Russia is conducting the South Stream project actively in order to bypass Ukraine, although this project is very expensive, and will not yield any productivity.

Russia has been trying to expand its exporting routes to the Asian-Pacific region. To this end, Russia has promoted negotiations with China, Korea and Japan regarding the supply of gas.

According to BP sources of 2011, while Russia exports 140.6 bcm to the European market annually, its export to the Northeast Asian market currently remains at only 14.4bcm, in other words, export to Euro£ is ten fold greater than that of Northeast Asia. As of now, although the gas price has not been set in China's case, 38 bcm is to be exported to China annually once price negotiations are made. Then, the share of the Northeast Asian market is expected to increase sharply.

However, Russia's gas supply to Northeast Asian countries has not seen much progress despite quite a long period of negotiation. In particular, cheap US gas pnces are transforming the Asian market in a more challenging way. Furthermore, as China, the largest potential consumer of Russian gas, has secured gas supply from not only Central Asia and the East Africa but also from its own supply, this challenge in Northeast Asia is being aggravated. In the case of Japan, while the nation is predicted to increase its demand of natural gas as an alternate energy resource because of the suspension plan on nuclear power plants since the Fukushima accident, the biggest obstacle in ongoing negotiations between Russia and Japan is that Gazprom is insisting on the oil-indexed gas price.29l

2. Russia-China Energy Cooperation

President Xi Jinping of China visited Russia from l'viarch 22nd to 24th for his first trip abroad as China's top leader. President Xi Jinping confirmed that China will make developing relations with Russia a priority in its foreign policy orientation and agreed on cooperation in the oil and gas sector.

During the March visit of China's president, Xi Jinping, to Moscow

Russia and China have signed a package of agreements in the oil and gas sector. Under the memorandum between Gazprom and China National Petroleum Corporation, the Russian gas giant will build a spur to China from the Power of Siberia gas pipeline (Yakutsk -Khabarovsk - Vladivostok) to supply China with 38 billion cubic metres of gas with the potential to boost shipments to 60 billion cubic metres in future. Russian gas flows to China, agreed for 30 years, will start in 2018.30)

China currently imports 0.33 bcm of gas from Russia, which is the smallest amount of Russian gas being imported compared to the 9.76bcm and 3.88 bcm of imports by Japan and Korea, respectively. However, if the joint development project on Chayanda gas field between China and Russia is realized, China is expected to import a huge amount of gas from Russia, which amounts to ten folds the amount of Russian gas imported by Korea at the moment.

The 38 bcm is less than the planned 68 bcm per year it would have shipped under an earlier agreement which envisaged shipments from both untapped new fields in East Siberia which would

be linked to China by a new pipeline, and West Siberia.31l

In signing the memorandum of understanding, Gazprom gave up it's dream of using its core fields in West Siberia to supply both Europe and China and become a 'swing supplier' capable of transporting the same gas east and west, thus supplying gas in the most lucrative price option.

Gazprom and CNPC agreed that 38 bcm of Russian gas per year would flow from the Chayanda gas field through Russia's East Siberian fields to China starting from 2018. However, the current MOU still falls far short of settling on a final supply although the two countries have agreed upon the gas pricing formula.32)

China prefers gas import from the Russia's East Siberian fields that is within a 2,(X)Okm range to imports from the West Siberian fields within a 5,000km range. Thus China is only considering gas imports from the East Siberian fields for China-Russia PNG negotiations.

Even with the reduction of the agreed gas volume from 68 bcm to 38 bcm, China would be Gazprom' s largest customer, ahead of Germany, which imported over 33 bcm of Russian gas last year33)

In a sign that CNPC has taken a more accommodating stance in return, the Chinese energy company agreed to discuss an up-front payment for the 30 years worth of gas supplies, which would likely be an interest free arrangement that could whittle down the proj ected cost of delivering the gas, according to analysts "It is a new vehicle to balance the price gap," said Keun-wook Paik, a senior fellow at Oxford Institute for Energy Studies.

The current MOU still falls far short of a final accommodation on price between the world's largest conventional gas producer and the fastest -growing energy consumer. Both sides have committed to signing a deal by year end but neither has shown any sign of conceding on price.3.5l

Both countries plan to conclude a legally-binding agreement including price conditions by the end of 2013, but it is expected that the deal will not be easily concluded as there have been great differences in opinion on the gas price for a long time. The High Development cost of the Chayanda gas field, which will be a supply source of Russia's gas exports, is another variable of the deal.

Analysts say there is little possibility the two will agree on a final price deal as China moves to take advantage of the rapidly expanding supply options and secures contracts to cover the rising gas demand in the coming decades. "We do expect a deal to eventually be concluded," Chinese analysts wrote in a note. "However, unless and until we get news from both sides that a price has finally been agreed to, we will consider the deal not yet done, and we are not fully convinced it will be reached in 2013.")

In fact, Gazprom and CNPC concluded the contract on important conditions in the gas supply from Russia to China through the Eastern Siberian line(Agreement on the maj or terms and conditions of pipeline gas supply from Russia to China via the eastern route) , during the G20 Summit held in September 2013 in Saint-Petersburg. Still, most of the conditions of this agreement have almost no differences with the MOU signed in March. Moreover, no agreement related to prices was included in this contract, as both sides could not reach an agreement upon prices. According to some press sources, with regard to the pricing system, Gazprom wants the level of oil indexation to yield a price equivalent to its European sales while China wants a lowered price based on Henry Hub.

In the mean time, China's priority lies in PNG as China shares its vast border with gas producing countries including Russia. Therefore, the country is not inclined to participate in the LNG proj ect. Moreover, dramatic progress has recently been made in China's PNG importing conditions particularly from Turkmenistan and Myanmar.

First, with regard to Turkmenistan, all the PNG introduced from abroad to China so far comes from Turkmenistan through CACGP(Central Asia-China Gas Pipeline). According to BP Statistical Review of World Energy, in 2010, China first began to import 3.55 bcm of gas from Turkmenistan (21.7% of total amount of gas export by Turkmenistan, which amounts to 16.35 bcm). In 2011 China imported 14.3 bcm of gas from Turkmenistan (46.2% of total gas export by Turkmenistan, amounted to 46.2%), and in 2012 imported 21.3 bcm of Turkmenistan gas. Furthermore, Turkmenistan is expected to increase its gas export to China thanks to the Galkynysh gas field, which entered into operation in September 2013, with an estimated reserve of 13.1 21.2 tern, which is considered to be one of the top five gas fields in the world. In 2020, Turkmenistan is projected to increase the volume of gas supply to China up to 65 bcm per annum.

The Siberian PNG deal has not been settled and the possibility of reaching an agreement by the end of this year seems to be low. China is not in a hurry to make negotiations on the deal because it currently has alternative imports from Central Asia including Turkmenistan.37)

Next, with regard to Myanmar, the construction of the gas pipeline between China and Myanmar started since 2009, and was finished in June 2013. This pipeline amounts to approximately 800 km in length, is proj ected to connect Myanmar with the inland of China through Yunnan Sheng in the future. It is capable of transporting 12 bcm per annum, which will cover 1/4 of the total demand on natural gas in China. With the completion of the construction of this pipeline, China is going to import natural gas directly from the Indian Ocean. The Myanmar gas pipeline is expected to function as one of the major gas transport routes, which include the China-Central Asian line, China-Russian line and other maritime transport routes etc.

In summary, Russia is urgent in securing importers of its East Siberian gas. Therefore, if Russia does not take a more accommodating stance on price negotiations such as lowering the price through subsidies, the deal is not likely to be reached within this year.

3. Korea-Russia Energy Cooperation

Korea has imported 1.5 million tons of Sakhalin II LNG per annum since April 2009, which accounts for 6% of its total gas imports. If the pipeline construction project connecting Korea and Russia via North Korea, which was agreed by the two presidents in September 2008, turns into reality, 7.5 million tons(lObcm) of additional Russian gas would be provided to Korea, accounting for 17.7% of Korea's total gas imports.

In accordance with the planning of the abovementioned project, Korea is expected to introduce Russian gas from two gas production centers including Yakutsk and Sakhalin.

The Chayanda field being considered as the heart of the Yakutsk gas production centers, with gas reserves of 1.2 trillion cubic meters, and is regarded as the most important part of the Eastern UGSS. In accordance with Gazprom' s construction plan in 2012, Chayanda gas will be transported via the Yakutia-Khabarovsk-Vladivo stok pipeline, with a length of about 3,200 km, for exports to Korea.

Still, as the measure to deal with helium, Russia's strategic mineral are yet to be decided, the

development plan has not been prepared in detail, but substantial development is expected to commence in the near future.

When it comes to the Sakhalin center, the production of gas from Sakhalin I and II are under way, and Sakhalin ill and VI are scheduled for construction in the future. Among them, Korea's main importing sources will be Sakhalin II and ill.

ROK-Russia-DPRK gas pipeline project arms for not only resolving economic issues related to securing a long-term supply of natural gas, but also dealing with political problems including the promotion of inter-Korean relations by connecting the two Koreas and Russia, and the contribution to the stability on the Korean Peninsular.38) Potential stakeholders such as Russia and South and North Koreas, have discussed the project several times, and so far, tangible progress has not been made. In this regard, one Russian government official made an interview with Rossiyskaya Gazeta, expressing unsatisfactory feeling as follows: "According to the information, the Korean government has recently approved the plan on the demand and purchase of natural gas for the period of the next 15 years. Pursuant to the plan, while gas consumption in Korea is expected to decrease and import from US shale gas is planned to increase. There is no word on the project between Korea and Russia at all.

However, the stalemate of this PNG project should not be ascribed to Korea's gas demand and purchase policy. The North Korea risk and PNG price are at the heart of the matter. Therefore, with regard to the resumption of the PNG project, how to remove these obstacles would be utmost important. There are some arguments that in case Russia becomes in charge of the pipeline construction in North Korea, this will reduce the North Korea risk. But others are wonied that this will cause a premium in the gas price. A more persuasive argument is that the participation of the ADE or the WE in this project would reduce the North Korea risk significantly.

After all, this PNG project should not be limited to three stakeholders as far as possible. Once stakeholders are expanded, and the project is upgraded enough to meet the global standards, it could solve the matters simultaneously of the reduction of North Korea risk, and the increase of profitability.

As another solution, some scholars from China and Korea argue that in order to complement the uncertainty and vulnerability in the PNG proj ect, there is no need to be overly obsessed with the participation of North Korea. From their perspective, South Korea-China Yellow Sea natural gas pipeline project could be an important infrastructure of gas trade m Northeast Asia. A comprehensive research on this project should be conducted, and if feasible, this project could be dealt with afterwards as an agenda between Korea and China.

In retrospect, for Korea, the East Siberian gas fields have been regarded as not ju st something related to energy security, but something special that is necessary for securing geopolitical stability. In particular, the PNG project, based in the East Siberian gas fields, has been considered as a safeguard that guarantees regional security, and an important method for realizing common interests on the Korean Peninsula and Northeast Asia.

However, this project is thought to have missed an opportune time for commencement, as the North Korean risk is yet to be resolved, and Russian gas is losing its price competitiveness compared to North America and Australia. Accordingly, the Korean government needs to promote the project comprehensively by conducting a thorough review on its progress and problems,

diplomatic and energy security aspects, economic feasibility etc. The bottom line is that resuming or conducting this project is not to confine stakeholders within a triangle framework of cooperation, but to extend the scope of cooperation. Also the project of integrated energy network with China should be newly reviewed to diversify the scope of stakeholders. After all, if the project meets the requirements in the world energy market, and is attractive enough to create new demand, its success will be ensured.

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IV. NAUTILUS INVITES YOUR RESPONSES

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