International Workshop on

Building an integrated Infrastructure in the Korean Peninsula

on September 29, 2005

at Conference Room, KRIHS
Anyang, Korea

Organized by
Korea Research Institute for Human Settlements(KRIHS)
Thursday, September 29th

10:00~10:15

**Opening Ceremony**
Welcome Remarks
Dr. Lee, Kyu Bang (President at KRIHS)

10:15~12:00

**1st Session:**
An Integrated Approach for Infrastructure Development in the Korean Peninsula
Chair: Prof. Kang, Jung Mo (Kyung Hee University)

Presentation
Dr. Lee, Sangjun (KRIHS),
“Integrated Inter-Korean Cooperation on Infrastructure”

Dr. Mitsuhashi, Ikuno (ERINA)
“The Direction of the Upgrading of the Korean Peninsula Transport Network and Priority Improvement Projects from the Perspective of Northeast Asian Economic Development”

Mr. Li, Kun (The Institute of Comprehensive Transportation of National Development and Reform Commission)
“The transportation infrastructure development between China and Korea peninsula”

Discussion
Mr. Li, Kotetsu (National Institute for Research Advancement)
Dr. Oh, Jaehak (The Korea Transport Institute)
Dr. Kim, Kyung-Sool (Korea Energy Economy Institute)

12:00~13:30
Lunch

14:00~16:00

**2nd Session:**
International Cooperation for Infrastructure Development in the Korean Peninsula
Chair: Dr. Lee, Chang Jae (Korea Institute for International Economic Policy)
14:00~16:00

**Presentation**

Prof. Calder, Kent (Johns Hopkins Univ.)
“International Cooperation on Infrastructure Development in North Korea and USA’s role”

Dr. Kachur, Anatoly N. (Institute of Pacific and Geography in Russian Scientific Academy)
“Background of developing the integration relations between Democratic People’s Republic Korea (DPRK) and Russian Federation.”

Dr. Kim, Won Bae (KRIHS)
“International cooperation framework for Infrastructure Development in North Korea

**Discussion**

Prof. Zang, Hyoungsoo (Hanyang Univ.)
Dr. Yoon, Deok Ryong (Korea Institute for International Economic Policy)
Dr. Park, Chang-Won (SK telecom)

16:00-16:20

**Coffee Break**

16:20-17:30

**Panel Discussion**

Chair: Prof. Ahn, Choong Yong (Chungang Univ)

**Discussion**

Prof. Oh, Seung Yul (Hankuk University of Foreign Studies)
Dr. Lim, Kang Taeg (KINU)
Dr. Koh, Il-Dong (KDI)
Prof. Calder, Kent (Johns Hopkins Univ.)
Dr. Kim, Won Bae (KRIHS)
Dr. Kachur, Anatoly N. (Institute of Pacific and Geography in Russian Scientific Academy)

17:30

**End of the Workshop**
Integrated inter-Korean Cooperation on Infrastructure

Sang Jun Lee
Research Fellow
Korea Research Institute for Human Settlements

1. Introduction

According to a statement of the South Korean government, an opening ceremony for the connection of the Gyeong-ui Line and the Donghae Line will be held within this year. It reflects the advancement of inter-Korean cooperation. One of the symbolic projects in inter-Korean cooperation is the Gaeseong Industrial Complex project. In Gaeseong-si and the surrounding area, it is planned to develop 20 million pyong in total (66.1㎢) as an industrial complex.¹ To ensure the provision of electricity and communication to 15 companies in the pilot site, 25km power transmission line from Moonsan in the South to the Gaeseong Industrial Complex is constructed. Also, 15 km phone lines and internet lines are constructed. Agreements at the 10th Meeting of the Inter-Korean Economic Cooperation Promotion Committee include some agreements related with infrastructure development for the Gaeseong Industrial Complex.

Although inter-Korean cooperation on infrastructure has been advanced since 2000, there are many complicated issues that hinder the cooperation. One of the most serious issues is the nuclear problem. Rising military tension related with the nuclear problem could jeopardize inter-Korean cooperation on infrastructure. The talks on the connection of the Trans-Korean railroad(TKR) with Trans-Siberian railroad(TSR) were stopped by North Korea's inaction. North Korea argues that at a time when the United States is toughening its policy in regard to North Korea, the Korean side 'sees no sense' in holding a second trilateral expert meeting on the reunification of the Trans-Korean

¹ http://www.unikorea.go.kr/
railroad.\textsuperscript{2} Also, there are criticisms against inter-Korean cooperation on infrastructure not only from international society but also from some experts in the South. There are some arguments that inter-Korean cooperation on infrastructure must be distinguished from humanitarian support to North Korea because infrastructure development has strategic meaning. Therefore, the prospect for inter-Korean cooperation on infrastructure is not so optimistic.

If North Korea agrees to dismantle its nuclear weapons programs in a verifiable way, there would be an opportunity to introduce massive investment from foreign countries to North Korea.\textsuperscript{3} Although it is not yet clear whether the North Korean regime will give up its nuclear development program, it is evident that resolving nuclear problem is one of the most important preconditions for improving relationships with international society. Also, it is clear that the infrastructure of North Korea could not be rehabilitated without improving relationships with international society. In this regard, resolving nuclear problem is one of the most important preconditions for the rehabilitation of infrastructure in North Korea.

Therefore, the rehabilitation of Infrastructure in North Korea through inter-Korean cooperation on infrastructure is not a simple issue but a complicated one. Although the South Korean government announced providing 2 GW (gigawatt) of electric power to North Korea, dismantling the nuclear weapons program and its verification are important preconditions for providing electric power.\textsuperscript{4}

In this regard, we should consider various aspects of inter-Korean cooperation on infrastructure. We should consider not only economic aspects but also political and military aspects that could affect inter-Korean cooperation on infrastructure. According to the survey by KRIHS, the respondents cited resolving nuclear problem (50%), improving hard infrastructure (23%) and legal issues (15%) as major hindrance to the

\textsuperscript{2} NORTHEAST ASIA PEACE AND SECURITY NETWORK DAILY REPORT. August 10, 2005, from the University of San Francisco Center for the Pacific Rim, California, USA.

\textsuperscript{3} Bloomberg (“NORTH KOREA MAY HALT NUCLEAR ARMS PROGRAM, BAN SAYS”, 2005-08-22) reported that according to ROK Foreign Minister Ban Ki Moon, Kim Jong-il may give up the DPRK's nuclear weapons program in return for security guarantees, energy and economic aid. NORTHEAST ASIA PEACE AND SECURITY NETWORK DAILY REPORT For Monday, August 22, 2005, from the University of San Francisco Center for the Pacific Rim, California, USA.

\textsuperscript{4} South Korea’s offer to Kim Jong Il appears to be benchmarked to past US-DPRK Agreed Framework energy assistance, and is designed to substitute for the power output of the two KEDO light water reactors that were roughly 2 gigawatt-electric in size. Peter Hayes et. al. 2005. “South Korea’s Power Play at the Six-Party Talks”. East Asia Science and Security Collaborative Special Report.

success of Special Economic Zones (SEZ) in North Korea. Because developing SEZs in North Korea has important implications for infrastructure development, the survey result means that political and economic issues can not be separated in inter-Korean cooperation on infrastructure.

In order to implement inter-Korean cooperation more efficiently, we need to establish a master plan for integrated infrastructure system. Although there are some research works on inter-Korean cooperation on infrastructure, a master plan for building integrated infrastructure system in the Korean peninsula is not discussed yet. In order to build a master plan, we need to consider many aspects related with it.

In this paper, major issues on inter-Korean cooperation on infrastructure are reviewed and the concept and roadmap of integrated inter-Korean cooperation on infrastructure are suggested. This work could be a beginning step to find the way for building an integrated infrastructure system in the Korean peninsula. In order to define priorities and some policy issues related with inter-Korean cooperation on infrastructure, mini-survey was conducted.

2. What does “Integrated inter-Korean cooperation on infrastructure” mean?

An integrated approach has various meanings that could be differentiated from a sectoral approach. Because development of infrastructure should reflect various aspects, we should consider not only economic aspects but also political and strategic aspects of infrastructure development. The concept of an integrated inter-Korean cooperation on infrastructure consists of two elements. The first is setting priorities in infrastructure cooperation. It means building hierarchy in infrastructure cooperation. The second is building a horizontal network in infrastructure cooperation. Building priorities and networking in infrastructure cooperation are key points in an integrated inter-Korean cooperation.

6 The mini-survey was conducted in May 2005 and targeted over 210 experts on North Korea with responses from 120.
Setting priorities in infrastructure developments

In order to implement infrastructure cooperation more efficiently, priority setting is necessary. It has an important meaning not only to North Korea but also to South Korea and international community. Developing transportation and energy facilities in North Korea needs massive investments. According to one study related with the North Korean economy, the amount of investment needed for North Korea’s infrastructure was estimated more than US$ 60 billion over the next 10 years. South Korea does not have enough financial resources to support North Korea. In this regard, building priorities and concentration of financial resources on specific infrastructure projects in North Korea has an important meaning not only to the North but also to the South.

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7 Construction & Economy Research Institute of Korea(CERIK), SOC of North Korea and policy directions, 2000.
Priorities in inter-Korean cooperation on infrastructure could be introduced through the considerations about two dimensions. The first is “macro aspects” in inter-Korean cooperation on infrastructure. It means that consideration about international cooperation on infrastructure in Northeast Asia and economic integration in the Korean peninsula are important elements that should be considered in building priorities in inter-Korean cooperation on infrastructure. The second is “micro aspects” in inter-Korean cooperation on infrastructure. Domestic needs on infrastructure development in North Korea by private firms on inter-Korean economic cooperation could be considered as important elements in inter-Korean cooperation on infrastructure. In sum, priorities in inter-Korean cooperation on infrastructure could be introduced by these considerations about macro and micro aspects in infrastructure cooperation.

**Building a horizontal network in infrastructure cooperation**

Horizontal networking in infrastructure development means a networking between infrastructure projects, a networking between various actors such as governments, international organizations and private firms. Development of transportation facilities is deeply related with rehabilitation of power transmission and telecommunication network. Telecommunication network in North Korea is constructed along road network. Therefore, we need to consider near-simultaneous implementation of infrastructure projects. This linkage approach can maximize effects of project implementation and minimize related costs. In order to develop infrastructure such as road, gas, power plants, massive investments are needed. But introducing private capitals to develop infrastructure is not easy especially in transition economies. Therefore, it is inevitable to mobilize public funds to infrastructure development in North Korea. In this regard, networking various actors is important in developing infrastructure in North Korea.

Also, we must consider time schedule of the six-party nuclear disarmament talks in inter-Korean cooperation on infrastructure. Inter-Korean cooperation on infrastructure should be advanced according to the six-party talks. According to Foreign Minister Ban Ki-moon, it will take at least two to three years to dismantle the DPRK's nuclear program.\(^8\) It means that we need a gradual approach to infrastructure development in

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\(^8\) Yonhap News ("N.K.'S NUCLEAR DISMANTLEMENT WILL TAKE AT LEAST 2 YEARS: BAN", 2005-08-24) reported that Foreign Minister Ban Ki-moon said “technical experts will have to get involved in the scrapping, monitoring and inspection process to ensure transparency.”
North Korea. Therefore, building an integrated framework for infrastructure development based on the six-party talks could be an important avenue for building a horizontal network.

3. Issues on Infrastructure Cooperation in Northeast Asia: Macro Aspects

In order to introduce priorities in inter-Korean cooperation on infrastructure, we need to define the current issues in infrastructure development in North Korea in macro and micro aspects. In the macro aspect, we need to review current issues on infrastructure development in Northeast Asia. In this section, some issues on energy and transportation sectors are reviewed because these two sectors have important implications for infrastructure cooperation in Northeast Asia

Energy sector

There is an increasing need for energy infrastructure investment. In fact, there have been discussions on the construction of infrastructure helping exports of Russian gas and oil to Northeast Asian countries. Developing indigenous energy resources in Northeast Asia, especially oil and natural gas is one of the important reasons for energy cooperation in Northeast Asia. Russia proposed many pipeline construction projects including Irkutsk Plan(Irkutsk-Mongolia-China-South Korea). And many other countries proposed similar projects related with pipeline construction.9

Also, there is needed for building electric power grids in Northeast Asia. These potentials for energy cooperation in Northeast Asia could provide a chance to build an integrated energy supply system in the Korean peninsula in the future.

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9 Korea(KPGA) proposed two alternative route from Irkutsk to South Korea through Mongolia and Beijing, with one using an undersea pipeline after Beijing and the other routing via North Korea. North Korea wants pipeline from Far East Russia as follows; Vladivostok-Rajin-Wonsan-Gaesung(800km), Sinuiju-Pyongyang-Gaesung(500km). NIRA. 2003. Grand Design for Stability and Prosperity in Northeast Asia.

Transportation sector

One of the major obstacles to activating economic cooperation in Northeast Asia is the high cost of transport. Deteriorated transportation infrastructure in Northeast Asia such as poor transportation and logistics infrastructure, seriously undermined economic cooperation in this region. In this regard, repairing transportation facilities including railroads and ports are one of the urgent issues for enhancing economic cooperation in Northeast Asia.

There have been discussions about connection of Trans-Siberian Rail (TSR) to the Trans-Korean Rail (TKR). Also, the U.N. Economic and Social Commission for Asia and the Pacific (ESCAP) suggested an "Asian Highway" network. Asian Highway in South Korea is AH1 and AH6 line (907km). For promoting industrial network and economic block in Northeast Asia, building transport corridors based on railroads and highways is needed. Building transport corridors in the Korean peninsula including...
TKR and Asian Highway AH6 can stimulate inter-Korean economic cooperation. These cooperation potentials in transportation sector can play an important role to stimulate inter-Korean cooperation on infrastructure.

4. Issues on Inter-Korean Infrastructure Cooperation: Micro Aspects

North Korea is now confronting many difficult issues related with infrastructure development such as the high cost of transport and unreliable power supply. Most of all, rehabilitation of energy production and related distribution systems must be one of the most urgent. According to the EC-DPRK Country Strategy Paper (CSP) for 2001-2004, the Commission’s priorities for supporting North Korea are concentrated on sustainable management, use of natural resources and reliable and sustainable transport sector.  

It means that issues on energy and transport sectors have an important meaning in infrastructure development of North Korea.

Energy sector

Major issues in energy sector in North Korea could be summarized as continuing degradation of electricity generation and transmission infrastructure. It caused reduction in industrial production. Drastic decline in the supply of crude oil from China since 1990 caused reduction of coal production that is essential for thermal power plants. It caused a lack of electricity in North Korea. Total electrical output fell from about 46 TWh (terawatt-hours, or billion kilowatt-hours) in 1990 to 13 TWh by 2000, with 2005 output likely not very different from that in 2000. Lack of electricity caused serious problems in transportation because North Korea has an electrified railway-oriented transport network. Power supply and other facilities in North Korea are likewise either aging or based on outdated technology.

Transmission and distribution system in North Korea is in a disastrous state of near collapse. To solve this problem, massive investment to grid network and power plants is needed. The fastest way to bring electric power to end-users is to repair the existing grid. The grid can be rehabilitated piece-meal in locations such as major ports and around special economic zones.

In sum, major issues in energy sector in North Korea could be summarized as follows:
• Restore/repair existing thermal and hydro plants;
• Build new thermal and hydro plants;
• Repair, integrate, improve transmission network;
• Rehabilitate, modernize coal production;

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13 http://www.nautilus.org/DPRKBriefingBook/energy/issue.html
Transportation sector

The major issues of transport system in North Korea are a deficiency in transport infrastructure and poor maintenance. Deteriorated transportation infrastructure in North Korea such as poor railroads, highways and logistics infrastructure seriously undermine production activities. The present stock of transport infrastructure in North Korea is comparable to that of the mid-1970s in South Korea.14

In sum, repairing transportation facilities and enhancing its capacity are important issues in transportation sector in North Korea. Some urgent issues in transportation sector can be identified as follows:

- Repair existing road and railroads especially in major harbor and special economic zones;
- Build new highways and railroads;
- Rehabilitate transportation management system;

<Tab. 1> Major issues in transportation and energy sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
<td>Rehabilitation of rail and related facilities.</td>
</tr>
<tr>
<td></td>
<td>Connecting TKR with TCR and TSR.</td>
</tr>
<tr>
<td>Road</td>
<td>Rehabilitation of road. Building express networks.</td>
</tr>
<tr>
<td>Seaport</td>
<td>Rehabilitation of facilities</td>
</tr>
<tr>
<td>Airport</td>
<td>Rehabilitation of facilities and building new international airport.</td>
</tr>
<tr>
<td>Power plant</td>
<td>Rehabilitation of facilities and building modern power plants</td>
</tr>
<tr>
<td>Transmission</td>
<td>Modernization of grid.</td>
</tr>
<tr>
<td>Mines</td>
<td>Rehabilitation of facilities.</td>
</tr>
</tbody>
</table>

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14 Jae-Hak Oh. 1998. “Strategies for Developing Transport Infrastructure in North Korea”, in Developing Social Infrastructure in North Korea for Economic Cooperation between the South and the North, Korea University. p.207.
According to other research works about investment priorities on infrastructure, the rehabilitation of transportation, energy and telecommunication network is the most urgent issue in North Korea.

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting road and railways</td>
<td>1</td>
</tr>
<tr>
<td>Repair harbors</td>
<td>2</td>
</tr>
<tr>
<td>Improving inter-Korean roads and railways</td>
<td>3</td>
</tr>
<tr>
<td>Connecting roads and railways between North Korea and Russia and China</td>
<td>4</td>
</tr>
<tr>
<td>Connecting TKR-TCR/TSR</td>
<td></td>
</tr>
<tr>
<td>Repair airports</td>
<td>5</td>
</tr>
<tr>
<td>Supply Power to North Korea</td>
<td>1</td>
</tr>
<tr>
<td>Modernization power plants</td>
<td>2</td>
</tr>
<tr>
<td>Repair transmission</td>
<td>3</td>
</tr>
<tr>
<td>Networking transmission between two Koreas</td>
<td>4</td>
</tr>
<tr>
<td>Building new power plants</td>
<td>5</td>
</tr>
<tr>
<td>Opening telecom. Line between two Koreas for economic cooperation</td>
<td>1</td>
</tr>
<tr>
<td>Support public telephones in North Korea</td>
<td>2</td>
</tr>
<tr>
<td>Connecting telecom. System between two Koreas (wire)</td>
<td>3</td>
</tr>
<tr>
<td>Connecting telecom. System between two Koreas (wireless)</td>
<td>4</td>
</tr>
</tbody>
</table>


5. Expected costs of inter-Korean cooperation on Infrastructure and its financing

Inter-Korean cooperation on Infrastructure needs massive investment. Peter Hayes estimated that the investment for the power sector of North Korea is expected to amount

Kim, Kyung Sul at KEEI (Korea Energy Economics Institute) estimated the total amount of investment on power and oil sectors in North Korea are $1.8 billion in 2010. Oh, Jae Hak at KOTI (Korea Transportation Institute) estimated the total amount of investment on transportation including railroads, roads, harbor and airport are $42.6 billion in 2020.

The North Korean economy is too weak. North Korea’s nominal Gross National Income (GNI) of year 2004 was only US$ 20.8 billion. The Inter-Korean cooperation fund of South Korea is not enough to cover it, introducing foreign capitals from international society is essential. According to the mini-survey, 61.7% cited introducing public funds from international society through cooperation between two Korean governments as an effective financing instrument.

<Tab. 3> Financing the infrastructure development in North Korea

<table>
<thead>
<tr>
<th>Financing</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Inter-Korean cooperation fund of South Korea</td>
<td>17.5</td>
</tr>
<tr>
<td>② Private capitals from South Korea</td>
<td>6.7</td>
</tr>
<tr>
<td>③ public funds from international society based on inter-Korean cooperation</td>
<td>61.7</td>
</tr>
<tr>
<td>④ Private Capitals in international Society</td>
<td>11.7</td>
</tr>
<tr>
<td>Non response</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Under the experience of transition economies, we could consider two major instruments of financing for infrastructure development in North Korea: one is Official Development Assistance (ODA) and the other is the support of international financial institutions such as IBRD, IDA, ADB etc. For larger projects, international consortium is a feasible and effective way to mobilize financial resources. In the short to medium term, ODA could play an important role in international cooperation. If the nuclear problem could be resolved, it is possible for North Korea to join international financial

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17 The Bank of Korea 2005.5.31.
institutions and to secure funds from those institutions. In this phase, it will be possible to develop large-scale industrial sites in collaboration with foreign firms.

Before we introduce priorities in inter-Korean cooperation, we need to review the main sectors into where funds of international financial institutions go. In the case of IDA\(^\text{18}\), support for projects was targeted at human development such as education, health, social safety nets, water supply and sanitation (44%), infrastructure (26%), and agriculture and rural development (11%). The main factor that determines the allocation of IDA resources among eligible countries is each country's performance in implementing policies that promote economic growth and poverty reduction. \(^\text{19}\) In the case of ADB, the sectors to which ADB does lend the most are agriculture and rural development.\(^\text{20}\)

6. Priorities in inter-Korean Cooperation on Infrastructure

Priorities in inter-Korean cooperation on infrastructure could be introduced through reviews on possibility of cooperation in macro- and micro aspects.

**Priorities in macro aspects**

Infrastructure development projects in North Korea should be undertaken in the sectors and areas that inter-Korean cooperation and international cooperation could be easily achieved. Inter-Korean cooperation and international cooperation to fully exploit geo-economic potentials and resources in North Korea are needed for infrastructure development. In this regard, international cooperation for infrastructure development

\(^\text{18}\) The International Development Association (IDA), established in 1960, is the part of the World Bank Group that provides long-term interest-free loans (credits) and grants to the poorest of the developing countries.

\(^\text{19}\) Three criteria that used to determine which countries are eligible to borrow IDA resources are 1) Relative poverty, defined as GNP per capita below an established threshold, US$965 (as of July 1, 2005). 2) Lack of creditworthiness to borrow on market terms and therefore a need for concessional resources to finance the country's development program. 3) Good policy performance, defined as the implementation of economic and social policies that promote growth and poverty reduction. http://web.worldbank.org/WEBSITE/EXTERNAL/EXTABOUTUS/IDA/

\(^\text{20}\) ADB is a multilateral development finance institution dedicated to reducing poverty in Asia and the Pacific. Established in 1966, we are now owned by 63 members, mostly from the region. ADB's operations are diverse, covering agriculture and natural resources, education, energy, finance, health, nutrition, and social protection, industry and trade, law, economic management, and public policy, transport and communications, water supply, sanitation, and waste management, activities involving multiple sectors. http://www.adb.org/About/default.asp
should focus on transportation networking in border regions. There is a need to connect Rajin-Seonbong in North Korea and Hunchun in China and the Far eastern region in Russia through energy and transportation network. Especially, the Rajin-Seonbong Economic and Trade Zone(ETZ) has geo-economic potentials to be developed as a new center for international trade and logistics.\(^{21}\)

In the long-term, Natural Gas Pipeline Route Sakhalin-Khabarovsk-Vladivostok-Rajin-Seoul could be key project for building an integrated energy network in the Korean peninsula. Also, the development of power plants in Russian Far East and cross-border power interconnection grids between Vladivostok and Chungjin in North Korea could be important for an integrated electricity network in the Korean peninsula. Therefore, potentials for international cooperation on energy and transportation in Northeast Asia should be utilized as a momentum for inter-Korean cooperation on infrastructure. According to the mini-survey, the connection between TKR and TSR should be implemented prior to other infrastructure projects. 75% of 120 respondents cited the connecting TKR and TSR or TCR as the most urgent issue. When TSR and TCR are linked to TKR, the Korean peninsular will be able to enhance its competitiveness as a new logistics hub in Northeast Asia.

\(<\text{Tab. 4}>\) Priorities in international infrastructure cooperation in Northeast Asia related with inter-Korean infrastructure cooperation

<table>
<thead>
<tr>
<th>Major issues</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
</tr>
<tr>
<td>Connecting TKR and TSR/TCR</td>
<td>75.0</td>
</tr>
<tr>
<td>Connecting Korean Highways and Asia Highway</td>
<td>8.3</td>
</tr>
<tr>
<td>Connecting logistics between major harbors in Northeast Asia</td>
<td>6.7</td>
</tr>
<tr>
<td>Connecting natural gas pipeline in Northeast Asia</td>
<td>1.7</td>
</tr>
<tr>
<td>Connecting oil pipeline in Northeast Asia</td>
<td>0.0</td>
</tr>
<tr>
<td>Connecting power network in Northeast Asia</td>
<td>6.7</td>
</tr>
<tr>
<td>Non response</td>
<td>1.7</td>
</tr>
</tbody>
</table>

\(^{21}\) The Rajin-Seonbong ETZ has potentials as a new regional hub for logistics related with building pipelines and shipping with Japan, South Korea and Russia.
Priorities in micro aspects

As reviewed in section 4, energy and transportation sectors are major sectors that inter-Korean cooperation is needed. Of the experts surveyed, 46.7% cited railroad as the key item to inter-Korean infrastructure cooperation in the short- and medium term. It is followed by power(26%).

In the long term, industrial park(16.7%), telecommunication(15.8%) and harbor(15%) are more important than other items.

<table>
<thead>
<tr>
<th>Major Issues</th>
<th>Short- and medium term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
<td>2nd</td>
</tr>
<tr>
<td>railroad</td>
<td>46.7</td>
<td>19.2</td>
</tr>
<tr>
<td>road, highway</td>
<td>12.5</td>
<td>30.0</td>
</tr>
<tr>
<td>harbor</td>
<td>1.7</td>
<td>4.2</td>
</tr>
<tr>
<td>airport</td>
<td>0.0</td>
<td>1.7</td>
</tr>
<tr>
<td>telecommunication</td>
<td>2.5</td>
<td>9.2</td>
</tr>
<tr>
<td>power</td>
<td>26.0</td>
<td>16.7</td>
</tr>
<tr>
<td>gas/Oil</td>
<td>0.0</td>
<td>3.3</td>
</tr>
<tr>
<td>industrial park</td>
<td>5.0</td>
<td>6.7</td>
</tr>
<tr>
<td>logistic facilities</td>
<td>0.8</td>
<td>2.5</td>
</tr>
<tr>
<td>living infrastructure</td>
<td>0.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Non response</td>
<td>5.8</td>
<td>5.8</td>
</tr>
</tbody>
</table>

According to the survey, the Gyeong-ui(Seoul-Sinuiju) railroad has more important meaning than the Gyeong-won(Seoul-Wonsan) or the Donghae(Gangneung-Wonsan) railroad.

In the sector of harbors, Nampo(83.3%) and Wonsan(44.2%) harbors are important for inter-Korean economic cooperation. Nampo and Wonsan have high potentials as new special economic zones in the future.
7. Horizontal networking in inter-Korean Cooperation on Infrastructure

As discussed in section 2, horizontal networking in infrastructure developments means near-simultaneous implementation of various infrastructure projects and linkages between different development actors in inter-Korean cooperation on infrastructure. In order to build an integrated energy and transportation network in the Korean peninsula through inter-Korean cooperation, an integrated implementation program for infrastructure should be prepared by various actors including the Six-Party, international organizations and private firms.

In order to implement integrated cooperation on infrastructure successfully, it is important to connect infrastructure development projects with other regional development projects. For example, development or mineral mines in North Korea is closely related with the rehabilitation of power plants, transmission and transportation infrastructure. As a model project of networking infrastructure and regional development, the redevelopment of Yongyang-mine and modernization of Danchun harbor in South Hamgyung province could be considered. Yongyang mine is famous for production of magnesite. Although magnesite is one of the major export products in the North, production of magnesite have continually diminished due to lack of electricity and transportation facilities. In this regard, the development right of Yongyang mine could be granted to the private company in return for the modernization of harbor and railroads around Danchun.

<Fig. 4> Model project in Yongyang-mine and Danchun
8. A roadmap of integrated inter-Korean cooperation on Infrastructure

A roadmap of integrated inter-Korean cooperation on infrastructure could be introduced through reviews on potentials of infrastructure cooperation in Northeast Asia and of inter-Korean cooperation.

In the short to medium term

In the short to medium term, inter-Korean cooperation on partial renovation and repairing of roads, railways and port facilities should go first because they do not require a large investment. In this phase, some infrastructure projects that can support contract processing as well as logistics and trade industries could be implemented through inter-Korean cooperation. Also, the cooperation should be promoted in border areas of North Korea.

In this respect, Gaeseong, Mt. Geumgang, Sinuiju, Rajin-Seonbong could be considered for inter-Korean cooperation in the short to medium term. Especially, improving transportation network between Sinuiju and Dandong in China and between Rajin-Seonbong and Hunchun in China has very important meaning in this phase. Also, improving transportation network between Gaeseong and Seoul and between Mt. Geumgang and Seoul is important. In sum, inter-Korean cooperation on infrastructure in the short to medium term should focus on special economic zones such as Sinuiju, Rajin-Seonbong, Gaeseong and Mt. Geumgang in border areas.

Also, inter-Korean cooperation on infrastructure should be developed by keeping pace with resolving the nuclear problem and development of the North Korean economy. If North Korea give up the nuclear weapons program and announces it, South Korea and other nations in the Six-Party talks can prepare action program for economic development of North Korea. In this stage, inter-Korean cooperation on infrastructure could be advanced in SEZs.

If the process of verification starts, then infrastructure development could be advanced to the surrounding areas of SEZs. Massive investment to the infrastructure in North Korea could be realized after the end of verification.
<Tab. 6> Resolving the nuclear problem and Inter-Korean cooperation on infrastructure

<table>
<thead>
<tr>
<th>Steps</th>
<th>Resolving the nuclear problem</th>
<th>Inter-Korean cooperation on infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Step</td>
<td>Announcement of dismantling nuclear program by North Korea</td>
<td>Cooperation on SEZ and surrounding areas Preparing the master plan for an integrated infrastructure in the Korean Peninsula</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Step</td>
<td>Verification on dismantling nuclear program by International Society</td>
<td>Cooperation on strategic areas in East and West corridor Building the master plan.</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Step</td>
<td>End of verification</td>
<td>Cooperation on infrastructure nation-wide through building multi-lateral cooperation body Implementation of the master plan</td>
</tr>
</tbody>
</table>

<Fig. 5> Inter-Korean cooperation on infrastructure in the short and medium term
In the long term

In the long term, inter-Korean cooperation on infrastructure should be expanded to the whole country around the two territorial development axes of the west coast and the east coast. Especially, infrastructure development between Special Economic Zones and surrounding areas has an important meaning to build integrated infrastructure axes. In this phase, inter-regional infrastructure facilities such as energy necessary for the development of large-scale industrial sites, long distance transportation and telecommunication facilities could be established and expanded through international cooperation based on two Korea’s initiative. Especially, it is necessary to develop large-scale infrastructure projects in collaboration with foreign firms and international financial organizations.

<Fig. 6> Inter-Korean cooperation on infrastructure in the long term
9. Concluding Remarks

As discussed in section 1, infrastructure development in North Korea is a very complicated issue and various elements are interconnected. Inter-Korean cooperation on infrastructure may be more difficult than any other sectors because infrastructure is closely related with national economic system. It means improving infrastructure in North Korea through inter-Korean cooperation is inter-connected with economic integration of two Koreas. If North Korea hesitates to take economic reform and external opening, the prospect for inter-Korean cooperation on infrastructure may be lean.

Although some priorities in inter-Korean cooperation on infrastructure are suggested in this paper, there is a dilemma between national priorities in North Korea and priorities in inter-Korean cooperation. North Korea revealed consistent national priorities of focusing on maintaining military power and centrally planned economic development.22 With advancement of inter-Korean cooperation, North Korea should change their national priorities from ‘military first’ and must prove it through action.

There is no reason to support North Korea that has national priorities of focusing on maintaining military power and centrally planned economic development. Inter-Korean cooperation on infrastructure should be implemented under the principle of "No Changes, No Support," If North Korea likes to get financial support from international society, they must take new policy. If the North Korean regime is unable to change its negative international image through improving foreign relations, integrated inter-Korean cooperation on infrastructure could not be realized.

As we experienced in last decades, the process of inter-Korean cooperation needs patience. It is evident that North Korea must be changed from centrally planned economic system to market system. Inter-Korean cooperation on infrastructure could play an important role in this transitional process. We should find the strategies and tactics that could be accepted not only to the South but also to the North. In this regard, we need to consider integrated approach in inter-Korean cooperation on infrastructure.

22 Andrew Scobell. 2005. -“North Korea's Strategic Intentions”. NORTHEAST ASIA PEACE AND SECURITY NETWORK SPECIAL REPORTS. August 23rd, 2005
1. Introduction

Northeast Asia consists of the ROK, the DPRK, Japan, Northeastern China, Far Eastern Russia, and Mongolia.

Until relatively recently, this region was still in the grip of war. Even now, there is a truce in force on the Korean Peninsula, so we could still say that it is an age of war. However, since 1991 the situation has undergone a significant turnaround, with a particularly dramatic transformation taking place in the last few years. Over the last 20 years, very few military clashes have occurred in Northeast Asia; at the same time, major course corrections have been occurring that are taking us further away from military tension, such as the success experienced by China and Russia in demarking the entire length of their borders and the increase in the value of the ROK’s support to the DPRK. There is tension in Northeast Asia regarding the nuclear issue in relation to the DPRK, but the six-party talks are taking place and we are heading towards a resolution of the situation. Now, we are no longer in an age of “eat or be eaten”, which prevailed for the majority of the 20th century; rather, it is an era in which not everything can be determined by means of military might. International opinion will not permit invasions and acts as a brake on abuses of military capacity. In other words, there has been a radical transformation in the situation. This is because the countries of Northeast Asia have realized that, unlike during the colonial era, it is possible to increase national wealth without resorting to invasions. The times have changed. The coming era will be the age of economic development.

We must now discuss how we can follow the path to this era.

Japan and the ROK have succeeded in achieving economic development through commerce with the rest of the world. China invented the special economic development zone as a means of skillfully making use of foreign capital and is experiencing explosive
economic development. Although Russia suffered economic meltdown in 1998, since then it has experienced high levels of growth due to the increase in its income from crude oil. Mongolia is receiving assistance from various other countries and is striving to introduce foreign capital and expand trade. That just leaves the DPRK. How can the DPRK achieve economic development in the future?

We should remember that the DPRK is surrounded by Japan, Russia, China and the ROK: in other words, it is positioned at the center of these four countries. People and goods/resources always gather at the center of things. This is because they pass through the central area when going to surrounding areas. Consequently, the central area usually prospers. However, in the case of Northeast Asia, this is currently the area that is lagging furthest behind the surrounding areas. The central area is becoming a vacuum, and development in Northeast Asia as a whole is being hindered significantly as a consequence. Nevertheless, if the DPRK underwent a transformation and emerged onto the international stage, it would be able to make use of its advantage as the heart of Northeast Asia. When this happens, it will be possible for Northeast Asia – not to mention the DPRK, as the heard of this region – to enjoy high levels of economic development. In other words, economic development that makes use of the transport hub of Northeast Asia can be proposed as one means of achieving economic development in the DPRK.

In this paper, I will give consideration to this point in talking about the roles of the Korean Peninsula and the DPRK in promoting economic development in Northeast Asia.

2. The Significance of and Strategy for Northeast Asian Economic Development

Northeast Asia is about to enter the stage of economic development. Japan and the ROK have achieved a high level of economic development, but the DPRK, Far Eastern Russia, Mongolia and Northeastern China have yet to reach the stage of high economic development. The objective of our research into economic development is to help these regions that are lagging behind to reach the stage of high economic development. How can we do this?

Energy, technology, workforce, money, transport and social stability are among the vital elements for economic development. Of these, from the perspective of Northeast Asia as a whole, as well as from the perspective of each country being given a fair opportunity to achieve economic development, the upgrading of transport routes is exceedingly important.

I have conducted research throughout Northeast Asia and this has brought me to the realization that everyone in every country and region has the following in common:

i) They believe that they have a responsibility to bequeath peace to their children and grandchildren.
They wish to have a more affluent lifestyle.

In order to achieve the first, we must maintain peace. In order to achieve the second, we must create wealth. In the past, countries tried to achieve this quickly by increasing military capacity and invading other countries. Nowadays, it is extremely difficult to do this. The strength of international opinion has increased considerably and it has become almost impossible to do unless it is in a region that is beneath the radar of the international community. In place of this, international trade has become a means of generating wealth.

Japan’s Edo Period lasted 260 years from the beginning of the 17th century, during which time the country was completely closed off from the outside world. As the Japanese government of the time permitted hardly any international trade, the population of the country remained around the same from beginning to end, standing at 30 million. Once the Meiji Period began with the restoration of the emperor to the throne in the latter half of the 19th century, international trade began to take place and 130 million people now live in Japan. It goes without saying that this is because international trade generated wealth.

In order for Northeast Asia to achieve economic development, it is important that the countries of the region do not engage in wars and that international trade is developed. If international trade increases, the interdependence of each country will deepen and it will become more difficult for wars to break out. Consequently, it is extremely important that international trade in Northeast Asia undergoes a major expansion. The ultimate goal of this may well be the creation of an economic community like the EU, but this is still a distant prospect. We must begin first of all by improving the situation with regard to interdependence, which is still poor at present.

Currently, the volume of international trade within Northeast Asia is insufficient. This is because transport is a major bottleneck. Accordingly, we should think about an economic development strategy from the perspective of transport.

I would like to propose the following economic development strategy.

1) Understanding the present situation

The table below shows the number of inbound passengers within Northeast Asia. About the same number of Japanese visit the ROK and China: 2.4 million. However, only 39,000 visited Heilongjiang Province, 25,000 visited Jilin Province, 1,500 visited the DPRK and 23,400 visited Far Eastern Russia. The number of passengers from these four regions visiting Japan was similar. This shows how sluggish interaction is.
2) The factors behind this sluggish interaction

Clearly, political quarrels are one cause. Due to territorial issues and historical problems, Japan has still not concluded peace treaties with Russia and the DPRK. Many Japanese people still retain the Cold War mode of thinking and cannot open up to the possibilities of a new age. Moreover, the DPRK’s refusal to emerge onto the international stage is also casting a dark shadow over Northeast Asia.

3) Conjecture (hypothesis) regarding the future of Northeast Asia from the perspective of local developments and the flow of the times

Although it may take time, it is likely that, given the following situation, Northeast Asia will proceed towards economic integration of the kind seen in the EU and also in North America with NAFTA.

The Advent of the Great Age of Interaction

With the end of the Cold War, both the Iron Curtain and the Bamboo Curtain were torn down. Isolated economic blocs began to link up. More active flows of people and goods began.

The countries of the region reached the consensus that isolated economies do not provide any benefit to their people, so corporate activities spread across national borders and international specialization is progressing. Thus, the time distance between countries
within the region is becoming shorter and relationships have developed in which countries have a far bigger impact on each other than they did previously. Each country is strongly influenced by the situation in neighboring countries and we cannot ignore this fact. The only solution to this is to establish win-win relationships based on mutual harmony and mutual benefit. This requires the integration of systems.

Thus, exchange activities in Northeast Asia have been blossoming, with economic exchange in particular expanding, and systems are progressing in the direction of integration. So the economy of Northeast Asia is moving in the direction of economic integration as a natural outcome of this.

**Improving the Performance of International Institutions**

Contemporary society has evolved in such a way that international institutions such as the UN spring into action, promoting coordination and conciliation, before political differences between states cause wars. Compared with the situation that existed previously, we now live in an age in which it is much more difficult to start a war. Instead, the activities of international institutions work in a way that encourages cross-border economic activity. This is because the purpose of such institutions is to draw countries in the direction of the peace and prosperity desired by the populace of each and every country. It is in this direction that economic integration lies, and it can be described as the trend of the times. International institutions function by inhibiting the conflicts between countries that act as a drag on economic integration, so it is likely that this will make it easier to promote economic integration.

**Progress in Technological Innovation**

Technological innovation in the field of transport and communications is irresistibly pushing countries across the globe in the direction of economic integration. Time-distance throughout the world is decreasing, leading to a dramatic expansion in the volume of information distributed via mass media. As a result, the degree of mutual transparency is increasing and the psychological distance between neighboring countries is decreasing. Tourism is also growing, while the development of military surveillance satellites is significantly reducing the potential for surprise attacks. This in turn reduces the likelihood of the outbreak of conflict between countries, which acts as a drag on economic integration.

**The Emergence of Issues Requiring a Joint Response**

Issues that could have an impact on the survival of the human race are occurring across national borders, so there is a distinct need for cross-border initiatives to deal with these. We
will be unable to resolve these problems unless we put together a cooperative framework that transcends national borders. The effect of this is to promote economic integration. The issues affecting Northeast Asia are as follows:

i) Environmental problems
   Global warming
   Acid rain
   Yellow dust storms

ii) Energy issues and resource shortages
   Electricity supply
   Iron ore procurement
   Utilization of recycled resources

iii) Infectious diseases
   SARS

iv) Natural disasters
   Tsunami
   Redundancy (the role of Busan Port in relation to the Kobe earthquake)

Economic Integration lies in the Same Direction as Human Evolution

Human beings that are part of the life forms are entities at the pinnacle of biological evolution. Evolution has continued throughout the history of humankind; one example of this is the evolution of our brains, which control our instincts, from reptilian brains to frontal cortex brains. As a result, humanity has been able to move on from an age of “eat or be eaten” with regard to other humans, to an age in which we can seek the path towards mutual harmony and mutual benefit. Mankind now has many nuclear weapons and if these were used, we would enter a cycle of destruction that would eventually result in the whole of humanity perishing. Moving in a direction that avoids this is evolution and economic integration conforms to this principle of evolution.

Advanced Regions Promote Economic Integration

Northeast Asia can learn about the path that it should take in the future from more advanced regions. In this case, these are Europe and North America.

In Europe, many countries have attracted people from former colonies and developing countries and are using these as human resources and labor that are essential for the national economy. There is no significant resistance to accepting foreigners into the country. In this respect, these countries differ considerably from Japan.

Moreover, in Europe, the EU was established and a borderless economy already exists.
This can only be because the countries of Europe believe that a borderless economy contributes to the development of individual national economies. Moves towards regional economic integration can be seen in many regions around the world and this is believed to be a rational step towards national prosperity. Northeast Asia will surely also follow this path at some stage.

*The Characteristics of East Asia Compared with Africa and South America*

60 years have passed since the end of the Second World War. 60 years ago, many of the countries of Africa, South America and East Asia were colonies in a dire state. Today, 60 years later, only East Asia has become prominent as an economically prosperous region. This is because, as a result of accumulating various experiences during the last 60 years, this region has been able to develop a system for cooperation. The ultimate destination of this is economic integration. If economic development in Northeast Asia continues in this way, economic integration will appear on the horizon as a matter of course.

4) *Setting targets*

From section 3) above, we can see that our goals must be the transition to a higher level of economic development, economic integration within the region in the future, the establishment of borderless transport within the region, and the abolition of cabotage.

5) *Specific strategy*

With regard to the specific strategy for achieving these targets, first of all, in addition to formulating a vision for transport corridors in order to gain an understanding of the course of the upgrading of transport routes throughout Northeast Asia, bottlenecks that must be resolved in order to ensure that the transport network as a whole is constructed efficiently and economically will be specified. What are important here are the three missing links. If these could be joined up, a transport network covering the whole of Northeast Asia would be built; after this, upgrading would focus on the elimination of discontinuities within the region and the enhancement of the network towards Central Asia and Europe. At this stage, it is likely that requests for the development of borderless transport between Japan, China and the ROK would escalate and the need to form an integrated transport market could well emerge. Furthermore, this market could be expanded to encompass countries such as Mongolia. Thus, the conditions that would ultimately lead to economic integration would gradually be put in place.

3. *The Publication of the Transport Corridors Vision as Part of the Strategy*
1) The formulation of the transport corridors vision

The prerequisite for promoting international trade within Northeast Asia is ensuring that transport corridors are sufficiently well developed to allow international trade to take place smoothly. In line with this aim, we have already published our Vision for the Northeast Asia Transportation Corridors (see Figure 1). The translation of this vision into reality will assist progress towards Northeast Asian economic integration. The total cost of implementing the infrastructure development projects specified in this vision is $20 billion. Of this, $8 billion is required for short-term projects, $6 billion for medium-term projects, and a further $6 billion for long-term projects. However, as these calculations were made in 2000, the implementation costs may have altered in the last five years.

This vision has the following characteristics:

i) It was formulated from the standpoint of promoting economic development throughout Northeast Asia. The promotion of trade between inland areas of continental Northeast Asia and Pacific Rim countries is important, so linkage with marine transport elements has been emphasized and the origins of all the routes are international ports.

ii) It was formulated on the basis of detailed field surveys.

iii) It was formulated through joint work conducted by experts from all the countries and regions of Northeast Asia. However, it is entirely unofficial.

iv) It was formulated on the basis of the assumption that international combined multimodal transport will become the prevailing force in international transport in the future.

2) The elimination of missing links in the transport corridors

In order to realize these transport corridors, the many missing links that exist within these
corridors must be joined up.

Of these, the following two are essential to Northeast Asian economic integration.

i) The linkage of the DPRK section of the Korean Peninsula transport corridors

ii) The development of a route that gives Northeastern China an outlet onto the Japan Sea (East Sea)

These two projects have the following characteristics:

✧ They are projects involving multilateral cooperation within Northeast Asia (rather than bilateral)
✧ They will contribute significantly to the promotion of international trade and the expansion of exchange
✧ Although they are projects that will benefit all the parties involved, progress has not yet been made.

In order to implement these projects, joint work by the countries involved will be necessary.

3) The enhancement of the transport network

Where Northeast Asia has an advantage in comparison with Southeast Asia is in the fact that, as the region is located at a very high latitude, the overland distance to Europe is relatively short. Marine transport of containers between Japan and Europe takes about a month, but if the Trans-Siberian Railway is used, it is possible for cargo to arrive in about half that time. This is the advantage of Northeast Asia and it is likely that a transport network that makes use of this will be developed.

A stable transport route from China has been developed in Central Asia, and it is conceivable that this route will be extended to the Caspian Sea and the Black Sea. This is
because, if things continue as they are at present, it is possible that Central Asia will become the powder keg of the modern age, so it is expected that, in order to prevent this, Russia, China and the EU will provide focused economic assistance in this area.

4) The establishment of an integrated transport market in Japan, the ROK and China

Japan, the ROK and China have an extremely profound interdependence. In global container transport, this region has the world’s largest volume of container flows, which signifies that international specialization among these three countries has grown rapidly in recent years. As a result, transport networks encompassing these three countries are becoming extremely dense; at the same time, there are increasingly vocal demands that border-crossing procedures be made as streamlined, unified and rapid as possible. This is the borderless situation. In Northeast Asia, first of all, these three countries should form an integrated transport market. After that, these moves should be expanded progressively to encompass surrounding countries.

5) Economic integration

If economic integration is achieved, national boundaries will become very low and it will become possible for people, cars, trains and buses to cross borders without the need for checks. Moreover, there is the possibility that transport operators will be able to obtain transport service licenses that will enable them to operate in other countries within the region (the abolition of cabotage), thereby exposing previously protected domestic transport industries to the world of international competition. When this happens, great progress will undoubtedly be made in the domestic transport industries of each country.

4. The Position of the Korean Peninsula in the Transport Corridors Vision

![Fig. 3. The Existing Transport Network Around the Korean Peninsula](image)
Three transport corridors run through the Korean Peninsula. These are the Korean Peninsula West Transportation Corridor, the Korean Peninsula East Transportation Corridor, and the Tumen River Transportation Corridor.

Of these, the West Corridor takes the same route as Route 1 of the Asian Highway, passing through Tokyo, Osaka, Busan, Seoul, Pyongyang, Shenyang and Beijing, and extending to Central Asia. The East Corridor links Busan with Primorsky Krai in Russia, and then runs from Vladivostok to Moscow and Europe. The Tumen River Corridor runs from Tokyo to Mongolia via Jilin Province.

Currently, as the DPRK does not permit transit through its territory, none of these three corridors can function. As is clear from the diagram above, it is possible for the Tumen River Corridor to run from Tokyo to Jilin Province via Russia rather than the DPRK. However, consensus on this matter has not been reached between Russia and China either, so the corridor is not functioning at present.

If the DPRK were to permit transit through its territory, the following effects can be expected:

i) The corridor would be connected and the missing link eliminated. The Northeast Asia transport network would become extremely convenient.

ii) In particular, the economies of the areas at both ends of the joined-up corridors would be revitalized.

The ROK’s transport routes to the rest of mainland Asia would become more diverse,
which would be of great benefit to that country. Russia’s Khasan District would be economically invigorated. Northeastern China, particularly Yanbian Prefecture, would also be infused with greater economic vigor. The ports in Primorsky Krai would be exposed to competition with Busan Port in SLB transport. As a result, the volume of cargo transported on the SLB would increase, leading to the enhancement of the Trans-Siberian Railway or the promotion of use of the BAM Railway.

iii) It would have a variety of advantages for the DPRK, but in the short term it would make a significant contribution to promoting domestic construction and increasing foreign currency revenue (via earnings from transit fees).

iv) If the DPRK were to emerge onto the international stage, a marine exchange network involving Japan and the DPRK could well be formed. The DPRK is located adjacent to the Bohai Gulf Rim Economic Bloc and the Japan Sea (East Sea) Rim Economic Bloc, so interaction with these blocs and the rise of industries that also involve players from these blocs is also conceivable.

v) In the long term, it is possible that an undersea railway tunnel linking Japan and the ROK may be constructed. If the high-speed train systems of Japan and the ROK were unified and suitable railways were constructed in the DPRK and China as well, the large-scale transport of passengers would become possible.

5. The Direction of Reconstruction in the DPRK from the Perspective of Transport

I have been to the DPRK twice in recent years, visiting Pyongyang and various places in the country’s northeast, such as Chongjin, Rajin-Sonbong and Namyang. Accordingly, I have only seen a very small part of the country. Although it was a very limited tour in regional terms, I was able to verify that the transport infrastructure there was in an extremely advanced state of dilapidation.

Almost all the roads were unpaved and when it rained, it was difficult to climb the steep, winding roads. The concrete coverings of the girders of the rail bridges had disintegrated, exposing the reinforcing bars, which were corroded. On the roads, the supports of some road bridges across rivers had collapsed and the bridges were being held up by makeshift struts; in some places, those struts had also collapsed, so it was impossible to cross the bridge and our car ended up having to go through the water.

The runways of provincial airports had broken up and the aprons were in an even worse state. These airports did not even have passenger terminals.

Next to Chongjin Port, one of the DPRK’s leading ports, is an ironworks and ships were
entering the port, but although there was a development plan for the crucial container
terminal, it was still undeveloped.

Many of the rail cargo wagons were damaged and generally in poor condition. There
were very few cars and there were not even many bicycles in the provincial areas. The
people mainly walked and their main means of transport was walking. Quite a few times, I
saw old-fashioned trucks stopping at the request of local people and giving them a lift if they
were heading for the same destination. This is because public buses do not currently
operate in provincial areas. Public buses operated during the Cold War, when there were no
energy shortages, but they were abolished when those shortages began to bite.

Thus, the DPRK’s transport system was in an extremely poor state, even worse than we
had imagined. It is likely that the spread of ISO international container transport is still quite
a distant prospect. However, what was interesting was that the roads were sufficiently wide
for this, and even the unpaved roads were quite well maintained. The main problem is the
lack of energy.

In this kind of situation with regard to transport routes, attempts to develop industry have
virtually no hope of succeeding. First and foremost, what is needed for the DPRK’s
economic development is the upgrading of its domestic transport routes and the
modernization of its transport facilities.

It is plain to see that the root cause of this extremely poor situation is the lack of energy.
The reduction of road and rail transport due to energy shortages restricts the DPRK’s mining
of its domestic coal and makes it difficult to deliver it to cities around the country. People who
cannot obtain coal even though they live close to where it is produced use wood cut from the
mountains to keep warm, and the desertification of the mountains is progressing. This
causes natural disasters even after a relatively small amount of rainfall, and these are
having a serious impact on agricultural production.

Consequently, although the elimination of energy shortages is priority number one, the
securing of transport routes is also essential, as the lack of transport routes is further
exacerbating these energy shortages and energy cannot be imported and distributed
without adequate transport routes.

Which transport routes and facilities should be the first to be upgraded?

Naturally, major traffic routes should be upgraded first and particular haste should be
made in the development of the three Northeast Asia transport corridor routes. These three
routes are international trunk routes and cargo from many other countries is expected to
pass along them, so the DPRK will be able to collect transit fees for this cargo. These transit
fees could conceivably be used to finance the reconstruction of the DPRK’s transport routes.

One other reason why the upgrading of transport routes is a matter of urgency is because
this will assist in increasing the number of foreign tourists, which is a quick way of obtaining foreign currency earnings. The DPRK undoubtedly has many undeveloped tourism resources. It has a World Heritage Site and also produces an unusual fruit called an “apple-pear”. The quality of the water at its hot springs is particularly good and it is likely that they could attract many foreigners. Tourism is an industry that can generate a considerable amount of income without the need to upgrade a great deal of infrastructure and it is necessary to give particular priority to tourism in reconstructing the DPRK. However, in order to do this, transport routes that meet the bare minimum requirements are necessary and routes that allow access to tourist attractions are needed.

In addition, the upgrading of international airports that can deal with tourist passengers is important. Currently, the only airport that could be described as international is Pyongyang. International airports should be established at a number of locations throughout the country.

The rapid rehabilitation of industry, such as manufacturing, and the creation of products that are highly competitive on the international market are also vital to the reconstruction of the DPRK. The upgrading and expanding of trade on commission would be effective in this. Accordingly, it is necessary to establish special economic development zones next to major foreign trade ports. Success in this area has already been seen in China and if the DPRK can use its cheap but excellent labor force, there is a high probability of success. In order to do this, the DPRK’s foreign trade ports must be able to handle container cargo, which is the standard form of transport across the globe.

6. Conclusion

As you will have understood from the foregoing, the biggest bottleneck impeding economic development in Northeast Asia is the existence of the DPRK. The DPRK’s transport infrastructure is in an extremely poor condition and it is anticipated that economic development will be exceedingly difficult. Learning from China’s example and actively introducing foreign capital may well be one effective method of promoting economic development, but even in this case, substantial assistance from various foreign countries will be required.

We must not forget, however, that if economic development progresses in the DPRK, it will yield significant benefits for Northeast Asia as a whole. We must remember that the whole region is in the same boat. The existence of major disparities in the standard of living in the region will make it difficult to maintain order. For the sake of the peace and prosperity of all of us in this same boat, improving the standard of living in the DPRK is imperative. Japan and the ROK must be completely aware of this fact.
Transportation Development between China and the Korean Peninsula

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1 Present situation of Chinese social economy and transportation

1.1 Present situation of Chinese social economy

China covers an area of 9.6 million square kilometer, and a population of 1.3 billion. Since the reform and open to the outside world, China has experienced growth, GDP increases by 10% per year, reaches 1,365.84 billion Yuan and foreign trade increases by 16.7% per year, reaches 593 billion US Dollar.

Table 1 Chinese economic and foreign trade

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<td>13,658.4</td>
<td>1,154.7</td>
<td>593.3</td>
<td>561.4</td>
</tr>
</tbody>
</table>

1.2 Present Situation of Chinese Transportation

1.2.1 Transportation Infrastructure

By year 2004, the total length of transportation lines in China is 2.3 million kilometers
(including 74 thousand kilometers railway, 1.87 million kilometers road, 123 thousand kilometers waterway), which is 2 times of that in 1978. The growth rate of the lines is about 3% each year from 1979 to 2004.

Table 2 The length of transport lines in the past years

<table>
<thead>
<tr>
<th>Year</th>
<th>Total (Thousand kilometers)</th>
<th>railway</th>
<th>highway</th>
<th>waterway</th>
<th>airline</th>
<th>pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>1101.09</td>
<td>51.7</td>
<td>890.2</td>
<td>136</td>
<td>14.89</td>
<td>8.3</td>
</tr>
<tr>
<td>1980</td>
<td>1073.33</td>
<td>53.3</td>
<td>883.3</td>
<td>108.5</td>
<td>19.53</td>
<td>8.7</td>
</tr>
<tr>
<td>1985</td>
<td>1146.02</td>
<td>55.1</td>
<td>942.4</td>
<td>109.1</td>
<td>27.72</td>
<td>11.7</td>
</tr>
<tr>
<td>1990</td>
<td>1261.88</td>
<td>57.8</td>
<td>1028.3</td>
<td>109.2</td>
<td>50.68</td>
<td>15.9</td>
</tr>
<tr>
<td>1995</td>
<td>1460.7</td>
<td>62.6</td>
<td>1157</td>
<td>111</td>
<td>112.9</td>
<td>17.2</td>
</tr>
<tr>
<td>2000</td>
<td>1765.69</td>
<td>68.7</td>
<td>1402.7</td>
<td>119.3</td>
<td>150.29</td>
<td>24.7</td>
</tr>
<tr>
<td>2004</td>
<td>2310</td>
<td>74</td>
<td>1871</td>
<td>123</td>
<td>204</td>
<td>38</td>
</tr>
</tbody>
</table>

1.2.2 The current situation of transport

The lasting, healthy development of Economy impels transportation demand to increase fast. The volume of passenger transport rose to 17.7 billion in 2004 from 6.2 billion in 1985, with the growth rate of 5.7% each year. The turnover volume of the passenger rose to 1630 billion passenger-kilometers in 2004 from 443.7 billion passenger-kilometers in 1985, increase 7% each year. The volume of freight transported rose to 17 billion tons in 2004 from 7.46 billion tons in 1985, increase by 4.4% every year. The turnover volume of freight transport rose to 6944 billion ton kilometers in 2004 from 1,836.5 billion ton kilometers in 1985, increase by 7% every year. (See the following table in details)

Table 3 The volume of passenger, freight and turnover volume

<table>
<thead>
<tr>
<th>Year</th>
<th>Passenger transport</th>
<th>Freight transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Year</th>
<th>Volume of passenger (billion)</th>
<th>Passenger's turnover volume (billion passenger-kilometers)</th>
<th>Volume of freight (billion tons)</th>
<th>Freight turnover volume (billion ton kilometers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>6.20</td>
<td>443.7</td>
<td>7.46</td>
<td>1836.5</td>
</tr>
<tr>
<td>1990</td>
<td>7.73</td>
<td>562.8</td>
<td>9.71</td>
<td>2620.7</td>
</tr>
<tr>
<td>1995</td>
<td>11.73</td>
<td>900.2</td>
<td>12.35</td>
<td>3573.0</td>
</tr>
<tr>
<td>2000</td>
<td>14.79</td>
<td>1226.1</td>
<td>13.58</td>
<td>4421.2</td>
</tr>
<tr>
<td>2004</td>
<td>17.7</td>
<td>1630.9</td>
<td>17.06</td>
<td>6944.2</td>
</tr>
</tbody>
</table>

### 1.2.3 Transportation structure

The proportion of the passenger turnover volume by railway drops from 54.5% in 1985 to 35% in 2004; the freight turnover volume by railway drops from 44.2% of 1985 to 28% in 2004. The proportion of highway, airline in passenger and freight transportation is rising. Various kinds of transportation mode’s proportion in freight and passenger transportation as follows.

Table 4 Passenger's turnover volume forming

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Railway</th>
<th>Highway</th>
<th>Waterway</th>
<th>Airline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>100</td>
<td>54.5</td>
<td>38.9</td>
<td>4.0</td>
<td>2.6</td>
</tr>
<tr>
<td>1990</td>
<td>100</td>
<td>46.4</td>
<td>46.6</td>
<td>2.9</td>
<td>4.1</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>39.4</td>
<td>51.1</td>
<td>1.9</td>
<td>7.6</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>37.0</td>
<td>54.3</td>
<td>0.8</td>
<td>7.9</td>
</tr>
<tr>
<td>2004</td>
<td>100</td>
<td>35</td>
<td>54</td>
<td>0.4</td>
<td>10.6</td>
</tr>
</tbody>
</table>

Table 5 Freight’s turnover volume forming

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Railway</th>
<th>Highway</th>
<th>Waterway</th>
<th>Airline</th>
<th>The pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>100</td>
<td>44.2</td>
<td>10.4</td>
<td>42.1</td>
<td>0.02</td>
<td>3.3</td>
</tr>
<tr>
<td>1990</td>
<td>100</td>
<td>40.5</td>
<td>12.8</td>
<td>44.2</td>
<td>0.03</td>
<td>2.4</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>36.0</td>
<td>13.1</td>
<td>49.1</td>
<td>0.06</td>
<td>1.7</td>
</tr>
<tr>
<td>2000</td>
<td>100</td>
<td>31.3</td>
<td>13.8</td>
<td>53.4</td>
<td>0.1</td>
<td>1.4</td>
</tr>
<tr>
<td>2004</td>
<td>100</td>
<td>28</td>
<td>11.3</td>
<td>59.6</td>
<td>0.11</td>
<td>0.99</td>
</tr>
</tbody>
</table>
2. Basic situation of economy and transportation development of the Northeast China

2.1 Basic situation of economic development of the Northeast China

The Northeast China covers an area of 790,000 sq. km., which is 8.23% of the whole country. Total population is 106.35 million, which is 8.2% of the whole country.

The GDP (Gross Domestic Product) in this area is 1,295.5 billion Yuan, which is 11.05% of the whole country; GDP per capital is 12.13 thousand Yuan, which is 1.34 times of the average national level;

Total import and export of foreign trade is 38 billion U.S. dollars, which is 4.5% of the whole country.

Table 6 Social economic major indicator of three provinces

<table>
<thead>
<tr>
<th></th>
<th>Heilongjiang</th>
<th>Jilin</th>
<th>Liaoning</th>
<th>Total</th>
<th>The whole country</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The population in end of the year (million )</td>
<td>38.15</td>
<td>27.04</td>
<td>41.62</td>
<td>106.80</td>
<td>1292.27</td>
<td>8.26</td>
</tr>
<tr>
<td>urban population</td>
<td>20.06</td>
<td>14</td>
<td>37.85</td>
<td>71.91</td>
<td>523.76</td>
<td>13.73</td>
</tr>
<tr>
<td>Urban population proportion (%)</td>
<td>52.6</td>
<td>51.8</td>
<td>90.94</td>
<td>67.32</td>
<td>40.53</td>
<td></td>
</tr>
<tr>
<td>2. The land area</td>
<td>0.455</td>
<td>0.187</td>
<td>0.148</td>
<td>0.79</td>
<td>9.60</td>
<td>8.23</td>
</tr>
<tr>
<td>(million sq. km.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. the gross domestic product (billion Yuan )</td>
<td>443.0</td>
<td>252.26</td>
<td>600.25</td>
<td>1295.51</td>
<td>11725.19</td>
<td>11.05</td>
</tr>
<tr>
<td>4. GDP per capital</td>
<td>11615</td>
<td>9338</td>
<td>14258</td>
<td>35211</td>
<td>9073.33</td>
<td>134</td>
</tr>
<tr>
<td>(Yuan )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total import and export value (billion $)</td>
<td>5.33</td>
<td>6.17</td>
<td>26.56</td>
<td>38.06</td>
<td>850.99</td>
<td>4.47</td>
</tr>
</tbody>
</table>

2.2 Situation of transportation development of Northeast China

2.2.1 Current transportation facility situation

Railway, The main trunk railways of the Northeast are Haerbin-Dalian, Beijing-Shenyang, Qinhuandao-Shenyang railway.

The Haerbin-Dalian railway, which goes to Dalian by Changchun, Shenyang from
Harbin, it is the main trunk railway of the Northeast and one of the national railroad network backbones too. The total length is 944 kilometers, double-line electrified circuit. The Ha-Da line is one of the busiest four major main lines of the whole country railway.

The Beijing-Shenyang railway, which is from Shenyang to the Beijing, the total length is about 700 kilometers, it is the arterial railway exchanged with other areas of the whole country in the Northeast.

The Qinhuangdao-Shenyang passenger special rail line, which is from Qinhuangdao to Shenyang, the designed speed is 200 kilometers per hour, designed capacity is about 120 million people each year. It is the important passenger corridor collected northeast China and all parts of the country.

High way, The main highways of Northeast are Haerbin-Dalian, Beijing-Haerbin expressway.

The Harbin-Dalian expressway, starts from Dalian, runs through Yingkou, Shenyang, Siping, Changchun, and ends at Harbin. It is 758 kilometers, designed speed is 120 kilometers per hour.

The Beijing-Harbin expressway, which is from Beijing to Harbin, runs through Tangshan, Qinhuangdao, Jinzhou, Shenyang, Siping, Changchun, and Harbin. It is the important highway for the exchanged between Northeast and north China.

Airport, The main airports of the Northeast China include Dalian, Shenyang, Changchun, and Harbin.

Table 8 Facility situation of main airport

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>Model</th>
<th>Runway (meter) (long×width×height)</th>
<th>Area (Square meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalian Airport</td>
<td>4E</td>
<td>B747</td>
<td>3300×45×0.37</td>
<td>33000</td>
</tr>
<tr>
<td>Shenyang Airport</td>
<td>4E</td>
<td>B747</td>
<td>3200×45×0.35</td>
<td>83538</td>
</tr>
<tr>
<td>Changchun Airport</td>
<td>4D</td>
<td>B767</td>
<td>2600×50×0.32</td>
<td>13358</td>
</tr>
<tr>
<td>Harbin Airport</td>
<td>4D</td>
<td>B767</td>
<td>3200×45×0.31</td>
<td>67000</td>
</tr>
</tbody>
</table>

The passenger's throughput is 9,168,505; the goods throughput is 172 thousand tons.
Table 9 Situation of throughput of main line airport

<table>
<thead>
<tr>
<th>Name</th>
<th>passenger throughput</th>
<th>goods throughput (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalian Airport</td>
<td>3333451</td>
<td>72583.1</td>
</tr>
<tr>
<td>Shenyang Airport</td>
<td>2652340</td>
<td>56798.7</td>
</tr>
<tr>
<td>Changchun Airport</td>
<td>1279379</td>
<td>15702</td>
</tr>
<tr>
<td>Harbin Airport</td>
<td>2148086</td>
<td>31351</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9168505</strong></td>
<td><strong>172202.5</strong></td>
</tr>
</tbody>
</table>

**Port**, The main ports of the Northeast are Dalian, Yingkou, Jinzhou, Dandong harbors.

Table 10 Main situation of the northeast Port

<table>
<thead>
<tr>
<th>Name</th>
<th>Passenger throughput (million)</th>
<th>goods throughput (million ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalian</td>
<td>8.38</td>
<td>108.51</td>
</tr>
<tr>
<td>Yingkou</td>
<td>----</td>
<td>30.06</td>
</tr>
<tr>
<td>Jinzhou</td>
<td>----</td>
<td>17.07</td>
</tr>
<tr>
<td>Dandong</td>
<td>----</td>
<td>0.708</td>
</tr>
</tbody>
</table>

2.2.2 Current situation of Northeast transportation

The Northeast China is connected to Korea, Russia, Mongolia with highway and railway.

The railway length of the Northeast is 17,822 kilometers, which is 24.41% of the whole country, and the length of the highway is 159,226 kilometers, which is 8.8% of the whole country.

The volume of passenger transport by railway is 211.45 million, which is 21.74% of the whole country, the volume of passenger transport by highway is 1 billion, which is 6.87% of the whole country.
Table 11 Index of transportation of three provinces

<table>
<thead>
<tr>
<th>Model</th>
<th>Heilongjiang</th>
<th>Jilin</th>
<th>Liaoning</th>
<th>Total</th>
<th>Whole country</th>
<th>Proportion of (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (km)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>railway</td>
<td>5373</td>
<td>3562</td>
<td>8887</td>
<td>17822</td>
<td>73000</td>
<td>24.41</td>
</tr>
<tr>
<td>highway</td>
<td>65123</td>
<td>44008</td>
<td>50095</td>
<td>159226</td>
<td>1809800</td>
<td>8.80</td>
</tr>
<tr>
<td>water</td>
<td>5528</td>
<td>1609</td>
<td>813</td>
<td>7950</td>
<td>124000</td>
<td>6.41</td>
</tr>
<tr>
<td>airline</td>
<td>108716</td>
<td>128996</td>
<td>238429</td>
<td>476141</td>
<td>1749500</td>
<td>27.22</td>
</tr>
<tr>
<td>passenger volume (million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>railway</td>
<td>82.07</td>
<td>42.32</td>
<td>87.06</td>
<td>211.45</td>
<td>972.60</td>
<td>21.74</td>
</tr>
<tr>
<td>highway</td>
<td>393.47</td>
<td>201.12</td>
<td>410.76</td>
<td>1005.35</td>
<td>14643.35</td>
<td>6.87</td>
</tr>
<tr>
<td>water</td>
<td>1.76</td>
<td>0.87</td>
<td>5.42</td>
<td>8.05</td>
<td>171.42</td>
<td>4.70</td>
</tr>
<tr>
<td>airline</td>
<td>2.31</td>
<td>0.82</td>
<td>4.89</td>
<td>8.02</td>
<td>87.59</td>
<td>9.16</td>
</tr>
<tr>
<td>Passenger's turnover (billion m p-km)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>railway</td>
<td>14.92</td>
<td>11.5</td>
<td>30.69</td>
<td>57.11</td>
<td>478.86</td>
<td>11.93</td>
</tr>
<tr>
<td>highway</td>
<td>20.33</td>
<td>8.84</td>
<td>16.41</td>
<td>45.58</td>
<td>769.56</td>
<td>5.92</td>
</tr>
<tr>
<td>water</td>
<td>0.03</td>
<td>0.008</td>
<td>0.72</td>
<td>0.758</td>
<td>6.31</td>
<td>12.01</td>
</tr>
<tr>
<td>airline</td>
<td>3.69</td>
<td>1.69</td>
<td>6.7</td>
<td>12.08</td>
<td>126.32</td>
<td>9.56</td>
</tr>
<tr>
<td>goods volume (million tons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>railway</td>
<td>141.18</td>
<td>60.44</td>
<td>132.05</td>
<td>333.67</td>
<td>2211.78</td>
<td>15.09</td>
</tr>
<tr>
<td>highway</td>
<td>390.31</td>
<td>252.11</td>
<td>659.81</td>
<td>1302.23</td>
<td>11599.57</td>
<td>11.23</td>
</tr>
<tr>
<td>water</td>
<td>10.52</td>
<td>0.72</td>
<td>36.49</td>
<td>47.73</td>
<td>1580.70</td>
<td>3.02</td>
</tr>
<tr>
<td>airline</td>
<td>0.047</td>
<td>0.09</td>
<td>0.137</td>
<td>2.19</td>
<td>6.26</td>
<td></td>
</tr>
<tr>
<td>Rotation volume of goods (billion m ton km)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>railway</td>
<td>78.86</td>
<td>42.26</td>
<td>101.28</td>
<td>222.4</td>
<td>1724.67</td>
<td>12.90</td>
</tr>
<tr>
<td>highway</td>
<td>16.31</td>
<td>9.06</td>
<td>22.65</td>
<td>48.02</td>
<td>709.95</td>
<td>6.76</td>
</tr>
<tr>
<td>water</td>
<td>1.93</td>
<td>0.021</td>
<td>113.06</td>
<td>115.01</td>
<td>2871.58</td>
<td>4.01</td>
</tr>
<tr>
<td>airline</td>
<td>0.1</td>
<td>0.029</td>
<td>0.16</td>
<td>0.289</td>
<td>5.79</td>
<td>4.99</td>
</tr>
</tbody>
</table>

Table 12 the ratio various kinds of transportation takes of each province Unit: %

<table>
<thead>
<tr>
<th>Volume of passenger (%)</th>
<th>Heilongjiang</th>
<th>Jilin</th>
<th>Liaoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>railway</td>
<td>17.11</td>
<td>17.26</td>
<td>17.13</td>
</tr>
<tr>
<td>Highway</td>
<td>82.04</td>
<td>82.05</td>
<td>80.84</td>
</tr>
<tr>
<td>Water</td>
<td>0.37</td>
<td>0.35</td>
<td>1.07</td>
</tr>
<tr>
<td>airline</td>
<td>0.48</td>
<td>0.33</td>
<td>0.96</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger's turnover volume (%)</th>
<th>Heilongjiang</th>
<th>Jilin</th>
<th>Liaoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>railway</td>
<td>38.27</td>
<td>53.12</td>
<td>56.28</td>
</tr>
<tr>
<td>(%)</td>
<td>Highway</td>
<td>Water</td>
<td>airline</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>52.14</td>
<td>0.08</td>
<td>9.46</td>
</tr>
<tr>
<td></td>
<td>40.83</td>
<td>0.04</td>
<td>7.81</td>
</tr>
<tr>
<td></td>
<td>30.09</td>
<td>1.32</td>
<td>12.29</td>
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<th>Liaoning</th>
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3 The transportation development planning of the Northeast

3.1 the national transportation planning

According to the goal of Chinese government, the economy of China will increase by 7%~8% from the year 2000 to year 2020, and the GDP of China will reach 17000 billion Yuan in the year 2010 and 35000 billion Yuan in the year 2020, 3 thousand Us Dollar per capital.

<table>
<thead>
<tr>
<th>Table 13 The goal of Chinese economic in different years</th>
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<tbody>
<tr>
<td>Year</td>
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<tr>
<td>---------------</td>
</tr>
<tr>
<td>2010</td>
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<tr>
<td>2015</td>
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<tr>
<td>2020</td>
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</table>

By 2020, the national railway mileage will reach 100,000 kilometers. In order to meet the fast increasing demand of passenger transport, it will emphasize the construction of the fast passenger railway system among provincial capital and large medium cities,
set up three intercity fast passenger railway systems: Bohai bay areas, Zhujiang River Delta areas, the Yangtze River Delta.

According to "National expressway Transportation Planning", China will accelerate the construction of national expressway network, which is make up by 7 capital radial highway, 9 vertical lines and 18 horizontal lines, more than 80,000 kilometers in total. After the national expressway network is built up, it will connect all provincial capitals and urban city of over 200,000 people at present in the whole country.

National water transport main route is to develop "two vertical and three horizontals” which is 5 water transport main corridor. "Two vertical " are the coastal from north to south, and the Jing-Hang Canal River; " three horizontals " are the Yangtze River and it’s main tributary, west river and it’s main tributary, Song Hua River and Heilongjiang river.

China will accelerate the construction of crude oil pipeline line; it is estimated that the pipeline transport mileage will up to 40 thousand kilometers in 2010, up to 50 thousand kilometers in 2020.

3.2 The transportation development planning of the Northeast

3.2.1 The construction of hub.

It Main includes Shenyang, Dalian, Jinzhou, Changchun, Shipping, Harbin, Manzhouli etc. it mainly strengthens the construction of railroad station, the road station, the airport, and the seaport as well as the construction of transportation information system.

3.2.2 Comprehensive transportation corridor construction

The corridors include eastern transportation corridor, central transportation corridor, western transportation corridor, In and out Sanhaiguan transportation corridor.

The eastern transportation corridor, it starts from Mudanjiang in the north, passes by Tumen, Dandong, Zhuanghe River, arrives to Dalian. It is composed by the railway of east of the Northeast, the expressway from Dandong to Dalian, and coastal water carriage.

The central transportation corridor, it starts from Harbin in the north, to Dalian by Changchun, Siping, Shenyang. It is composed by Haerbin-Dalian railway,
Haerbin-Dalian expressway, and pipeline and airline. This corridor has very important function to the socio-economic development of the Northeast especially to the foreign trade.

**The western transportation corridor**, it starts from Qiqihar in the north; goes to Jinzhou by Baicheng, Tongliao. It is composed by Pingqi railway, Rangtong railway, Da-zheng railway, Tie-Chao expressway, and national road 101. It has great importance to socio-economic development of the west of Inner Mongol and the east of northeast.

**In and out Sanhaiguan transportation corridor**, it starts from Harbin in the north, goes to Beijing by Shenyang, Jinzhou, and the Shanhaiguan. It is composed by the Beijing-Shenyang railway, Qinhuangdao-Shenyang passenger special line, Beijing-Haerbin expressway and airline. It plays an important role in exchanging for Northeast with other areas of the whole country.

In the year 2020, there are two passenger special rail lines: the Haerbin-Dalian line and Qinhuangdao-Shenyang line; 8 main expressways: Beijing-Haerbin, Shenyang-Dalian, Hegen-Dalian, Daqin-Beijing, Chanchun-Chende, Shuifenhe-Manzhou li, Huichun-chanchun-wulanhaote, Dandong-jingzhou-xilinhaote in Northeast China.

4. The transportation development between China and the Korean Peninsula

4.1 The transportation present situation between China and the Korean peninsula

The transportation system at present includes the railway, highway, aviation, and the marine between China and the Korean peninsula.

**The railway**, China is connected with DPRK by Shenyang—Dandong rail line, Changchun-Tumen rail line, Mudanjian-Tumen rail line, Meihekou-Jian rail line.

**Shenyang-Dandong rail line**, 277 kilometers, starts from Shenyang, after Benxi, the Fonghuan city, arrives at Dandong, connected with Xinyi Korean railway. It is the main railway that Liaoning Province China, Mongolia, and Russia lead to DPRK.

**Changchun-Tumen railway**, 529 kilometers, starts from Changchun, after Jilin,
Dunhua, arrives at the Chinese and Korean boundary city Tumen, connected with the North Korean Najin railroad. Changchun-Tumen railway is the main railroad that Jilin Province leads to DPRK.

**Mudanjian-Tumen railway**, 230 kilometers, starts from Mudanjiang, arrives at Tumen. This is the main railroad that Heilongjiang Province leads to DPRK.

**Meihekou-Jian railway**, 251 kilometers, starts from Meihekou, after Tonghua, arrives at Jian connected with North Korean railway.

**The highway**, The primary highway between China and Korea Peninsula includes Dandong--Dalian expressway, Changchun-Yanjii expressway, national highway 302, national highway 303, national highway 304.

**The marine**, Chinese major ports, especially the ports in the North China like Tianjin, Qindao, Dalian open to Korea Peninsula. Pusan is connected with most Chinese ports, and the container transportation grows fast recent year.

**The aviation**, China's Beijing, Shenyang opened the air route to North Korea'Pyongyang. South Korea's Seoul, Pusan, Cheju, Taegu, and Kwangju open the air route to about 20 Chinese cities like Beijing, Shanghai, Chengdu, Dalian. The scheduled flights are over 200 each week.

### 4.2 The transportation development between China and the Korean peninsula

**The economics and trade will develop fast**, According to the customs, the volume of trade between China and South Korea in 2002 achieves over 40 billion US dollars, it grows nearly 8 times compared to 1992 when both countries established diplomatic relations. The volume of trade breaks through 50 billion us dollars in 2004, Korea has become the Chinese 5th trade partner. As it mentioned above, the Chinese economy will develop fast in the future, it is estimated that economics and trade will develop fast in the future, that will provide the good foundation for the transportation development.

**The traveling will increase further.** Along with the increase of the Korean enterprise invests in China, the fast development of trade, the development of travel between China and Korea Peninsula, especially between China and South Korea, the passenger
will increase further. It should speed up the development of passenger transportation.

**The transportation cooperation between two countries will strengthen further.**

In order to build international transportation corridors, China will speed up the development of land bridge, enlarge the capacity of the relevant railway and port. The land bridges include Dalian-Manzhouli; Tianjin-Erlianhaote; Lianyungan-ALashan which belongs to Asia-Europe land bridge. So, the freight between Northeast Asian and European can be transported through these land bridges directly. The Eurasia land bridge provides Korea and Asia with the land bridge transportation service, Asian and Europe's cargo will be moved through the land bridge. It will promote the trade development both Asia and Europe, also the transportation cooperation between China and Korea Peninsula.

Along with the development of the Korea Peninsula integration transportation system, more goods and people will be moved between northeast China and South Korea in the future.

The Fusan port is an international port that attracted Chinese goods to transfer to Europe or US due to its position and service, the flight between Fusan and Chinese port will grow fast.

It is estimated that the transport demand in the future between China and Korea Peninsula grow further, especially along with the development of Korea Peninsula integration transportation system.

The comprehensive transportation system between China and Korea Peninsula includes railroad, road, aviation and marine will be established.

Speed up the construction of Seoul(Fusan, Kuangju)-P’yongyang-Dandong（Tumen, Jian）railway corridor, it is an important railway between China and Korea Peninsula.

China will speed up the construction of the eastern railway of the northeast China, mainly will construct the Dandong -Dalian railroad, Tonghua-Dandong railroad; Along with integration transportation development in the Korean Peninsula, not only DPRK but also South Korea may use these railroads.

The highway transportation system, China will construct Dandong-Hegang expressway, Dandong-Jinzhou expressway. The expressway network of the northeast China will be established. Though the road ports like Dandong, Tumen and so on, the
highway network of Korean Peninsula will be connected with the Chinese highway network.

China will adopt more open policy, “sky open” is the trend of Chinese aviation, more and more Chinese airports will open to two Koreas. It is estimated that in the future air movement will have quicker development between China and Korea Peninsula, and the cooperation between Chinese airline and Korean airline.

Along with the development of economics and trade, China will devote to construct the Dalian Northeast Asia shipping center, Tianjin, Qindao port will speed up the development. The ports of north China is not far from Fusan port, many China to Europe's and America's cargo was attracted by Fusan. The competition among these harbors will be more intense in the future, but the passenger by the ferry will grow fast, The China- Korea ferries will be developed further.

Speed up the construction of the land bridge, it starts from Korea's harbor to China's Lianyungang, Qingdao, Dalian, and the Tianjin port, then through the railway, reaches the Europe. It is estimated that the land bridge transportation may save many time between the Asian Europe compared to the marine transportation, has the very good development prospect.
NORTH KOREAN ENERGY INFRASTRUCTURE:
AVENUES FOR INTERNATIONAL COOPERATION

BY
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DIRECTOR
REISCHAUER CENTER FOR EAST ASIAN STUDIES
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PRESENTED AT THE WORKSHOP ON “BUILDING AN INTEGRATED
INFRASTRUCTURE IN THE KOREAN PENINSULA”
KOREA RESEARCH INSTITUTE FOR HUMAN SETTLEMENTS (KRIHS)
SEOUL, KOREA
SEPTEMBER 29, 2005
Energy is clearly North Korea’s Achilles Heel. Neither its military nor its organized civilian economy can function effectively without adequate energy supplies, for any prolonged period. Therein lies both the danger and the opportunity for the broader world, in addressing North Korea’s energy problems. Ignoring the security dimensions of energy could make North Korea prospectively more dangerous as an adversary, and enhance its ability to aid subversive and even terroristic efforts by others. Yet failing to see the positive contribution that energy cooperation with North Korea could make, under the right security circumstances, to Northeast Asian and indeed global economic growth would be equally short-sighted. It is thus crucial to stand back and assess the linkages between North Korean energy and broader national, regional, and global concerns.

North Korea has, like South Korea, historically had a high energy-use economy.¹ Primary commercial energy use in the DPRK was approximately three times the level of China in 1990, and about half the level of Japan, which had a GDP per capita twenty times as high as North Korea at that time.² North Korean energy use has been relatively high for three reasons: (1) industrial structure, with a high concentration of energy-intensive sectors like steel and fertilizer production; (2) inefficient use of fuels, due to obsolete equipment, as well as lack of market pricing; and (3) reliance on relatively less efficient fuels, such as coal, as a source of energy. This

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² Marcus Noland. *Avoiding the Apocalypse*, p. 144.
high-energy intensity of the economy, together with poor underlying energy resource endowments and the importance of energy to North Korea’s military, make energy a priority concern for the DPRK’s political-military leadership.

Energy shortages have clearly inhibited economic growth in recent years. They have, for example, complicated rail and motor transport, as well as industrial production. The lack of energy also contributed to the chronic food shortages of the mid-1990s, through their impact on fertilizer production, which helped contribute to the massive famines of 1995-1996.

Beyond North Korea itself, the DPRK’s energy situation has broader implications for nations throughout the North Pacific. For the United States, of course, the central concern is security-related: the potential of North Korean nuclear programs for generating fissile materials that might be used as warheads and other explosive devices, either by the North Korean military or by terrorists. For Russia, China, and South Korea, an additional, and often more immediately expressed concern is more cooperative: the prospect of addressing North Korea’s energy problems through regional solutions such as natural-gas pipelines and electric power grids, potentially transiting North Korea, and thus transforming South Korea from a geo-strategic island, as it has been for over half a century, into an interactive part of the Asian continent.3

Concretely speaking, the resolution of North Korea’s energy problems could potentially be linked to the broader resolution of the entire Northeast Asian region’s fundamental energy need: to diversify its supply of energy away from oil, and away from heavy dependence on the Middle East. Northeast Asia is, after all, the only major region of the industrialized world without a well-developed natural-gas grid, and the region has a correspondingly low reliance on that highly attractive fuel source: natural gas.

As is suggested later in greater detail, there are strong complementarities between South Korea and China’s rapidly rising energy demand, on the one hand, and the massive natural gas reserves and hydro-electric power potential of Siberia, on the other. This equation could be resolved through pipelines and power grids someday transiting North Korea, once the nuclear crisis is resolved. Virtually all parties to the ongoing six-party talks on North Korean nuclear issues—which after all represent the major participants in the prospectively integrated Northeast

Asian energy economy of the future-- also have economic interests in a cooperative resolution of
the nuclear crisis. Such a resolution should rationally involve large new infra-structural projects
in the area of energy.

**NEW OPTIONS FOR THE FUTURE**

There were serious problems with KEDO, and the Agreed Framework on which it is
based, as a comprehensive blueprint for North Korea’s energy future, long before the agreement
collapsed in 2002-2003. With fuel-oil deliveries and reactor construction at Kumho now
suspended, and with six-party talks on the nuclear question at an encouraging if still preliminary
stage, the time is right to think analytically and dispassionately about what sort of mechanism
should supplant KEDO. Clearly it should capitalize on KEDO’s achievements in network
building, and on sunk investments already made, if politically possible, while addressing North
Korea’s acute energy problems more directly, fundamentally, and efficiently than KEDO ever did.
Above all, new arrangements should build on the important new prospects for multilateral
cooperation generated recently by the six-party talks, and by earlier ROK initiatives.

The June, 2005 proposals by South Korea to provide two gigawatts of electric power
directly to the DPRK have strong economic as well as diplomatic logic, especially for Seoul. The
proposal would provide roughly the amount of power pledged to North Korea under the KEDO
agreement, but through direct transmission from South Korean power stations over an extension
of the ROK’s efficiently and safely functioning grid. Given the deplorable state of North Korea’s
severely degraded electric-power infrastructure, South Korea’s new initiative is one of the few
realistic short-term ways of supplying power to the North, and it preserves Seoul’s political-
economic leverage with Pyongyang to a degree that the KEDO agreement, if fully implemented,
arguably would not have done. Because the ROK proposal provides an economic resource badly
needed by the North, without reducing five-party leverage on the nuclear issue, it is also
relatively attractive to the United States. Yet it does relatively little to address North Korea’s
long-term energy problems, which demand a more comprehensive national resolution. And it
provides little incentive to other important participants in the six-party process—particularly
Russia.

The original Agreed Framework made no provisions regarding connection of the two
1,000-megawatt reactors to be built under the agreement and North Korea’s electric power grid.
Indeed, both differences in technical standards and recent degradation of the network would have made it both technically difficult and quite dangerous to attach the Kumho reactor currently under construction, or its prospective counterpart, to the North Korean grid. The power to be produced through the KEDO venture could have presumably been exported to South Korea or elsewhere in the world, but it would have been very difficult to use within the DPRK itself.

At a projected cost of $5 billion, the two large reactors contemplated under KEDO would have been both extremely expensive, and virtually impossible to connect to the North Korean power grid, as suggested above.\(^4\) To be sure, roughly $1.5 billion has already been expended on the construction of the first reactor, which has been ongoing since 1996. These sunk costs, and the possibility of exporting the power produced to South Korea or elsewhere in the region, once a modernized regional grid is established, would plausibly justify completion of one reactor, as a final concession in return for strong verification provisions in the final six-party nuclear agreement. Yet cancellation of the second reactor, and its substitution for more rational energy infrastructure, is definitely in order, given the new June, 2005 proposals for provision of power to Pyongyang directly from the ROK.

The indispensable condition for any alternatives to KEDO—indeed, for any form of continued energy cooperation with North Korea at all—must be a verifiable non-proliferation agreement. For American diplomacy, this is an imperative, as President George W. Bush and Secretary of State Condolezza Rice have repeatedly stressed. An encouraging preliminary agreement on ending North Korea’s military-use nuclear program was concluded in mid-September, 2005, although crucial inspection provisions remain to be determined. Provided that an effective agreement is forthcoming, the nuclear dimension of the energy-support program should be scaled down, or possibly be eliminated, as American negotiators have insisted. A nuclear plant for North Korea, after all, by itself would have merely a “trophy” character, as Ambassador Christopher Hill has emphasized, unless it were connected with a much more comprehensive refurbished electric-power grid, which would be prohibitively expensive to install.

In place of providing another nuclear reactor, the over-riding long-term imperatives are two-fold: (1) to provide North Korea reliably with cost-effective electric power; and (2) to

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\(^4\) These reactors, at around $5 billion, would reportedly cost more than the prospective cost ($3 billion to $3.5 billion) of the proposed Seoul to Sakhalin natural-gas pipeline. See Selig Harrison, “Gas and Geopolitics in Northeast Asia”, *World Policy Journal*, Winter, 2002/2003, p. 33.
proceed, in a related fashion, with pipeline proposals that would allow both North and South Korean access to Russian gas. This could be used in the long run to generate much needed electric power across a very broad portion of the DPRK, supplementing that provided directly from the ROK to more limited areas.

**The Attractiveness of Natural Gas**

Natural gas is one of the most energy efficient and environmentally attractive energy sources in the world, in the view of ever-growing numbers of energy experts worldwide. Yet Korea, like its Northeast Asian neighbors, uses relatively little gas, despite that fuel’s intrinsically attractive properties. Only 13 percent of South Korea’s primary energy is derived from gas, compared to 13 percent in Japan, 23 percent in Germany, and 25 percent in the U.S.\(^5\) In North Korea gas use is negligible.

There is thus considerable potential for expansion in gas consumption on the Korean peninsula as a whole, particularly in the North. And Russia is the logical source of supply. It has nearly one third of the proven natural gas reserves in the world, many of them located within commercial distance of the Korean peninsula. South Korea, to be sure, can easily access liquefied natural gas (LNG) from the Persian Gulf, and is, in fact, the second largest LNG importer in the world, following Japan. Yet Middle Eastern LNG is a much less attractive proposition for North Korea, for both geographical and infra-structural reasons.

There are three basic pipeline options between Russia and Korea. The simplest would run roughly 3200 kilometers from Sakhalin through the Russian Far East and North Korea, down the Korean east coast, toward Seoul. Japanese, and more recently American and Anglo-Dutch interests, have been discussing these reserves with the Russians since the mid-1960s.\(^6\) The Sakhalin route, a central piece of the Soviet Union’s Vostok Plan of the early 1990s,\(^7\) has substantial attraction to the Russians, since it could provide important gas infrastructure to major urban centers of the Russian Far East, such as Khabarovsk and Vladivostok enroute.

The second pipeline option—a longer and more complex route—would run from the massive Kovylkta gas field, northwest of Lake Baikal, through Manchuria and either under the Yellow Sea or along the western coast of North Korea, toward Seoul. Two variants have been proposed: one via Mongolia, and a second solely within Russian and Chinese territory. The


Chinese have strongly preferred the latter route, and have promoted it above other Russian pipeline alternatives, as it would provide fuel directly to Northeast Chinese urban centers, before passing on to Korea.

The third pipeline option between Russia and Korea, and the most attractive alternative to Sakhalin, from a Korean perspective, is the Sakha Republic (Yakutia) option. Yakutia is a sprawling area over 3000 kilometers north of Korea, covering one-fifth of the vast Russian Federation (3.1 million square kilometers), but hosting a population of only 1.3 million people. Much of Yakutia’s desolate Arctic and sub-Arctic terrain remains unprospected.

Initial recoverable gas reserves in Sakha/Yakutia are estimated at over 8 trillion cubic meters, at depths from one to four kilometers. Together with the massive South Pars field of Iran/Qatar, the Sakha fields are thus the largest gas fields ever discovered on earth. They could supply Korea, and potentially much of the rest of continental Asia as well, with natural gas for at least another half-century, at an estimated present-value development cost of around $20 billion.

This route has the considerable merit, from a Korean perspective, of being prospectively a Korea-centric, rather than a Japan-centric, concept, in contrast to Sakhalin. The Japanese, to be sure, held ten years of discussions during the Soviet era over Yakutsk gas, involving Bechtel and El Paso Natural Gas of the United States at one point. Yet disagreement over pipeline routes, liquefaction sites, and security (the Soviet invasion of Afghanistan) stalled the project. Since a dramatic January 1989 initiative by Chung Ju-Yung, founder of the Hyundai Group, South Korea has been a central player with respect to Yakutsk. 8

Chung’s bold notion, the basis on which discussions have since proceeded, was to construct a 3,200-kilometer gas pipeline across Russian territory near the Chinese border along the Amur and Ussuri Rivers, across North Korea, toward Seoul. Former Korean president Kim Young Sam and Russian president Boris Yeltsin jointly agreed to support a detailed feasibility study at their 1994 summit. Nevertheless, the project remains in abeyance. Uncertainties in energy demand and financing since the Asian financial crisis exploded in late 1997, including the collapse of the major chaebol Daewoo in November, 1999, compounded the short-run difficulties of proceeding further. Despite its long-term attractiveness, from a Korean point of view, the

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Yakutia option thus appears to have less short-term feasibility than the other two pipeline alternatives.

All of the three basic Russia to Korea gas pipeline options, it is important to note, at least consider the prospect of transiting North Korea. The ultimate locus of consumption, after all, is South Korea, and the source of supply is one of the three Siberian locations mentioned above—all located to the north of the Korean peninsula. In the absence of a verifiable nuclear non-proliferation agreement with the DPRK, it is obviously premature to move toward agreement on a trans-North Korea pipeline, from any of the three major prospective sources of Russian gas, even though it would be cheaper than alternatives, and more attractive to most Korean parties concerned.

The recent international feasibility study on the Kovykta field, recommending a 4,887 kilometer, $12 billion pipeline under the Yellow Sea to South Korea—bypassing the North—was thus the correct decision at the time. Yet if North Korea is forthcoming on details of the nuclear issue, within the six-party talks framework or elsewhere, the issue of transit pipelines across North Korea, from either Kovykta or Sakhalin, or ultimately from Yakutia as well, should be revisited. Indeed, they have prospectively strong political-economic merits that could make them the heart of a realistic “grand bargain” between North Korea and the nations of the North Pacific, provided that the nuclear issue is satisfactorily resolved. Such a “grand bargain”, with natural-gas pipeline projects at its heart, and also involving the supply of electric power from the ROK, together with a related modernization of the North Korean electric power grid and power generation systems, could be a highly constructive element of a broad, long-range Northeast Asian economic development plan.

From the perspective of North Korean economic development, as well as political preference, the Sakhalin route is definitely more attractive than Kovykta. The DPRK apparently fears that Beijing, with rapidly growing domestic demand for gas, and geopolitical leverage, would not be willing for very long to let Kovykta gas go to Korea. Kim Jong Il has repeatedly conveyed his preferences for a Sakhalin pipeline to Russian President Vladimir Putin.

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11 Ibid.
Electric Power Transmission

One possible alternative to a gas pipeline—or a long-run supplement, should Korea’s explosive growth in energy demand continue—would be a long-distance electric-power transmission line, of around 235 miles from Vladivostok in the Russian Far East, into North Korea. Russian hydro-electric potential is massive, and could help to ameliorate Korea’s prospective energy shortages. The electric-power transmission line option would also be substantially cheaper than the long-distance gas pipeline.

The Northeast Asian pipeline options could be highly synergistic with North Korean energy development, addressing many of the problems discussed above. They could harness long-term regional energy imperatives to the solution of serious local North Korean infrastructural problems. Concretely, gas-fired power stations could be built along the pipeline route, with two 500-megawatt combined cycle stations, which combine optimal energy efficiency and positive environmental traits, compensating for the electric power prospectively foregone in the cancellation of one of the 1000 megawatt reactors contemplated under the KEDO agreement. Three such gas-fired stations were contemplated in the 2001 understanding between a consortium of three Dutch trading companies (one since acquired by Bechtel, although it has indicated a desire to scuttle the deal) and North Korea, and the underlying conception would seem to have economic logic.12

Another possibility would be building a network of smaller 250-megawatt gas-fired power stations along the pipeline route, connected to a series of small local transmission grids. This could be an alternative to constructing a large-scale national transmission grid, which would likely be much more expensive. Korean energy specialist Keun Wook Paik has calculated that it would cost roughly $1.4 billion to construct such a network of eight regional gas-fired power stations linked to a trans-North Korea pipeline and connect them with a decentralized transmission grid such as that discussed above.13 At that cost, this proposal would be one third as expensive as the estimated total cost of the two over-sized reactors promised under the Agreed Framework, and much better adapted to North Korea’s basic energy needs.

Northeast Asia at present is the one major region of the industrialized world that still lacks a regional gas grid, as noted above. As a consequence, the region has remarkably little

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13 Ibid., p. 33.
reliance on natural gas, despite that fuel’s many attractive properties. With a quarter of the world’s population, the region has little more than five percent of its natural-gas usage.\textsuperscript{14} Gas is, in particular, both a highly efficient form of energy, and environmentally friendly. Yet the costs of large-scale pipeline development could be massive.

**New Linkages to the ROK**

While Japan does not appear likely to establish a national gas grid anytime soon, as such a grid could cost as much as $25-40 billion to build, calculations appear to be somewhat different in South Korea. Just in the past five years, South Korea has built a network of domestic pipelines that already surpasses Japan’s, and is pursuing much more varied and ambitious uses for national gas than is Japan. Seoul, for example, has been promoting demand for natural gas through tax incentives, aid for introduction of natural-gas vehicles (NGVs) such as gas-powered buses, and expansion of the domestic natural-gas grid. This growing gas network would appear to be establishing a solid economic basis for key Korean involvement in region-wide pipeline ventures in the foreseeable future—potentially including trans-North Korea pipelines.

The attractiveness for Korea of piped gas, as opposed to LNG or other fuel choices such as nuclear power, depends to an important degree on the inter-relationship between global energy prices and the progress of major North-South political-economic détente on the Korean peninsula itself. If global energy prices are predictably high, and the prospect of North-South détente with Korea is also strong, there is a strong political-economic rationale in Korea for rising dependence on Russian piped gas, and for the construction of the extensive Northeast Asian pipeline system that is often discussed. Conversely, if the political prospects are for North-South confrontation, the case for nuclear power may be strengthened.\textsuperscript{15}

**Geo-Political Logic to Trans-Korean Infrastructure**

Apart from the economics of a natural gas-based alternative to KEDO’s nuclear bias, there is also a geo-political rationale: one especially relevant under the assumption of a nuclear non-proliferation agreement, and intrusive inspections, as an ultimate precondition for the energy initiatives toward North Korea that are outlined here. The trans-North Korean pipelines contemplated here—like the railroads and regional electric-power grids also frequently discussed—would transform North Korea (or a united Korea that could well succeed it) from an

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\textsuperscript{15} On the political-economic assumptions involved, see Kent E. Calder. *Korea’s Energy Insecurities*, p. 17.
outsider in the regional political economy into a central player. North Korea’s crucial transit role for a panoply of infra-structural projects, including pipelines and railways, as well as trans-national electric power grids, would yield it ongoing revenue, to offset the otherwise depressed state of its domestic economy.

Yet this transit role would also provide—through the advantages it would bestow on neighboring nations—positive international economic leverage for a transformed North Korea as well. This leverage would compensate, at least in part, for the increased vulnerability that the DPRK or a successor state would experience through abandonment of its nuclear program. It would clearly provide a much healthier basis for political equilibrium in the region than would otherwise exist, if the North continued to rely, as it has done for so long, purely on military might and brinkmanship to gain recognition from the broader world. The time has come for all parties involved to agree to more enlightened energy infrastructure initiatives.

CONCLUSION

North Korea has faced a severe energy crisis over the past decade, along several dimensions: primary energy supply (apart from coal); electric power generation and distribution; and fuel for transportation. Indeed, energy has been the Achilles Heel of the economy as a whole, with energy shortages also crippling industry and agriculture. These shortages have inhibited North Korean military adventurism, to be sure, but they have also crippled economic growth, both in the DPRK and in surrounding areas.

KEDO for several years helped defuse the dangerous military confrontation of 1994-1995, and helped reinforce the important triangular relationship among the US, Japan, and South Korea. It also helped forge delicate but often useful inter-personal ties, mainly technical, between North Korea and the outside world. Yet the organization could not forestall the covert North Korean HU nuclear program, and has been continually weakened by political cross-fire. Given the inappropriate energy choices with which it started, particularly its strong nuclear bias, the body needs to be fundamentally transformed, with due consideration for the sunk-costs and the residual benefits involved.

A post-KEDO energy development body for North Korea, perhaps flowing from the six-party talks, should of course include all the nations involved at present as central members of
that organization, with a central role for the United States. To elicit needed American political support, any successor will also need to provide significant commercial opportunities for U.S. firms, and at least some jobs for American workers. Yet a successor body to KEDO should also broaden to include Russia and China in more systematic ways. With a more substantial mandate centering on developmental issues such as trans-national natural-gas and electric-power grids that naturally involve neighboring nations as well as North Korea, such a post-KEDO body could reasonably expect to avoid the nuclear-power specific resentments and sourcing difficulties that have rendered relationships between KEDO and its massive neighbors so complex. By including all the nations now involved in the six-party talks on the North Korean nuclear crisis, a “KEDO II” could also appropriately institutionalize that six-party forum to promote the long-term energy development of the Northeast Asian region as a whole. In an era when the old “hub and spokes” framework is no longer politically viable, a framework that reflects the economic interests of all major parties is crucial to long-term political stability. And such stability is clearly in the interests of the United States, as well as other powers, as Ambassador Christopher Hill and other negotiators have clearly recognized.

A new Northeast Asian energy-development body, based on the emerging six-party talks framework, should keep its energy-specific character. Yet it must broaden its mandate, and focus particularly on the development of natural gas resources in the region. While one of the 1000 megawatt nuclear reactors proposed under the Agreed Framework could well be continued, due to sunk costs, in return for strong verification provisions in a six-party nuclear agreement, the other should clearly be cancelled, and a systematic network of medium-scale gas-fired power plants, connected to a trans-Korean pipeline grid, should be substituted in its place. All such planning, of course, needs to be contingent not just on an agreed statement of principles, like that achieved in September, 2005, but on a full resolution of the nuclear crisis consistent with the imperatives of global security.
BIBLIOGRAPHY


Background of developing the integration relations between 
Democratic People’s Republic Korea (DPRK) and Russian Federation.

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Russia and the countries of the Korean peninsula traditionally are partners in many areas of trade, a science, culture. Especially close relations were characteristic for relations of Russia and DPRK.

**DPRK is an old trade-economic, culture and scientific partner of Russia.** In the mid-1990s, the enterprises erected in the country with technical assistance of the USSR produced up to 72% of electric energy, 53% of chemical fertilizers, 44% of iron ore, 43% of rolled metal, 42% of textile, 34% of steel, 100% of microelectromotors, 100% of aluminum, 99% of conductor enamel, 75% of automobile accumulators and 38% of bearings.

**Territory of DPRK differs the big number of features and resources which draw attention of its many partners.** DPRK territory is characterized by the very favorable geographical position. In the west, the country looks towards the East (Japan) Sea with its lengthy (about 450 km) coast. Through this sea, an access is possible to different countries and regions of the Japan Sea coasts including Japan, Russia, and Republic of Korea. In the east, DPRK looks on the Yellow Sea and through it, on the industrially developed areas of China. In the north and north-east, DPRK borders upon the greatest country of the world - China - and its developing North-Eastern region and one of great countries - Russia - and its most developed region - Primorsky Krai. In the south, DPRK looks towards the demilitarized zone and, further, towards the Republic of Korea.

DPRK has several railway outlets: one to Russia, Trans-Siberian Railway, two ones to China - to Harbin and Shenyang as well as a dead, for the time being, outlet to the south, to the Republic of Korea.

**In DPRK, there are considerable reserves of natural resources:** hydro-electrical, iron ore, copper-nickel, lead-zinc, tungsten and molybdenum ores. There are coal, woods, land resources, building materials, chemical raw materials, fish resources, recreation resources. The extractive industry, first of all, mining, building material, chemical industries, separate branches of machine-building, light, fish and food industries are, to a sufficient degree, developed.

The DPRK political system determines the domestic economy policy of the state the base of which is the Chuchhe ideology - a support on the country’s own forces. According to the expert evaluations, the annual volume of the North Korea GNP was at the end of last year about USD 14.5 billions. The external economic relations of the DPRK are characterized by not great scales; a volume of the external trade of the country is at a level of USD 2 billions in the last years. The presence of a chronic deficit in the external trade of the country supposes a weak export base of the North Korea.

**Economic relation.**

Before the beginning of the 1990s, the Russian market was a basic external market for DPRK. Beginning from 1992, the DPRK trade with traditional partners in the person of the Russia and republics of the former USSR became to reduce which resulted in a sharp drop in the
country’s external trade turnover. The DPRK attempted to compensate a loss of the Russian market by the expansion of trade with other countries.

At present, the main trade partners of DPRK are China (30 % of the total commodity turnover), Republic of Korea (22%), Japan (15 %), and the EC countries (14 %) (Devayeva, 2004).

The basis of the North-Korean export is sea products, consumer goods (textile fabrics and clothes), metals, refractory materials, and some nonmetal ores.

In the external demand of DPRK, the agricultural products, machinery and equipment, energy carriers, raw materials for textile and clothing industries prevail.

At present, the trade relations between DPRK and Russia continue to remain at a low level (Table 1). The RF share in the DPRK’s external trade turnover is about 4 %.

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<tbody>
<tr>
<td>Export</td>
<td>171.0</td>
<td>239.0</td>
<td>168.0</td>
<td>51.2</td>
<td>70.0</td>
<td>35.4</td>
<td>68.0</td>
<td>56.9</td>
<td>49.0</td>
<td>38.4</td>
<td>61.7</td>
<td>68.7</td>
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<tr>
<td>Import</td>
<td>194.0</td>
<td>72.5</td>
<td>54.2</td>
<td>43.7</td>
<td>15.3</td>
<td>29.7</td>
<td>17.0</td>
<td>8.5</td>
<td>7.2</td>
<td>7.7</td>
<td>16.6</td>
<td>10.9</td>
</tr>
<tr>
<td>Turnover</td>
<td>365.0</td>
<td>311.5</td>
<td>222.2</td>
<td>94.9</td>
<td>85.3</td>
<td>65.1</td>
<td>85.0</td>
<td>65.4</td>
<td>56.2</td>
<td>46.1</td>
<td>78.3</td>
<td>79.6</td>
</tr>
</tbody>
</table>

Source: data of the RF State Statistic Committee and State Custom Committee.

About one third of the DPRK export to Russia falls on the commodities produced in the third countries (China, Japan, Singapore etc.) including computers and electronic components, consumer goods, foodstuffs. In 1996, the supplies of such commodities as the magnesite clinker, nonmetallic raw materials, and non-ferrous metals to Russia were terminated.

In the DPRK import from Russia, such commodities as oil products (23.7% of total Russian export to DPRK in 2001), coal (1.5%), ferrous metals and products of them (23.7%), fertilizers (1.8%) and motor-cars (4.4%) prevail. At that, about 30% of the above commodities are re-exported by DPRK to the neighboring APR countries (Devayeva, 2004).

From the beginning of 1990s, the Russian commodity turnover with DPRK has sharply reduced: from 365.0 to 46 millions USD in 2000.

In the 2000s, there is some reviving of the external economy co-operation between the North Korea and Russia; in these years, the rate of commodity turnover growth between two countries is 7-12% a year. By three fourth, the volumes of the timber harvesting on the Russian territory by the Korean workers have increased. The reciprocal supplies of the coking coal and magnesite clinker were resumed in the area of the co-operation with Kemerovskaya Oblast and DPRK’s Ministry of Ferrous Metallurgy. A reviving of the interregional relations is observed on which more than 70% of the Russian-North-Korean commodity turnover in the wood, coal industries, agriculture and fishery fall. The co-operation in these areas is based on the use of The North Korea manpower resources.

The economic relations between Russia and DPRK are rested on the certain contractual-legal base. In the last 3-4 years, 8 economic agreements were signed. The normative-legal base of the Russian-North-Korean trade-economic co-operation consists of the agreements of the encourgement and mutual protection of investments to avoid the double taxation of property and incomes; of the economic and technical co-operation; of co-operation in the field of veterinary medicine; interdepartmental agreement of the co-operation in the field of agriculture etc. On February 11, 2002, a memorandum between the Russian PJSC “Far-Eastern Investment Company” and the DPRK Committee for International Trade Assistance was signed in the frameworks of which, the co-operation on projects in the field of the fuel-and-energy and raw material complexes, wood industry, construction and transport is supposed.

Considering the specificity of the North Korea society organization, it is rightful to bind the perspectives of the economic relations between RF and DPRK, first of all, with the important fact of a some new political rapprochement of Moscow and Pyongyang. The key contribution to
this process was made by the sensational visit of the Russian President V.V. Putin to the North Korea in summer of 2000.

The experts note that in the coming five years such the North-Korean commodities as the magnesite clinker, barite, burnt kyanite, talc, steel, zinc, calcium carbide, cement (in the category of raw materials and half-finished products), automobile accumulators, microelectromotors, machine-tools (in the category of finished products) as well separate vegetables and fruits (in the category of the foodstuffs).

In a some perspective, a quite good return would be expected from the Russian investments in the DPRK economy, basically, in the frameworks of the Free Economic Zones (FEZ) established there. The efficiency of such operations can be, first of all, provided by the cheapness of the North-Korean manpower. However, the attraction of this factor is reduced by the instable guarantees of the foreign investments safety and minimum favor on the side of the authorities in a realization of the commercial interests of foreign businessmen.

The North-Korean party shows an interest in the development of the trade-economic relations with the Russia regions. The regions of Siberian and Far East cooperate with DPRK with the most productivity. According to the experts’ evaluations, the basic branches in which the co-operation between the DPRK and Far-Eastern and Siberian regions will be developed are wood, coal industries, agriculture and fishery. The basic items of the Russian export to DPRK are machines, equipment and spare parts, chemical fertilizers, ferrous metals, oil products, timber, coal, fish and other sea products. DPRK supplies to Russia, basically, manpower services (up to 80-90%), re-export goods of the Japanese and Chinese origin and textile articles.

Of new great projects, the following ones are prospective: 1) transport project related to joining the Trans-Siberian and Trans-Korean railways to provide the railway communication between Europe and Republic of Korea through Russia and DPRK; 2) highway “Vladivostok (Russia) - Pusan (Republic of Korea) through the DPRK territory; 3) extension of the planned oil-pipeline “Angarsk-Perevoznya” (Khasan district, Primorsky Krai) to Pusan through the DPRK territory; 4) construction of the tourist complex of the international importance within the Free Economic Zone of «Rajin-Sonbon». These projects may contribute not only to a reviving of the North Korea economy and development of the external economic co-operation of this republic with the neighboring countries but also to the improvement of the military-political situation in the Korean Peninsula and in the region as a whole.

External economic links of the Russian Far East and DPRK.

In spite of the geographical closeness of the Russian Far East and DPRK, their trade-economic links are at a quite low level over the course of the prolonged period. A role of the DPRK in the external trade of the Far East is extremely small to present day. For a period of 1992-2001, a share of DPRK in the external trade turnover was at the level of 0,1 – 0,5 %. Since 1990s, the episodic growth in the commodity turnover has been purely reached by the way of an increase in the region’s export volume.
In the export’s structure of the beginning of the 1990s, the most weight has fallen on metals and flavoring goods. Small in volume import supplies were formed at the expense of the consumer goods. From 1998, the import from DPRK was practically terminated; its volumes did not exceed 50 thousands USD.

In the second half of 1990s, the certain positive changes occurred in the structure of the regional export to DPRK. In the last years, the basis of the export to DPRK is machinery production (about 70% in 2001).

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<td>In all, including:</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
</tr>
<tr>
<td>Machines, equipment, transport facilities</td>
<td>12,2</td>
<td>69,8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fuel, mineral, metals</td>
<td>42,9</td>
<td>9,3</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Chemical commodities</td>
<td>2,0</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Timber products</td>
<td>10,2</td>
<td>4,1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Flavoring goods</td>
<td>31,6</td>
<td>2,3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Industrial consumer commodities</td>
<td>1,0</td>
<td>7,0</td>
<td>100,0</td>
<td>100,0</td>
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<tr>
<td>Other</td>
<td>0,1</td>
<td>7,5</td>
<td>-</td>
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Table 2

Commodity composition of the external trade of the Far East with DPRK, in %

The closest trade-economic links with DPRK were established by Khabarovsk and Primorsky Krais as well as Amur Oblast. The situation established at that stage in the trade-economic co-operation of the Far East and DPRK is, in many respects, characteristic of the Russian-North-Korean trade too. At present, on a share of the Far East in the Russian trade turnover with DPRK of the Far East in the Russian trade turnover with DPRK, 16.5 % fall while in the export - 20,9 %.

Khabarovsk Krai and Amur Oblast hold an interest in an increase of the timber harvesting volumes with the use of the Korean manpower. The co-operation of DPRK with the fishery enterprises of Primorsky Krai in the field of the joint fish catching and processing, mariculture seems to be prospective. The potential reserves of marine bioresources in the DPRK waters open up wide possibilities for their joint study and following catching. The Russian party has worked over at the appropriate levels the question of the co-operation with DPRK in the field of the power industry. The execution of electric energy supply to the Korean Peninsula is considered in the complex of a realization of the program of the network construction in the Far East related to the Bureyskaya hydroelectric power station launching.

Table 3


<table>
<thead>
<tr>
<th>Countries</th>
<th>Russian Federation</th>
<th>Far East of Russia</th>
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<tbody>
<tr>
<td>DPRK</td>
<td>4.6</td>
<td>0.3</td>
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The investment co-operation of the Far East with DPRK was developed even weaker than the external trade one. At present, only not many joint ventures (with DPRK) operate in the Far East, mainly, on the territory of Khabarovsk and Primorsky Krais as well as Sakhalin Oblast. In the second half of 1990s, a number of enterprises went out their business in connection with that they did not practically operate over a period of years. On the whole, the investment co-operation with DPRK was of no considerable importance for the Russian Far (Devayeva, 2004)
External economic links between Primorye and DPRK

The long-standing good neighbor relations remain between Primorsky Krai and DPRK. The fish industry and sea cargo traffic are the traditional fields of co-operation between two territories. With DPRK, such great Primorye enterprises as the “Far-Eastern shipping company” and some fishing companies work. At present, the questions of the joint exploitation of the petroleum refinery in the North-Korean port of Radjin and export of electric power are studied. In 2002, the Krai’s foreign trade turnover with DPRK reached 5.4 millions USD. On the Primorye territory, eight enterprises with the North-Korean investments were registered. (http://scripts.online.ru)

Table 4

Trade of Primorsky Krai with DPRK in 1991-2001, thousands USD

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</thead>
<tbody>
<tr>
<td>Export</td>
<td>2742,5</td>
<td>393,5</td>
<td>2029</td>
<td>2300</td>
<td>2600</td>
<td>1800</td>
<td>1600</td>
<td>3000</td>
<td>2900</td>
<td>2000</td>
<td>2500</td>
<td>5400</td>
</tr>
<tr>
<td>Import</td>
<td>1033</td>
<td>300</td>
<td>91</td>
<td>1500</td>
<td>400</td>
<td>300</td>
<td>200</td>
<td></td>
<td></td>
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<tr>
<td>Trade</td>
<td>3775,5</td>
<td>693,5</td>
<td>2120</td>
<td>3800</td>
<td>3000</td>
<td>2100</td>
<td>1800</td>
<td>3000</td>
<td>2900</td>
<td>2000</td>
<td>2500</td>
<td>5407</td>
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<tr>
<td>Balance</td>
<td>1709,5</td>
<td>93,5</td>
<td>1938</td>
<td>800</td>
<td>2200</td>
<td>1500</td>
<td>1400</td>
<td>3000</td>
<td>2900</td>
<td>2000</td>
<td>2500</td>
<td>5393</td>
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Table 5

Number of the North-Korean workers in Primorsky Krai in 1992-2001

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<tbody>
<tr>
<td>Total number</td>
<td>1779</td>
<td>1181</td>
<td>1421</td>
<td>3956</td>
<td>4144</td>
<td>3119</td>
<td>2134</td>
<td>2373</td>
<td>1469</td>
<td>2013</td>
<td>2089</td>
</tr>
<tr>
<td>% of total number of all foreign workers in Primorye</td>
<td>20,1</td>
<td>15,2</td>
<td>25,5</td>
<td>30,8</td>
<td>30,6</td>
<td>27,6</td>
<td>20,6</td>
<td>23,5</td>
<td>12,5</td>
<td>12</td>
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Table 6

Number of the working Russian-North-Korean joint ventures in Primorsky Krai in 1992-2001

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<tbody>
<tr>
<td>Number</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
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</table>

In 2003, 15496 foreign workers worked in different branches of the Krai economy. In the first half of 2004, 15739 foreign workers were engaged in the branches of the Krai economy. As before, the greatest exporters of foreign manpower are China (68%), DPRK (16.3%) and Vietnam (9.2%).

The Korean party holds an interest in a granting by the Russian party of the state credits for reconstruction and expansion of the Kim Chak metallurgical works (assesses expenses are about 800 millions USD, Pyongyang (150 millions USD), Puckchhan (110 millions USD), East-Pyongyang (50 millions USD) и Ckhonjin heat stations (30 millions USD), i.e. in all to the amount of 1150 millions USD.

Holding an interest in the co-operation extension in the field of timber cutting with the use of the Korean workers on the Russian territory, the Korean party continues to insist on signing of the protocol-supplement on the questions not stipulated by the intergovernmental agreement of области лесного комплекса от 28.12.1999 (including a granting of tax and customs privileges with respect to the imports and exports of goods of private use and production activity for the
DPRK citizens engaged in the timber cutting in Russia) as well as it has earlier proposed to consider the questions related to the co-operation arrangement in the timber cuttings, besides Khabarovsk Krai and Amur Oblast, in Irkutsk and Sakhalin Oblasts, Primorsky Krai, Buryat Republic, Republic of Sakha (Yakutia) and other regions of Russia with attraction of the Korean manpower and possibility to export the timber from Russia to the port of Unsan located within the trade-economic zone of “Radjin-Sombon” as well as a processing of timber in Unsan.

As for an expedience of the timber export through the trade-economic zone of “Radjin-Sombon”, the question is worked over by the Russian exporters – timber enterprises of Amur Oblast. A delay was caused by the difficulties concerning the determination of tariff rates for the exported products and the former persevering position of the Korean party of a granting to it additional privileges with respect to providing of the duty-free and tax-free export from Russia of the Korean portion of products which conflicts with the Russian legislation.

The Korean party supposed to resume a co-operation in the field of light industry based on operations with goods made on commission.

The basic lines of co-operation in the field of transport are based on the connection of railways of the North and South Korea and arrangement of carriages of transit cargoes from the South Korea through the DPRK territory with going out to the Trans-Siberian Railway.

Of Russia, the recovery of the Kenvonson line bringing out the freight flow along the eastern coast of the Japan Sea to the frontier point of Khasan-Tumangkan is the most interest. The President of Russian Federation V.V. Putin has announced of the interest of Russia in this route at the time of his visits to Pyongyang in July, 2000, and to Seoul in February, 2001.

Today, the project of joining of the railways of Republic of Korea and DPRK with the Trans-Siberian Railway according to the scheme: Pusan-Seoul-Pyongyang-Khasan-Ussuriisk. A joining of the communications of both Korean republics with the Trans-Siberian Railway will provide not only strengthening of their external economic links with Russia (first of all, with the Primorsky Krai territories) but also the transit railway access to the European countries. Undoubtedly, the realization of this international railway and road-transport project (Khabarovsk-Vladivostok-Pusan) provides a new impulse for economic development of the south-western Primorsky Krai and northern territories of DPRK and will be the important factor of the strengthening of the external economic link, recovery of political situation in the region. In this connection, a reconstruction of the road section of Razdolnoye-Khasan of the highway Khabarovsk-frontier passage to DPRK should be one of priority. A speeding-up of construction of this section of the highway mates also with the planned establishment of new tourist-recreation zone of Vladivostok on the opposite shore of Amur Bay and tourist complex within FEZ “Radjin-Sonbon”.

In connection with the project of The Trans-Korean and Trans-Siberian Railways and suspected intensification of the external economic and other international links of Russia and both Korean republics, it is necessary to include the roads Khabarovsk-Khasan and Khasan-Vladivostok-Nakhodka among the top-priority reconstructed or constructed motor-ways on the Krai territory. The expediency of the priority construction of the motor-way Khabarovsk-frontier passage to DPRK should be one of priority. A speeding-up of construction of this section of the highway mates also with the planned establishment of new tourist-recreation zone of Vladivostok on the opposite shore of Amur Bay and tourist complex within FEZ “Radjin-Sonbon”.

Russia and DPRK are partners as well in the field of scientific researches in many fields of knowledge. The important area of cooperation is preservation of the environment and the nature.

The international relations in the field of the environment conservation and preservation of ecosystems, especially within such transboundary zones as the East Asia, have passed a complex way in their development from a distrust and jealousy to a growing mutual understanding.

The conservation of biodiversity is of particular importance in these areas being key ones in the view of the world gene pool. The East Asia, owing to the peculiarities of its geographical
position, surface structure and development history, had a chance to establish the great quantity of natural complexes being unique not only for Asia but also for the whole world.

A new form of the international co-operation development is an establishing transboundary structures as two interacting links in the near-boundary areas of the neighboring countries. In this connection, different transboundary structures begin to form in the near-boundary areas of DPRK-PRC-RF. The formation of the Russian-Chinese-Korean transboundary nature-conservative complex is beginning. The latter consists of a number of protected territories of the southern Primorye, Chinese reserve near Hunchun and created reserve within the FEZ of Rason (DPRK) (Fig. 2).

The lower reaches and the estuary of the Tumen River is a vast wetland complex, mainly located in Russia’s Khasan District and including the largest complex of natural lakes (Manpo, Ponpo and Tongbon in Rajin-Sonbong in the DPR Korea, immediately south of the Tumen River. These two coastal areas have over 30 freshwater lakes and brackish lagoons and rivers, and serves as a critical transit area of the main migratory path of the East Asian-Australasian Flyway.

They also support over 200 species of migratory birds including 34 globally endangered species that are listed in the IUCN (The World Conservation Union) Red Data Book, including the Red-crowned Crane, the White-naped Crane, the Whooper and Bewicks Swans and the Swan Goose. Large populations of ducks, geese and moorhens are observed in spring and autumn, and other large bird populations are observed during the summer season.

The countries of this region agree to enlarge and/or establish Nature Protection Areas (NPA) to protect threatened species such as the Amur tiger, Far-eastern leopard, and various migratory birds (as noted in the TDA) (Fig. 3). Goals include strengthened NPA management, stricter and more comprehensive ecosystem management, increased public information and awareness raising measures.
Now the DPRK government has taken measures on environment protection and biodiversity conservation, reproduction of animals and plants in the lower Tomen River. In accordance with it the government provides safe political, legal and social-economic guarantees in this area.

Fig. 3. The International transboundary biosphere reserve in the lower stream of Tumen River

Such structures functioning in the close co-ordination improve the integration processes.
International Cooperation for Infrastructure Development in North Korea

Won Bae Kim
KRIHS
September 2005
Contents

- Infrastructure development as an essential part of economic assistance
- Current status of infrastructure in North Korea
- Investment requirements for infrastructure development
- Strategic approach
- Investment needs and financing
- International cooperation framework
Infrastructure Development as part of Economic Assistance

- Policy towards North Korea: engagement, containment or ignorance (consider the opportunity costs of each option)
- If engagement is a preferred option, economic assistance can be an important part of a package deal in the six party talks
- Infrastructure development as a central component of economic assistance
- Infrastructure development in DPRK should be understood as a strategy for building regional public goods in Northeast Asia
Current Status of Infrastructure in North Korea

- Comparison of South and North Korean economy
- Comparison of infrastructure stocks with South Korea
- Industrial districts and infrastructure endowment
- Major problems
### Comparison of South and North Korean Economy, 2003

<table>
<thead>
<tr>
<th></th>
<th>South Korea</th>
<th>North Korea</th>
<th>SK/NK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population in thousand</td>
<td>49,925</td>
<td>22,522</td>
<td>2.13</td>
</tr>
<tr>
<td>Gross national income in $ billion</td>
<td>606.1</td>
<td>18.4</td>
<td>32.9</td>
</tr>
<tr>
<td>Per capita GNI in $</td>
<td>12,646</td>
<td>818</td>
<td>15.5</td>
</tr>
<tr>
<td>Trade in $ billion</td>
<td>372.6</td>
<td>2.4</td>
<td>155.9</td>
</tr>
</tbody>
</table>

Source: National Statistical Office of ROK
Problems of the North Korean Economy

- Three shortages: food, energy and transportation
- Causes: a command economy with the self-reliance principle
- Reform started? Yes but hesitantly
- Way out? An open market economy
- Can they do it alone? No
## Comparison of Infrastructure Stocks with South Korea

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit</th>
<th>S. Korea</th>
<th>N. Korea</th>
<th>SK/NK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
<td>Km</td>
<td>7,287</td>
<td>5,269</td>
<td>1.4</td>
</tr>
<tr>
<td>Road</td>
<td>Km</td>
<td>96,037</td>
<td>24,449</td>
<td>3.9</td>
</tr>
<tr>
<td>Port</td>
<td>Million ton</td>
<td>528.0</td>
<td>35.5</td>
<td>14.9</td>
</tr>
<tr>
<td>Electricity</td>
<td>Thousand kw</td>
<td>53,801</td>
<td>7,700</td>
<td>6.9</td>
</tr>
<tr>
<td>Telephone</td>
<td>Thousand lines</td>
<td>23,433</td>
<td>1,100</td>
<td>21.3</td>
</tr>
</tbody>
</table>
## Industrial Districts and Infrastructure Endowment

<table>
<thead>
<tr>
<th>Districts</th>
<th>Other infra</th>
<th>Transport</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinuiju</td>
<td>Rel. good</td>
<td>Poor</td>
<td>Light</td>
</tr>
<tr>
<td>Anju</td>
<td>Rel. good</td>
<td>Rel. good</td>
<td>Heavy</td>
</tr>
<tr>
<td>Pyongyang</td>
<td>Rel. good</td>
<td>Rel. good</td>
<td>Mixed</td>
</tr>
<tr>
<td>Haeju</td>
<td>Poor</td>
<td>Poor</td>
<td>Light</td>
</tr>
<tr>
<td>Cheongjin</td>
<td>Poor</td>
<td>Rel. Good</td>
<td>Heavy</td>
</tr>
<tr>
<td>Gimchack</td>
<td>Poor</td>
<td>Poor</td>
<td>Heavy</td>
</tr>
<tr>
<td>Hamheung</td>
<td>Poor</td>
<td>Poor</td>
<td>Heavy</td>
</tr>
<tr>
<td>Wonsan</td>
<td>Rel. good</td>
<td>Rel. good</td>
<td>Mixed</td>
</tr>
<tr>
<td>Ganggye</td>
<td>Poor</td>
<td>Very poor</td>
<td>Defense</td>
</tr>
</tbody>
</table>
Major Problems of Infrastructure in North Korea

- Under-investment in infrastructure due to the self-sufficiency principle and heavy industry emphasis of industrial development
- Inefficient industrial sites development emphasizing defense industries and raw materials
- Poor maintenance and lack of facilities
  - Dilapidation of rail system (average speed of 20 - 40km/hour)
  - Underdeveloped road system and low pavement ratio
  - Poor harbor facilities (no cranes for 40ft container)
  - Insufficient electricity generation capacity, old and inefficient thermoelectric power plants, poor distribution system
Several estimations exist and they vary by scope and period. These estimates range from 16 billion to 60 billion dollars for a ten year period. For a longer period of about thirty years, estimates go up to 125 billion dollars. The method common to these estimates is the use of the ratio of infrastructure investment over GDP and South Korea is taken as a reference.
For the ten-year period (2003-2012)

- Electricity, transportation and communication covered
- Using Cobb-Douglass production function: $ 16.1 billion dollars
- Appropriate infrastructure investment ratio over GDP: $ 14.3 billion
Rationale for Development Assistance to North Korea

- Private financing is difficult for public infrastructure projects such as transport and energy.
- Public infrastructure is critical for the rehabilitation of the North Korean economy.
- Public infrastructure such as rail and gas pipelines serves the interests of neighboring countries and promotes economic cooperation in NEA.
Strategic Approach to Infrastructure Development

- Contingent upon the DPRK’s policy changes regarding nuclear development & economic reform
- Gradual development commensurate with industrial and urban development
- Integration among different components of infrastructure
Principles to be Observed in Infrastructure Development

- Investment efficiency
- Flexibility
- Connectivity to network development
- Foremost, North Korea should win trust from the six-party talks members
### Gradual Development Synchronized with Reform and Industrial Development

<table>
<thead>
<tr>
<th>Stages and strategic options</th>
<th>Opening &amp; reform</th>
<th>Industrial development</th>
<th>Spatial implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>First stage 3-4 years</td>
<td>Preferential opening of border areas and limited reform</td>
<td>Light industries primarily of contract processing &amp; utilization of tourism resources, distribution activities</td>
<td>Border locations and special economic zones</td>
</tr>
<tr>
<td>Second stage 6-7 years</td>
<td>Non-preferential opening and expanded reform</td>
<td>Export-oriented light industries plus selective renovation of heavy industries and new industries promotion</td>
<td>Coastal locations and more special economic zones to induce foreign direct investment</td>
</tr>
<tr>
<td>Third stage 10-15 years</td>
<td>Country-wide opening and deepening reform for market economy</td>
<td>Enhancing the value adding capacity of export industries including some information industries</td>
<td>Major cities along transport corridors and a few heavy industry centers targeted for renovation</td>
</tr>
</tbody>
</table>
## Infrastructure Development Phases

<table>
<thead>
<tr>
<th>Stage</th>
<th>Emphasis</th>
<th>Geographical focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Local transport &amp; electricity in special zones</td>
<td>Growth points</td>
</tr>
<tr>
<td>Second</td>
<td>Arterial transport, trade ports &amp; power plants</td>
<td>Concentrated dev. in a few key regions</td>
</tr>
<tr>
<td>Third</td>
<td>Transport system &amp; power grid</td>
<td>Network development</td>
</tr>
</tbody>
</table>
Spatial Configurations of Infrastructure Development

Four corners, two north-south corridors
## Priority Projects (Examples)

| First stage | - transport and electricity link to special zones such as Gaesong, Guemgangsan and Rajin/Sonbong  
- road connections and expansion at the border  
- renovation of Gaesong-Pyongyang rail  
- improvement of power plants operation |
|-------------|------------------------------------------------------------------------------------------------|
| Second stage | - infrastructure improvement in special zones of Sinuiju, Nampo and Wonsan  
- construction of highway from Anju to Sinuiju  
- renovation of Pyongyang-Sinuiju & Seoul-Wonsan rail,  
- power plants and communication system in major cities |
| Third stage  | - double tracking of arterial railways and road expansion between major cities  
- construction of airports and country-wide communication system  
- construction of nuclear or gas power plants |
Region-wide Connections to be Promoted

- Continental transport and energy connections from China & Russia to the Korean peninsula
  - Shenyang-Pyongyang-Seoul rail
  - Trans-Korean Rail with Trans-Siberian Rail
  - Natural gas pipeline from Sakhalin to S. Korea via N. Korea
  - Cross-border connections of highway and road
<table>
<thead>
<tr>
<th>Stage</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td>3-4</td>
<td>6-7</td>
<td>10-15</td>
</tr>
<tr>
<td>Investment needs</td>
<td>4-5 $ billion</td>
<td>9-10 $ billion</td>
<td>50-75 $ billion</td>
</tr>
</tbody>
</table>
Financing Infrastructure Projects

- Inter-Korean cooperation: South-North Korea Economic Cooperation Fund ($1 billion annually)
- Bilateral cooperation, e.g., Japan-DPRK, Australia-DPRK and Canada-DPRK ($1 billion annually)
- ‘Korean Peninsula Infrastructure Development Organization’ through the five country multilateral framework ($1 billion per annum)
- International financial agencies such as World Bank/IMF and Asian Development Bank ($1 billion per annum)
- Creation of Northeast Asia development bank
- Private sector financing (e.g., Northeast Asia Development Financing Council)
DPRK’s Contribution to Infrastructure Development

- Land and labor in the initial stage
  - Granting land use right
  - Construction corps using demobilized North Korean military (RAND)

- Re-prioritizing public expenditures
- Raising domestic savings and investment in the later stage
### Sequencing for International Cooperation with DPRK

#### Political events
- Resolving DPRK’s nuclear problem in the six party talks
- US-DPRK & Japan-DPRK normalize relations
- DPRK adopts major opening and reform programs
- International organizations extend membership to DPRK

#### Economic events
- Economic assistance program initiated by the five party forum
- Bilateral/multilateral assistance to infra. dev.
- FDI and trade expansion by the private sector in the North
- Major infrastructure building begins with private financing
International Cooperation Framework: Initial Stage

Japan’s ODA
Other bilateral dev. assistance
Inter-Korean Cooperation
NGO/UN

KIDO
US
Japan
S. Korea
EU +
China & Russia
International Cooperation Framework: Later Stage

Japan’s ODA → Inter-Korean Cooperation → Other bilateral dev. assistance

World Bank-led Consultative Group
Suggested International Cooperation Framework

- Many potentially divisive issues exist in Northeast Asia besides DPRK’s nuclear problem
- US should get involved in setting up a multilateral security and economic cooperation framework in Northeast Asia
- Infrastructure development in NK should be understood as part of building regional public goods, essential for economic cooperation in NEA
- Inter-Korean cooperation and other bilateral cooperation should be coordinated by KIDO in the early stage
- International financial organizations like World Bank should lead and coordinate financing in later stages
Let us hope for a better future.

Thank you.