Regional Economic Cooperation
in Northeast Asia

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OPENING CEREMONIES
WELCOMING ADDRESS

H.E. Mr. Mendsaikhany Enkhany Enkhsaikhan,
Prime Minister of Mongolia
(Translation from Mongolian)
Ulaanbaatar, 19 August 1997

Mr. Chairman,
Distinguished delegates,

On behalf of the Government of Mongolia and on my own behalf, I would like to extend my sincere greetings to the participants of the Seventh Meeting of the Northeast Asia Economic Forum being held in my country for the first time.

We are pleased to note that the Northeast Asia Economic Forum has become a vehicle for the exchange of views among scholars, and research and governmental organizations on important issues of cooperation in this region, and is generating vital ideas and recommendations for the action of the respective Governments.

You are all well aware that today, when the world is overwhelmed by the endeavor to make humanity one family and our planet one home, it has become imperative, first of all, for countries to be integrated by region. This imperative is especially relevant for the countries in the Northeast Asian region. These are the only countries in Asia not covered by a regional mechanism. I should note that only a lack of political will and certain circumstances are temporarily holding us back, although there is no obstacle to economic integration in terms of geographical location, traditions and historical background. That is why the Government of Mongolia attaches great importance to your Forum and endeavors to work together with you towards developing a permanent mechanism of cooperation.

We are happy that the agenda of this Seventh Meeting has the same directions as the goals of the Program of Action of my Government. We are fully confident that you will produce constructive suggestions and recommendations on such important issues as scenarios for regional development, prospects for regional cooperation, ways of effective
utilization of the comparative advantages of the countries in the region, and for defining the structure and infrastructure needed for future integration.

The Government of Mongolia will be following closely the work of your Forum and will carefully consider the documents from the Meeting.

I wish every success to the Meeting and thank you for your attention.
Opening Statement

Yuji Nishio
Governor
Tottori Prefecture, Japan

First of all, I would like to express my great respect and sincere appreciation to Dr. Lee-Jay Cho, Chairman of the Northeast Asia Economic Forum, and to the representatives of the Mongolian Government, who have made tremendous efforts in preparing for the Seventh Northeast Asia Economic Forum. It is an honor for me to have the opportunity to speak at the opening of this prestigious Forum.

This year represents the advent of a new era for Asia, marked particularly by the historical return of Hong Kong to China. Considering these new circumstances, I think it is extremely meaningful and timely that the representatives from the national governments, local governments, and research institutions have gathered here to exchange views about the present and future cooperative development of Northeast Asia.

Tottori Prefecture, which faces the Japan Sea, is the smallest prefecture in Japan, and has a population of only 610,000. Despite our small size, we have been actively engaged in interchanges with the Japan Sea Rim countries.

We have established a cordial relationship with the Central Province of Mongolia, and the Honorable Governor Badbold of the Central Province paid a visit to Tottori on the 25th of July this year. We have also been promoting cooperation with both the Jilin and Heibei provinces of China, Kangwondo Province in South Korea, and the Primorsky region of Russia. A Local Government Summit, consisting of these four local governments as well as Tottori, has been held regularly.

As a result of these ongoing exchanges, several overseas local governments have sent exhibitions to the Japan Expo, Sanin Yume Minato, and their pavilions will appear there from July to September this year. We believe that this Japan Expo will enhance Tottori's efforts to become the gateway of the Western part of Japan in terms of Japan Sea Rim cooperation. It should also be noted that the Sakai Minato region, where this
Expo is being held, has been designated as a Foreign Access Zone. This is expected to provide a positive impetus in terms of importing goods from Northeast Asian countries.

We in Tottori prefecture will continue to welcome exchanges of people as well as economic cooperation in Northeast Asia by facilitating the development of infrastructure. For example, we are expanding our harbor facilities to a total of 50,000 berths and warehouses, and establishing regular shipping and airline services. Furthermore, through the Local Government Summit, we have been exchanging views on subjects of common concern. Among these is the promotion of tourism based on the mutual rich tourism potential and concern for environmental protection around the Japan Sea Rim.

As a concrete contribution to economic cooperation in Northeast Asia relevant to energy development such as oil and gas resources and other infrastructure, we have been participating financially in feasibility studies for the Zarabino Port. In this regard, we look forward to expanded cooperation in the future development of Northeast Asia. Our confidence in the future prosperity of Northeast Asia is also reflected in our promotion of exchanges at different levels, such as local governments, research institutions and enterprises involved in economics, cultural affairs and the environment.

Tottori hopes to be the window for the western part of Japan in terms of the cooperative development of Northeast Asia. As part of the groundwork for realizing this goal, we will open the Yonago Convention Center in May next year. This new Convention Center will give us the capability of hosting large-scale international conferences. We hope the next Northeast Asia Economic Forum can be held in 1998 at the newly opened Yonago Convention Center in Yonago City, Tottori Prefecture.

Finally, I would like to conclude my speech by expressing my best wishes for the success of this Forum and for the good health of the participants.

Thank you very much.
Statement

Li Ju Yong, Vice-Chairman  
Committee for the Promotion of  
External Economic Cooperation  
Democratic People's Republic of Korea

Esteemed Mr. Chairman,  
Esteemed Representatives,  
Ladies and gentlemen,

The Northeast Asia Economic Forum which took its first step in Changchun in August, 1991, is today opening its Seventh meeting here in Ulaanbaatar following meetings in Pyongyang, Vladivostok, Yeongpyong, Niigata and Honolulu.

This meeting has great significance and promise because it completes the full cycle of meetings held in the participating countries of this Forum. These meetings have deepened mutual understanding and interest in regional cooperation and joint development.

On behalf of the Committee for the Promotion of External Economic Cooperation (CPEEC) of the Democratic People's Republic of Korea (DPRK), I express our deep appreciation to the Chairman of this Forum, Lee-Jay Cho, and the sponsors of the Forum for inviting our delegation.

It is expected that the Seventh meeting of the Northeast Asia Economic Forum will further promote common understanding for the development of Northeast Asia and expand and improve cooperation among countries and peoples in the region. In conformity with the Forum's goal of constructing a peaceful and prosperous Northeast Asia, our delegation will make every effort to contribute to the success of this Forum by actively participating in the discussion of all the matters raised.

According to the Tumen River Area Development Programme (TRADP), under the auspices of United Nations Development Programme (UNDP), development of the Rajin-Sonbong Free Economic and Trade Zone (FETZ) is making considerable progress.
Our delegation reconfirms the firm will and position of the government of the DPRK to support the development of Northeast Asia, including the Tumen River area. I believe that our position and our efforts to contribute to constructing a prosperous Northeast Asia, especially through the Rajin-Sonbong FETZ, will receive your support and sympathy.

I want to conclude by expressing my hope that this will be a practical and productive meeting which stimulates economic development and prosperity in Northeast Asia.

Thank you.
The Future of Regional Cooperation in Northeast Asia

Lee-Jay Cho
Chairman, Northeast Asia Economic Forum and Executive Vice President, East-West Center

This morning I would like to share with you my vision of Northeast Asia’s possible future. Many of us have just come back from a visit to the Gobi, where we witnessed the vastness of this magnificent desert, which stretches as far as the eye can see. We should draw inspiration from this experience and look to the future with an equally wide, open, and far-reaching vision. The centrifugal force of globalization and the centripetal force of regionalization are rapidly changing the world we live in today and will continue to be powerful forces into the 21st century.

All of us have been witnesses and contributors to the remarkable transformation of this region, from an area of tension and conflict to one of peace and cooperation, mainly through economic cooperation—or as Deng Xiaoping put it, “economics outflanking politics.” Northeast Asian governments are now more motivated toward maximizing economic wealth, and their increasing economic interdependence makes outright conflict too costly. Moreover, political multipolarity and the opening of once-closed national economies are contributing to the emerging network of natural economic territories (NETs). As a result, there are more multilateral intra-Asian economic relationships and economic interactions across ideological and political boundaries, creating a “soft” regionalism in Northeast Asia—one which lacks organizational structure but which is accepted and even encouraged by governments—i.e., the soft is overcoming the hard. This intraregional multidirectional pattern implies a more diversified set of cooperative and conflictual economic relations in much of the North Pacific. Consequently, there is a growing need for rules, codes of conduct, and harmonization of domestic practices affecting international transactions—in short, regional regimes and institutions.
Clearly, present positive political trends provide an unparalleled opportunity to think boldly and to be innovative about the institutional framework for regional economic cooperation in Northeast Asia. Could Northeast Asia’s future include an Association of Northeast Asian Economies? Think for a moment about Southeast Asia—and the history and achievements of the Association of Southeast Asian Nations which now includes nine countries. The emergence of the ASEAN 9 in its 30th year of existence is a remarkable achievement.

The ASEAN approach has consistently accentuated the positive—focusing on areas of common interest on which multilateral cooperation can be developed and expanded. Discussions are informal and agreements are by consensus and unanimous. To be sure, this style is slow and complicated, but it allows states with different perspectives and interests to synthesize their views. And ASEAN has deliberately used the market system as a catalyst for cooperation—for example, by focusing on growth triangles of common interest and allowing economics to outflank politics.

The Northeast Asia Economic Forum has a historic mission to facilitate such a process in Northeast Asia, namely, to lay the foundation for functional approaches toward an Association of Northeast Asian Economies. It has earned the confidence of relevant policymakers in all Northeast Asian countries and takes pride in a proven track record of successful meetings in the broad area of economic development and cooperation in this region. Indeed, the Forum serves as a catalyst for a burgeoning community for promoting regional economic cooperation. The driving vision of the Forum is that the factor endowments of developing Northeast Asia can be cooperatively harnessed to generate economic dynamism throughout the region. In short, the Forum is in the vanguard of what is essentially a movement for peace, cooperation and better relations, and ultimately for a better quality of life for everyone in Northeast Asia and the larger Asia-Pacific basin.

The success of this movement toward multilateralism may well be the determining factor for peace and stability in the region. The creation of a sense of international community is an absolute necessity and presupposes at least the mitigation and minimization of conflict so that the interests and common needs shared by nations
outweigh the interests separating them. The challenge for the region then is to find a variety of multilateral arrangements and interactions that will demonstrate that a habit of dialogue and working together can achieve common and shared interests and goals. All of us therefore must work toward institutionalizing cooperation as a foundation for lasting peace and prosperity.

For this Seventh Meeting we have sharpened our focus and added more specific substantive areas—eight substantive issues—for examination of possible ways and means of cooperation.

We begin with Scenarios for Regional Development. Because this region has been politically polarized for so long, there have been few, if any, grand visions of an integrated Northeast Asia. It is now time to attempt to envision linking the national development plans into an integrated whole, cutting across national boundaries.

We will then move to National Infrastructure Development Plans and Their Relationship to Regional Cooperation. National infrastructure development plans—road, rail, ports, airports, energy, and telecommunications—are the building blocks of regional planning and integration. This session will provide an opportunity for development planners in each Northeast Asian country to present their national plans and perspectives and to discuss how they may complement or compete with each other.

Perhaps the biggest constraint to cooperative development is financing. The session on Financial Institutions and Mobilization of Capital will focus on potential sources of financing for infrastructure development and will discuss, from the perspectives of the private sector and the development banks, the possibilities and problems of securing the required funds.

We will then move to a focus on pragmatic areas for cooperation. First we look at Cooperation in Development Strategies for Northeast Asia’s Telecommunications Infrastructure. Communications is central to investment and development. Indeed, a regional communications hub in Northeast Asia would stimulate economic and social activities throughout the region and beyond. Japan, China, and South Korea are actively enhancing their efforts toward a regional hub. A panel of experts from each of the
countries represented will discuss and explore how their national systems and future plans will lead to transnational telecommunication linkages.

Next is Cooperation in Energy Infrastructure. Northeast Asia is one of the world's last frontiers for the development of energy resources. And for the first time in decades, vast resources including offshore oil and gas are being made available for investment by foreign companies. The uneven distribution of supply and demand among Northeast Asian countries indicates that common benefits can be derived from cooperation in oil and gas development.

Next is Comparative Approaches to a Cooperative Electric Power System for Northeast Asia. Industrial development clearly requires sufficient electric power. In remote areas near national borders, cross-border electricity networking may be efficient and desirable. For example, China, North Korea and Russia might consider sharing an electricity grid in the Tumen River area, which perhaps could become a nucleus for an eventual grid encompassing much of developing Northeast Asia. A panel comprised of experts from each of the countries represented will discuss national electric power plans and the pros and cons of grid sharing.

Environmental Issues are extremely important in the development process. The development of mainland Northeast Asia and its resource base will inevitably stress the natural environment. To avoid the worst effects and a repeat of the environmental mistakes of the more developed nations of Northeast Asia, it is imperative that protection of the environment be incorporated in development planning in its earliest phases. This session will discuss the likely risks and the methods and means to their minimization.

Last but not least we look at Special Economic Zones. Establishment of special economic zones is one way to help overcome the constraints to cooperative development. Indeed, several such zones have been established in the region, e.g., Hunchun, Vladivostok, Rajin-Sonbong, Tottori, and Niigata, while others are being contemplated, e.g., in Mongolia. This session will explore and compare the particular features of each of these zones, with a view to their improvement and application elsewhere in the region. A progress report on the Tumen River Area Development Programme, including lessons learned, will link and conclude the presentations.
With this agenda we believe this meeting will be another historic step in the process of building the foundation of trust and mutual understanding necessary for regional cooperation in Northeast Asia.

On behalf of the Forum, I would like to express our great appreciation to the Government of Mongolia, particularly the Ministry of External Relations, for their warmhearted welcome and constant efforts to ensure the success of this meeting. I would also like to extend special thanks to the Tottori Prefectural Government for its support in making this meeting possible.
II

SCENARIOS FOR REGIONAL DEVELOPMENT
Development Issues in Northeast Asia

Hisao Kanamori
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Niigata, Japan

The Growing Interest in Northeast Asia

Northeast Asia refers to six countries and areas: the Russian Far East, Northeast China, Mongolia, the Democratic People’s Republic of Korea (DPRK), the Republic of Korea (ROK), and Japan. Because this region has distinct characteristics, it is called the Northeast Asia Economic Zone or the Japan Sea Rim Economic Zone.

The official promotion of a Northeast Asia Economic Zone has a short history. It began in September 1988 with an international symposium in Niigata entitled “Japan Sea Symposium.” A month later, the International Conference on the Management of Resources in the Japan Sea was held by the East-West Center in Niigata, reinforcing the concept of regional cooperation in Northeast Asia.

Although some argue that implementation has been slow, this criticism does not take into account that it has only been ten years since the idea first appeared. Some 30 years were required for ASEAN to fully develop. Ten years ago, the concept of regional economic cooperation in Northeast Asia did not exist in the minds of participants in international conferences. The focus then was purely on national interests and concerns. However, trade and investment in the zone have increased, and dialogue among government officials and exchanges among businesses have become commonplace.
Reasons for the Development of the Northeast Asia Economic Development Zone

There are several reasons why the concept of a Northeast Asia Economic Zone has found ready acceptance and support. First of all, political relations within the region have improved. Until the middle of the 1980s this region was beset with seemingly intractable political conflicts, such as those between China and the former USSR; the ROK and China; Japan and Russia, and Japan and the DPRK. This political situation made economic cooperation difficult at best. However, with the advent of Mikhail Gorbachev as Secretary General of the USSR in 1985, the Cold War began to wane and the political situation improved rapidly.

Regarding Sino-Russian relations, the Long-Term Trade Agreement and the Economic and Technology Agreement signed in 1985 marked the beginning of an increase in trade between the two countries. When Gorbachev visited China in 1989, the two nations normalized their diplomatic relationship.

Perhaps the most astonishing change was between the ROK and the USSR. When a Soviet fighter shot down a Korean Air Lines passenger aircraft in September 1983, negative sentiment in the ROK toward the USSR overflowed. However, after 1988, when the ROK hosted the Olympic Games in Seoul, the ROK began to make overtures toward the USSR. Then, in 1990, diplomatic relations were established. Diplomatic relations between China and the ROK were established in August 1992 and since then, investment and trade have sharply increased.

Although Russia-Japan relations have not greatly improved due to the Northern Territory issue, the atmosphere has improved, e.g., the Tokyo Declaration, the G7 framework, and the agreement on regular summit meetings between Japan and Russia. The remaining diplomatic gap is between the DPRK and Japan, and, of course, the DPRK and the ROK.

The second reason for the acceptance of the Northeast Asian Economic Zone is that the economies of the six countries and areas in Northeast Asia are extremely complementary. The resources, capital, and technology in each country differ greatly:
abundant oil, minerals, timber, and fish in Russia; a huge labor force in China and the DPRK; and ample capital and technology in the ROK and Japan. Each country could benefit substantially from cooperation.

The Russian Far East has many natural resources - coal, oil, natural gas, water power, minerals, gold, diamond, tin, fluorite, tungsten - an amazing cornucopia. Raw timber and fish resources - larch, spruce, red pine, salmon, trout, pollack, and herring - are also abundant. Northeast China has a population of 100 million, whereas the population of the Russian Far East is only 8 million. The development of Russian Far East resources cannot be realized without China’s labor force.

The scale of the potential Northeast Asian market is mind-boggling - 300 million persons and a GDP of one trillion dollars. These conditions are much more than those required to promote regional economic cooperation. Furthermore, the countries and areas in the region are in closer geographic proximity than those in, e.g., Southeast Asia. And with the exception of Russia, the countries and areas have common cultural features.

The Northeast Asia Economic Zone differs in character from other economic blocks like the European Union (EU). The EU is a group of economically similar countries with a Central Bank and a Parliament. There is little difference in laws and regulations, and the movement of capital and labor is not restricted. Europe is now on the way to becoming one country at least economically. On the contrary, the Northeast Asia Economic Zone is characterized by very diverse countries located within a short distance of one another. These countries can provide each other with what each needs and thus mutual exchange will foster the development of the region.

It is not appropriate to say that Northeast Asia cannot be regarded as an economic zone because it has no institutional framework. Professor Robert Scalapino calls this type of economic zone a Natural Economic Territory (NET), which means that it is characterized by naturally occurring complementaries among countries in close geographic proximity. I agree with him.

A third reason for Northeast Asia’s development is the huge efforts which have been made to promote cooperation within the region. In Japan’s case, the local governments of prefectures along the Japan Sea have been very enthusiastic. After World
War II, the Japanese economy developed mainly on the Pacific coast with the expansion of trade with the United States and Southeast Asia. Consequently, the development of the Japan Sea side lagged behind. Now this area intends to catch up by forming and participating in the Northeast Asia Economic Zone. This enthusiasm is spurred by a long history of contacts and exchange. Since the sixth century Japan has been culturally influenced by the continent via the Japan Sea.

Politicians and academics in Northeast China are among the keenest supporters of a Northeast Asia Economic Zone. This part of China does not have an exit to the Japan Sea, and thus, China is interested in expanding the market for its trade by opening up a door to the Japan Sea, in cooperation with Japan, Russia, and the DPRK. It was actually Jilin Province academics who first proposed the development of the Tumen River area. Mongolia also wants to secure an exit to the Japan Sea through the development of the Tumen River area.

The ROK is also eager for cooperation in Northeast Asia. Jilin Province contains the Yanbian Korean Autonomous Prefecture, whose 800,000 inhabitants belong to the same ethnic group as citizens of the DPRK. Blood relationships between these two populations are very strong. Just as overseas Chinese played an important role in the development of Southeast Asia, a Korean network is likely to play a similar role in the Northeast Asia Economic Zone. As an indication of the DPRK's support for economic cooperation, Kim Il Sung established the Rajin-Sonbong Free Economic and Trade Zone in the Tumen River area in 1991.

In Russia, interest in the Far Eastern region has increased since Gorbachev’s July 1986 speech in Vladivostok stating that the USSR was an Asian-Pacific nation. In 1987, the Russian Far East Comprehensive Plan to the year 2000 was announced. This plan was rather unrealistic in that it predicted that industrial production would increase by 2.4-2.5 times by the year 2000. However, it did at least demonstrate Russian enthusiasm for a Northeast Asia Economic Zone. Although, at the beginning, Russia was not very interested in the Tumen River development project, the Primorsky government eventually decided to promote transit trade from Jilin Province by expanding Zarubino Port. And a railway to the Chinese border was completed at the end of 1996.
The initiative taken by the United Nations Development Programme (UNDP) regarding the Tumen River Area Development Programme is very important. Indeed, the Tumen River Area Development Programme would not have progressed without the support of UNDP. UNDP showed great interest in the international conference on Northeast Asian economic development held in Changchun in 1990, and formulated a master plan for development of the Tumen River area. The plan was realized through many meetings with practitioners.

Another characteristic of the Northeast Asia Economic Zone is that it is not the central governments of the countries involved, but the local governments and business circles which are taking the initiative. For instance, Primorsky Territory in the Russian Far East is much more keen on such cooperation than Moscow. In China, as well, it is the three provinces in Northeast China rather than Beijing which are taking the initiative. Unfortunately, the present political situation prevents the central governments from moving more energetically because Japan does not have diplomatic relations with the DPRK, and it has not signed a peace treaty with Russia. Thus, the development of the Northeast Asia Economic Zone could be a manifestation of a new era in which local governments play a role in economic relations with foreign countries.

The Reality of the Formation of the Northeast Asia Economic Zone

It is obvious that the Northeast Asia Economic Zone has huge potential to bring benefits to the countries involved. But what is the present reality? Many people still think that the Northeast Asia Economic Zone is only a dream. But just ten years have passed since the idea first surfaced. Although its development is not far advanced, it is definitely in progress.

The most significant progress is the growth of border trade between Russia and China. Russia and China agreed to abolish visa requirements for each other’s citizens, and the Russian Far East, especially Primorsky Territory, overflowed with Chinese consumer goods. However, the visa-free exchange was stopped in 1994. As a result,
Russian-Chinese border trade greatly decreased. But this is just a temporary setback in a long-term trend.

Joint ventures have increased as well. There are joint ventures in the Russian Far East with companies from Japan, the United States, the DPRK, China, the ROK, Singapore, Australia, and European countries. The number of Japanese joint ventures in the Russian Far East was 217 or 15.5% of the total joint ventures between 1988 and 1993.

Although the investment environment in the Russian Far East is not yet very favorable, there are many Japanese small- and medium-sized enterprises there. Many of these enterprises are military related, such as in aeronautics and the space industry. The conversion of military plants to civil use is an important issue. For example, a company from Osaka is successfully using vacuum tubes designed for military use for high quality audio equipment.

Northeast China is enthusiastic about inviting small and medium sized enterprises to invest in the region. Dalian industrial park, a Japan-China joint venture, was recently completed in the Economic and Technology Development Zone in the suburbs of Dalian. An industrial park has also been completed in Shenyang, Liaoning Province. The Dalian and Shenyang parks are connected by a highway. There is also great opportunity for small and medium sized enterprises to start businesses in Hunchun.

Direct Japanese investment in Northeast China (Liaoning and Jilin, 1993) was US$6.52 million (11.9%) on a contract basis and US$3.36 million (7.4%) on a registration basis. The amount of Japanese investment on a contract basis is a little less than that of the ROK, but on a registration basis Japan’s percentage is higher. The number of investments by Japan in the ROK in 1993 was 85 (31%), and there were seven (3.7%) investments by Japan in Mongolia between 1990 and 1994.

Thus the fact that Northeast Asia does not have a very good investment environment, many enterprises are being launched there, in the use of resources, restaurants for Japanese customers, apartment buildings, hotels, small- and medium-sized enterprises, and military conversion-related enterprises.

Unfortunately, export from Japan to Russia is sluggish. However, some interesting trade routes have developed between China, Russia, and Japan. On 4 August
1992, two thousand tons of corn produced in Heilongjiang were shipped from Songhuajiang across the Russian Far East via the Amur River to the Tatar Strait. The corn traveled across the Japan Sea, and finally arrived at Sakata Port in Yamagata Prefecture, Japan. This was the first time this route was used for trade since the Aigun Treaty was signed in 1858 prohibiting Chinese ships from sailing on the Amur River. This shows that international relations have greatly improved. The corn originated in America, and was grown in Heilongjiang with cooperation from Niigata prefecture. Although the amount of money earned by importing the corn to Sakata was small, the symbolism of economic cooperation among China, Russia, and Japan was very important. Because of poor harvests in China in 1995, corn was not imported to Japan that year. However, harvests were very good in 1996 and Japanese imports of Chinese corn will increase in the medium term.

**Cooperation in Economic Development**

**Tumen River Project**

The most interesting multilateral economic cooperation project is the Tumen River project. The 516 km-long Tumen River originates from Changbaishan between the DPRK and China, and marks the border between the DPRK, Russia, and China all the way to the Japan Sea. The new spirit of economic cooperation was born here and this area will be the core of a Northeast Asia Economic Cooperation Zone. The idea was first presented at a Northeast Asia Economic Forum on Northeast Asia economic development held in Changchun in July 1990, and has since become widely publicized in Japan.

The Tumen River project focuses on developing a triangular area of about 1,000 km² extending between Yanji, Chongjin, and Vladivostok. The triangle represents the core of the project. The reason why cooperation in this area is important is that none of the portions of each country along the Tumen River can be developed unilaterally. The Chinese territory ends just 15 km from the mouth of Tumen River, so it has no access to the sea by this route. Jilin Province thus needs ports, such as Rajin in the DPRK and
Zarubino in the Russian Far East, for development. Meanwhile, Northeast China, as a hinterland, is indispensable for the development of Rajin and Zarubino ports.

Changes in the Concept

In the last eight years, the concept of the Tumen River project has changed. The plan put forth by China in 1990 was to build a river port in Fangchuan in China in order to obtain the right to sail down the Tumen River through DPRK and Russian territory to the Japan Sea. However, this plan now has only symbolic meaning. However, when Gorbachev visited China, China was given the right to sail on the Tumen River through Russian territory. There is now a tiny port in Fangchuan with only small tourist boats at present as the capacity of a river port is rather limited.

In 1991, UNDP presented a joint development plan to China, Russia, and the DPRK for the lower part of the Tumen River. In 1993, the momentum to develop the area grew, and a plan appeared to establish a Tumen River Area Development Corporation with land leased from China, Russia, and the DPRK. This would have been an exceptional milestone for development of the area, and it drew international attention. A local committee was established and began to prepare for the establishment of the corporation. Unfortunately, these activities ceased due to lack of support from the Russian government. A more practical plan was then presented which called for the three countries to each develop their own territory, and a committee was established to coordinate development projects.

Implementation

The Tumen River project has entered its implementation stage after five years of preparation. There was much discussion and research during this five-year preparation period involving practitioners from China, Mongolia, the DPRK, the ROK, and Russia. UNDP not only conducted research but also played an important role in bringing representatives to the discussions from countries in conflict, such as the DPRK and the ROK.
The decision to establish the Tumen River Area Development Coordination Committee (Committee) and the Consultative Commission for the Development of the Tumen River Economic Development Area and Northeast Asia (Commission) in May 1995 marked the beginning of the implementation stage. The Committee members are China, the DPRK, and Russia and the ROK and Mongolia are included in the Commission. The Committee and the Commission were officially established in December 1995, and the presidency of both was given to China for the first year. The DPRK had the presidency in 1997, and Kim Jong U was the chairman. At that point, the initiative transferred from UNDP to the countries concerned. Most important, the Tumen River Trust Fund was established.

Hunchun, China is developing extremely fast. Hunchun was closed to foreigners until 1991 but in May 1992, it was proclaimed a border area special economic zone by the central government. At present 120 enterprises including, a steel pipe company and a textile company from the ROK, and seven companies from Japan, have launched businesses there. Hunchun’s population is 250,000 at the moment, and is expected to grow to one million by the year 2010. When I visited Hunchun for the first time five years ago, it was just fallow land. Now it is well on the way to becoming an industrial city, and the supply of water and electricity have increased. Hunchun will be a base for Tumen River area development. This was indicated by the attraction of 350 people from 24 countries to an investment forum held in cooperation with the United Nations Industrial Development Organization (UNIDO) in nearby Yanji in October 1995. At the investment forum, 118 contracts were concluded with a value of US$8.44 million.

The former socialist countries in Asia except the DPRK have introduced market economies. However, now there is a window to a market economy even in the DPRK - the Rajin-Sonbong Free Economic and Trade Zone. A forum was held in Rajin between 13 and 15 September 1996 to introduce the Zone and attract foreign businesses. The forum was attended by 461 participants from 26 countries, and contracts worth US$2.65 million were signed and investment worth US$5.77 million was agreed upon. This Zone is located in the northern part of the DPRK and shares a border with Jilin Province in China to the north and Primorsky Territory in Russia to the east. It is remarkable that this
A huge 746 km² free trade zone was established in this area. The Zone is separated from its neighbors by barbed wire to the west. The Zone will be radically liberalized, like Hong Kong. Liberalization includes the ability to enter the zone from overseas without a visa, external trade without customs, establishment of foreign enterprises with 100 percent foreign capital, capitalist management systems, favorable tax treatment, liberalization of prices, freedom of remittance of profits, flexible exchange rates, etc. However, outside of this Zone the DPRK remains a closed and strict socialist economy. Thus the economic systems outside and inside the Zone stand in stark contrast.

The idea of a free economic and trade zone was introduced by the late Kim Il Sung in 1991. However, only laws were created, and the actual creation of the Zone did not make any progress. It was only recently that the idea was revived and promoted by the Committee for the Promotion of External Economic Cooperation (CPEEC). Clearly, Kim Il Sung and the DPRK recognized that the expansion of trade with market economy countries was essential for survival of the DPRK economy. The initial plan was to make the Zone a modern international base by the year 2010 for exchanges appropriate for the world economy in the 21st century. Compared to other special zones, e.g., in China, such as Shenzhen, Dalian, and Hunchun, the Rajin-Sonbong Free Economic and Trade Zone has many more obstacles to overcome. The present development stage is extremely low. Although there are 50 enterprises in the Zone, they are insignificant in size. Infrastructure is poor and the streets are not paved except in the center of the towns. A first time visitor will be disappointed at the sight of the wastelands, fallow land, and poorly-contructed buildings. Moreover, there is a lack of know-how regarding the management of firms in a market economy.

Although short-term development might prove difficult, the potential of the Zone should not be underestimated. The DPRK government advocates making this Zone into a combined complex for transit trade, the export of processed goods, tourism, and financial services. Transit trade has the best prospects. Rajin has a good natural port, and it has the huge market of Jilin Province only 50 km away. The Russian border is also only 50 km away and is linked by a broad gauge railroad.
In October 1995 a weekly regular container service of 1,500 tons began between Rajin and Pusan in the ROK, transporting freight between China and the ROK. The capacity increased to 5,000 tons in July 1996. In the first half year it ran at a deficit, but since then it has been making a profit. In 1992, 2,500 TEU were handled, and it is expected to increase to 6,000 TEU this year. There is a plan for regular service between Rajin and Maizuru or Niigata in Japan. Another step forward for the Zone was the opening of the link between Hunchun and Quanhe to third parties on 1 January 1997.

The advantage for the export of processed goods from the Zone is trained, diligent, and inexpensive labor. Because the exchange rate is set rather high at present, the wages are not particularly low, approximately US$80 a month. Some say that the market exchange rate is 1/100 of the official exchange rate, and it is expected that the exchange rate in the Zone will be changed to reflect the actual market rate. If so, the Zone would be very competitive for light industry. UNIDO, the co-organizer of the previously mentioned forum, proposed 101 investment projects primarily in the fields of fish processing, mineral water production, and textiles.

Although economic development is in the initial stage, ING Bank of the Netherlands established a joint venture bank, and Loxley Public Company Limited of Thailand has provided telecommunications links. These companies are clearly confident about the future of the Zone. A modern Rajin Hotel with 100 rooms and 200 beds was built prior to the investment forum. Sixteen contracts worth US$840 million were signed at the forum including a contract for a hospital (US$50 million), a hotel (US$180 million), a bank (US$30 million), and a toy factory (US$6 million). Rajin also has prospects as a base for tourism to Paektusan. The shortage of funds for improving infrastructure is an obstacle, but the UNDP expects that the DPRK will soon join the Asian Development Bank which can help fund the necessary infrastructure. Nevertheless, development will be difficult without the involvement of ROK enterprises. However, as in the case of China and Taiwan, it is possible to have active investment without diplomatic relations. Hopefully, an increase in economic exchange will help relieve political tensions.
Russia is also changing dramatically. Connecting Russia with Jilin and Heilongjiang Provinces by constructing a new railway from Zarubino Port to Changlingzi, a Russian-Chinese border town, is a part of the Tumen River Area Development Programme. However, Russia was initially not very enthusiastic about the Programme, and construction fell behind schedule. But Russia changed its mind around May 1995 and sent troops and heavy machinery to start constructing the railway which was completed in November 1996. At the end of 1996, Chinese goods could be loaded onto freight cars and transported to Zarubino and from there across the Japan Sea.

Regarding the Zarubino Port Development Plan, at the request of Primorsky government, Japan established the Zarubino Feasibility Study Implementing Committee with mainly local government and private sector membership. This project was supported by the central government, including the Ministry of International Trade and Industry, the Ministry of Transport, and the Ministry of Foreign Affairs. Actual research was conducted at the Economic Research Institute for Northeast Asia (ERINA), and a report was submitted in November 1996, as a form of local Overseas Development Assistance (ODA).

Although the Tumen River Area Development Programme is well underway, there are still many problems to be solved, including financing, infrastructure deficiencies, inadequate technology, and insufficient knowledge of a market economy. The Programme clearly requires patience and a long-term perspective.

For political reasons, the central Japanese government has little interest in the Tumen River Area Development Programme and has only sent observers to its meetings. However, the Economic Planning Agency and the Port and Harbors Bureau of the Ministry of Transport have begun to show some interest. The National Comprehensive Development Plan drawn up in 1997 includes the area along the Japan Sea and the concept of a Northeast Asia Economic Zone.

In the business world, it has been small- and medium-sized enterprises in the prefectures along the Japan Sea and trading companies specialized in business with Russia that have shown the most interest in this region. Now, the Japanese Federation of
Economic Organizations has become interested and is sending large missions to the region.

Contrary to Japan, the ROK is very enthusiastic, and will play a major role in the formation of the Northeast Asia Economic Zone. A large delegation including a former prime minister and the former head of the central bank have participated in the annual Northeast Asia Economic Forum meetings held throughout the region and Korean enterprises are actively investing in Hunchun and Khabarovsk.

Many trading companies are interested in connecting Heilongjiang and Primorsky through Suifenhe. The vast Sanjiang Plain in Heilongjiang Province is surrounded by the Amur River, the Songhua River, and the Ussuri River and covers an area almost as large as the total cultivated acreage area of Japan. Capital has been invested there by Japanese ODA and the Export-Import Bank of Japan, and Japanese and Korean enterprises are producing soybeans. Indeed, all of the miso produced in Niigata is made from these soybeans. The possibility of importing coal from Heilongjiang Province is being investigated.

**Development of Oil and Natural Gas in Sakhalin**

Another mark of progress for the Northeast Asia Economic Zone is the development of oil and natural gas in Sakhalin following the adoption of the Production Sharing Agreement Law. Four projects are underway at present, and Japanese enterprises are actively participating in these projects. The Sakhalin II project involving Union, Mitsui, Mitsubishi, Marathon, and Shell expects to start producing oil in 1999 and natural gas around 2002. Production is estimated at approximately 5 million tons of oil and 20.6 billion m$^3$ of gas in the year 2010. If these projects are successful, the economic importance of the Russian Far East for Japan will increase significantly.

**The Development Plans of Each Country**

Each country in the region has its own development plans. China has its Ninth Five-Year Plan based on plans drawn up by each province in 1996. The plan also sets
long-term targets for the year 2010 regarding the national economy and social development. In this plan, growth rates by the year 2000 are estimated at 10% for Liaoning and Jilin Provinces, and 11.6% for Heilongjiang. These estimates are higher than that for the whole of China, which is 8 percent.

Russia has its Economic and Social Development of the Far East and Trans-Baikal Region Program drawn up in 1996. The Program covers the period between 1996 and 2005. The average income in that region, with 1995 taken as 100, is expected to rise to 130 in 2000 and 164 in 2005, surpassing the national average. The total capital needed for this Program is estimated at US$74-US$82 billion.

This Program includes a subprogram entitled “Involvement of the Far East and Trans-Baikal Region in the World Economy through Economic Integration with the Asia-Pacific Region Countries.” This subprogram states that economic relations with outside areas are important not only for capital gain for the Far East region, but also for positively influencing the social and economic climate in the region.

The Future of the Northeast Asia Economic Zone

Economic zones in Asia are natural economic spheres. Other organizations will form in Asia, and further institutionalization will occur. Economic relations will expand naturally with active cooperation between enterprises, and local and central governments. Both Russia and Mongolia will join APEC. The establishment of an international cooperation organization, like the OECD, would be an important milestone in the promotion of cooperation in Northeast Asia.

Conclusions

There are many difficulties facing the Northeast Asia Economic Zone, such as insufficient capital, infrastructure, and knowledge about the workings of a market economy. However, rather than focusing on problems, we should pay more attention to the fact that there is now active international cooperation in an area where only five years ago there were many conflicts, and entrance to foreigners was restricted. As far as
funding is concerned, the following financial sources are needed: internal funding from each country; assistance from international organizations such as the World Bank, the European Bank for Reconstruction and Development, and the Asian Development Bank; assistance from other countries; and funding from government-related financial institutions, private banks and enterprises. However, research is needed on the scope and type of financial sources that can be used for development of Northeast Asia.

The UNDP originally estimated that the capital necessary for the infrastructure of the Tumen River area would be US$30 billion over a twenty-year period. However, experts later changed the figure to US$100 billion over a thirty-year period. Considering the extraordinary shortage of infrastructure, the necessary funding may be much greater than estimated. Estimates of the funding required and the ways to obtain it need to be examined. If projects are promising and a positive policy for attracting foreign capital is adopted, direct investments by the private sector may be a major contributor to the amount required - as they have been in the case of the Newly Industrializing Economies, the Association of South East Asian Nations, and China.

Japan’s economic power in this region is overwhelming. Ninety percent of Northeast Asia’s GNP is contributed by Japan. Indeed, from the point of view of capital, technology, and knowledge, Japan’s participation in the development of the Northeast Asia Economic Zone is indispensable. Recognizing this, the Committee of the Tumen River Area Development Programme called upon Japan to participate officially in the Programme in October 1996. The Japanese government is gradually increasing its support through such activities as establishing a Japan Center in the Russian Far East, and providing loans for the Sanjiang Plain project. But I feel it should play a more active role.

Similarly, it is important to draw the United States into economic cooperation in the region as a collaborator. The participation of the United States is desirable to provide capital and technology, to prevent the Northeast Asia Economic Zone from becoming a closed block, and especially to ease fears of Japanese economic domination in Asia.

International cooperation in Northeast Asia is important not only for its economy, but also for regional security. Cooperation in this region should be considered from a
long-term perspective and should not be limited to regional interests. Moreover, cooperation should be based on the goal of contributing to the world economy and lasting peace.
Envisioning Regional Development in Northeast Asia

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The main rationale for regional economic cooperation in Northeast Asia is the potential for combining the complementary factors in different countries such as natural resources, plentiful labor, capital, know-how, and technology. The combination of these factors would provide an opportunity to reap the benefits of scale as well as an enlarged market. And if integrated infrastructure were in place, economic growth in one area could have a synergistic effect throughout the region.

Northeastern China has abundant natural resources such as oil and coal, a solid base for heavy industry, vast arable land, and some infrastructure. Indeed, until the 1970s, Northeastern China had the strongest regional economy in China. However, only Liaoning Province has direct access to the sea, whereas the borders of the other two provinces, Jilin and Heilongjiang, have been essentially closed. In contrast to the remarkable economic growth of Chinese coastal provinces since the institution of economic reforms in the 1980s, Northeastern China has lagged behind, particularly in foreign investment. Moreover, having failed to overcome the deficit operation of state-run industries, Northeastern China has become a drag on the Chinese economy.

The main problem is lack of direct access to the sea. Almost all transport of international goods is through Dalian in Liaoning Province. However, the end of the Cold War and the subsequent opening of borders have given new hope for the landlocked provinces and Jilin and Heilongjiang have started border trade with Russia. But if Jilin and Heilongjiang want a stable link with Northeast Asia, they must establish permanent access to the Sea of Japan (Figure 1). Since October 1995, Jilin Province has had access to the Sea of Japan via Rajin and its weekly link to Pusan. Road and train links to
Zarubino Port in Russia will be completed within the year, thus opening another route to the outside world for Jilin Province.

The Significance of the Tumen River Area Development Programme

The Tumen River Area Development Programme and its implementation reflect progress in humanity's conceptual vantage point from a tribal or national perspective to a global perspective. With the Tumen River project, human innovation has kept up with the trends toward integration of the world economy and regionalization, rejecting narrow nationalism. Indeed, international development of the Tumen River area through international cooperation among Northeast Asian countries can greatly promote the economic development of the laggard areas, thus enhancing regional economic equilibrium.

Northeast Asia is Asia's last economic frontier. The Northeast Asian region covers an area of 9.62 million km² and contains over 300 million people, a very large potential market. The central location of the lower reaches of the Tumen River ensures that this area will become a focal point for development. The production and flow of large quantities of goods will be accompanied by enhanced transportation, commerce and trade, finance, information businesses, and a wide range of tertiary industries.
Figure 1
Conceptual Map of the Development of Northeastern China by the Opening of Routes to the Sea of Japan (East Sea)
The result will be an international urban center, “Turnenjiang City.” The population of the city could eventually reach 1.0 to 2.5 million.\textsuperscript{3,4} The major functions of the city will be international transportation and communications, commerce and trade, manufacturing, finance, information, and tourism. The Trans-Sino (Jilin)-Mongolia Railway will feed into the city, and the ports in the Tumen River area will become worldwide commercial centers.

Turnenjiang City may develop along the lines of Hong Kong and thus planners could learn from Hong Kong’s experience. Hong Kong went from a village of 7,000 to a metropolis of one million people in only 90 years. The major economic activities of the city were ocean shipping and entrepôt trading. If economic development and urban construction were undertaken along similar lines and on the basis of equality and mutual benefit, the village of 6,000 people at the mouth of the Tumen River (in China) could grow to a metropolis of one million people in about 30 years.\textsuperscript{2,3}

Manufacturing also played a very important role in strengthening Hong Kong’s position as an international economic center. Since the 1950s the production of textiles and garments, electronic goods for family use, toys, watches, etc. developed rapidly. The proportion of secondary industries in the GDP of Hong Kong increased 30 percent in the 1970s.\textsuperscript{5} These industries prompted the take-off of Hong Kong’s economy, stimulating the development of shipping, commerce and trade, finance, tourism, and the information industry. Since the 1980s, the tertiary industries of Hong Kong have developed vibrant export-oriented industries. The policies of reform and the opening of mainland China are creating a favorable environment for the transformation of the economic structure of Hong Kong by extending the manufacturing industries to the mainland and developing tertiary industries in the city.

Adequate infrastructure connecting to the hinterland is critical. For Hong Kong, a railway link to its hinterland was built very late in its history. The Kowloon (Hong Kong)-Canton (Guangzhou) Railway was only built in 1911, 70 years after the British occupation of the island. And a railway connection between Hong Kong and the central cities of central and northern China and the construction of the Canton-Wuchang
(Wuhan) Railway linking Beijing, Hankou, and Wuhan was completed just before World War II.

A new railway linking Hong Kong with Beijing via Nanchang and Jiujiang in Jiangxi Province, called the Beijing-Kowloon Railway, went into operation in 1996. This is a second north-south rail artery, paralleling the Beijing-Guangzhou Railway with an extension of the Guangzhou-Kowloon line. The new rail artery meets the increasing demand of traffic between the north and the south of China in this new stage of economic and political development of the country, which is related both to its economic opening and to the repatriation of Hong Kong.

Based on Hong Kong’s experiences, the following are some suggestions for the construction and development of Tumenjiang City:

- It should be jointly developed and managed as a free port city. Jointly creating and managing Tumenjiang as an international city would be an unprecedented feat in world history. Inevitably, there would be problems in the process. However, if it is widely recognized that the Tumen River Area Development Programme is a step forward in the evolution of mankind, and if the related countries have the political will to realize the Programme’s goals, it will succeed.

- The hinterland must be used to accelerate economic development in the Tumen River area. Hong Kong could not have become prosperous without the natural and socio-economic resources in the surrounding Pearl River Delta. The best way to develop Tumenjiang City and its surroundings is to first develop the transport and communications sectors and resource-oriented processing industries. Commerce, trade, and tertiary industries will naturally follow. A newly emerging city should develop leading basic industries which form broader and more extended linkages, creating more jobs and extending urban functions to the hinterland.

- A Trans-Sino (Jilin)-Mongolian railway should be built as soon as possible. This railway will link the port city to Mongolia, traversing the richest resources in that country including deposits of coal, oil, copper, gold, iron, tungsten, aluminum, and fluorite, as well as abundant livestock. The extension of this railway to European
ports will create a new Asia-Europe Continental Bridge which will transform Tumenjiang into a world-class city.

The Suifenhe-Vostochny Route

Even if Jilin gains access to the sea, Heilongjiang Province remains landlocked. Although both the rail line and road are connected with Russia at Suifenhe, the route extending to the Sea of Japan has not yet been opened. This is because the significance of this transport route is not well appreciated, and Russia, mired in its current economic and political problems, has not cooperated in establishing the route. Nevertheless, this route has great potential (Figure 2). Heilongjiang has rich natural resources including oil and coal, large-scale state-run industries, and vast cultivated land. The agricultural sector, in particular, has great potential for development. Heilongjiang has one of the world’s three largest black soil plains, with the largest average cultivated area per capita in China, and there is still undeveloped land that could be utilized. In particular, the Sanjiang Plains, the hinterland of the Suifenhe Route, has great potential for new agricultural development.

The Suifenhe Route could reduce the cost of transportation by 10 percent and cut transport time by approximately one week. As the volume of export/import cargoes increases, costs will be further reduced (Figure 3). Since 1995, interest in the Suifenhe Route has gradually increased due to (1) serious food shortages in China, (2) an increase in the transportation capacity of the Chinese portion of the Suifenhe Route, and (3) a more favorable attitude by Russia towards handling transit cargoes from China.

An increase of food production in Northeast China is an important goal of China’s Ninth Five Year Plan which began in 1996. The focus is on Heilongjiang because of its undeveloped arable land. Several development projects are already planned using foreign capital from Overseas Economic Cooperative Fund (OECF) loans, World Bank loans, and some private investment. The produce will be transported by way of the Sea of Japan to other regions of China. Regarding improvements in the transportation infrastructure, the middle-grade road between Harbin and Suifenhe has been
Figure 2
Industrial Sector Map of Northeastern China

From Kobayashi et al., 1996
Figure 3
Routes to the Sea of Japan for Northeast Asia

From Kobayashi et al., 1996
completed, the double track line between Harbin and Suifenhe is under construction, and Suifenhe station is under renovation. Moreover, current economic troubles in Russia have led to a recession in the Russian transportation sector and facilities are operating at less than half their capacity. Thus the desire for foreign cargoes has greatly increased. The start-up of the Suifenhe Route will not require large investments because Heilongjiang is already linked by rail and road to major Russian ports. By using existing facilities, 2 to 2.5 million tons of cargo per year can be transported to the Sea of Japan.

The establishment of the Suifenhe Route to the Sea of Japan has already moved from concept to implementation. However, in constructing a system of international transportation from Northeast China’s landlocked provinces by way of the Sea of Japan, two routes should be considered simultaneously: the Tumen River Route from Changchun-Hunchun through Zarubino and Rajin, and the Suifenhe Route from Harbin-Suifenhe through Vostochny. Forty million people live along the two routes, and there is ample development potential in agriculture, industry, and natural resources. The Suifenhe Route will not detract from the Tumen River Route, where there are a number of projects both under development and in the planning stages. In order to promote regional development in Northeast Asia, both routes are necessary and should be developed in parallel.

To implement this plan, a joint venture company for international transportation should be established by Heilongjiang Province and Suifenhe City. Initially, the company should set up services for transportation, storage, and trading in Suifenhe City, including container shipments. At the same time, it should begin marketing goods which China can export using the Suifenhe Route instead of the Dalian Route. In the next stage, an export development scheme should be established to increase production of agricultural goods and coal for the international market. In the latter stage when the routes are stable, export processing zones in both Suifenhe and Mudanjiang will attract more foreign capital. Eventually, the bulk of the cargoes will be manufactured goods.
Northeast China and Beyond

In the early stage of broader regional economic cooperation, special economic zones will be an effective mechanism. In addition to those already established in Hunchun, Raijin/Sonbong, and Nakhodka, Dandong and Shunuiju are logical possibilities. Neighboring border towns at border crossings, e.g., Suifenhe-Grodekovo and Heihe-Blagoveshchensk, would be candidates for joint special economic zones. Cross-border railway and road connections and perhaps jointly used power plants could be supported by foreign direct investment. Port expansion at Raijin/Sonbong and Zarubino is already in progress. Dandong and Shunuiju would require port expansion, which could be of interest to South Korean and Japanese companies.

In this growth point strategy of regional development, joint ventures would be limited to labor-intensive export activities and sectors using local resources. But as countries and businesses gain experience, industrial cooperation could be expanded to larger scale projects with heavier investment requirements. Household electronics, metal fabrication, and machinery using medium technology are all obvious candidates for regional cooperation in continental Northeast Asia. This expanded industrial cooperation, however, will inevitably require an industrial base as well as transportation linkages between consumers and producers.

At this stage, the growth point process will transform into a growth line process (Figure 4). These growth lines can accommodate industries of regional importance, especially resource-based manufacturing such as wood products, iron and steel, metal products, and nonelectrical machinery. Heihe-Blagoveshchensk can be easily connected with Beian, and Suifenhe-Grodekovo can be expanded to link Mudanjiang and Ussuriisk. New lines of growth can be set up, for example, between Khabarovsk and Fuyuan, between Yanji and Chongjin, and between Fengcheng and Chongju. Infrastructure development should not only enhance linkages between major cities along the growth lines but also upgrade production efficiency in the cities themselves. To accommodate the increased international traffic in inputs and commodities, selected regional ports
should be expanded and/or renovated and their linkages with the growth lines constructed.

Figure 4
Long-Term Development Concepts for Northeast Asia

From Kim and Kim, 1997

In the next stage when the major growth axes are about to form, international land connections will be needed. Candidates are Harbin-Dalian, Shenyang-Pyongyang, Harbin-Vladivostok, and Khabarovsk-Vladivostok. The Harbin-Dalian growth line will form first. If Dalian is connected with Yantai by an undersea tunnel, the Harbin-Dalian axis will be the major growth axis in Northeast Asia. The other growth lines will be connected to the Harbin-Dalian axis. By that time, international highways and high-speed railways will connect Pusan/Seoul with Shenyang/Beijing, and Kwangyang/Seoul.
(via Chongjin and Vladivostok) with Khabarovsk. Industries such as machineries, iron and steel, and transport equipment will be located along the major growth axis and subsidiary axes, reaping the benefits of comparative advantage. In the final stage of regional development, growth lines and axes will join to become a growth network. Gas pipelines supplying the necessary energy for industrial production in continental Northeast Asia, South Korea, and Japan will fuel this growth network.

To realize this scenario, both bilateral and multilateral assistance are necessary, as are government efforts to supplement private initiatives. However, private direct investment will be the most important source of financing. A multilateral organization may be necessary to design, coordinate, and implement these projects as well as to build the confidence of investors and mutual understanding among Northeast Asian nations.

Notes


Mongolia’s Strategy for Participation in Regional Development and the “Tumen Gol” Program

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Mongolia’s foreign policy strategy includes the following relevant objectives: “to join the Northeast Asian networks of roads, transportation, information, and communication..., to be flexible to determine the priorities and objectives of the participatory policy in the “Tumen Gol” Program, with close regard to the foreign relation development and the world and regional political atmospheres..., and to provide favorable conditions for participating in regional integration, first of all by extending bilateral relations with the countries involved in integration....”

Mongolia has been actively involved in the “Tumen Gol River Valley Development Program” over the last few years. Through such participation in the “Tumen Gol” Program, Mongolia will be able to develop cooperation with other member countries, have new access to the sea, develop the Dornod region of Mongolia as one segment of the “Tumen Gol” Program, and connect Mongolia with the rest of Northeast Asia by nets of information, communication and transportation systems.

The Tumen Gol river valley is located in the center of Northeast Asia where the mainland meets the sea. This strategic location of the Tumen Gol river valley provides the shortest way to Asia and Europe, and thus there are great possibilities for developing trade and economic cooperation with all of Northeast Asia through this project. In particular, it will combine regional infrastructure with the Chinese and Korean labor force, Russian and Mongolian natural resources, and Japanese and South Korean advanced technology.

Over ten projects are planned for the Dornod region of Mongolia as part of the “Tumen Gol” Program. Mongolia has also manifested its interest in gaining access to the
sea by joining the International Maritime Organization and the International Sea Transportation Convention. Another example was the 1997 hosting of the Northeast Asian Conference on Transit Transportation in Landlocked Developing Countries.

The Mongolian government first gave serious attention to regional development in the 1930s. Regional development must take into consideration the dispersed population, the unique natural environment and the available natural resources. The main purpose of regional development is to reduce the extreme differences between the quality of life in the city and the countryside and to provide an environment in which regions can develop independently.

Mongolia is presently divided into the following main economic regions: Altai, Khangai, Tuv, Dornod, and Ulaanbaatar. The issue of regional economic development will soon be discussed and decided by the Great Khural. These regions were created by considering the appropriate direction of production and services based on local natural resources, infrastructure, environment and social development needs. We must now determine the economic capacity of provinces, regions, and townships, shape the appropriate production and service structures, and provide a comfortable living and working environment for local citizens. Important principles in regional development are comparative advantage, economic independence, self-reliance, and appropriate development of infrastructure.

While identifying comparative advantages and features of the regions, we must consider the establishment of export oriented production centers, the utilization of foreign aid and grants in those centers, and the issue of how to use and regulate investment. The experiences in the establishment of new production centers should also be studied within the regional development framework. Based on the derived development policies, production infrastructure should be formulated and small and medium enterprises should be initiated. Large enterprises will also be established on the basis of industrialization policies. The number of livestock will be increased and the domestic demand for consumer products will be met for main items like vegetables. Small and medium enterprises will then have been established, infrastructural centers will be more developed, and the effects of this development will be transferred to rural areas.
Road transportation, transportation distances and transportation costs play a
decisive role in the development of industry. At present the main export and import
Naushka-Ulaanbaatar-Reliyan railway line has limited service and insufficient capacity.
Thus the Choibalsan-Erentsev line will be the main transportation route in the Dornod
region. We are studying the possibilities of constructing railway lines connecting
Ulaanbataar, Undurkhan, Choibalsan, and Sumber-Rashiant. Infrastructure projects will
be initiated in some aimags to even up the development of aimags and local areas, provide
reliable service for the local coal mines, increase their capacities, and update their
technology.

Special attention will be paid to providing healthy living conditions and stable
settlements for local people in their homelands. This includes strengthening of medical
centers, provision of fundamental education, and the organization of specialized training
courses in the regions tailored to their particular features including population density,
natural and livestock raw materials, and customs.

In providing economic security, we must pay attention to the region’s different
comparative advantages for self development. Thus we must have policies for different
regions regarding taxation, salaries, and living standards. Regional development policies
will depend greatly on investment policies. In order to develop the rural regions, long-
and short-term investment is needed for developing production and service companies,
establishing long-term partnerships regarding the marketing of raw materials, goods and
products, and expanding economic relations with other countries by utilizing comparative
advantages.

- Mongolia will consider development cooperation with the countries of Northeast
  Asia within the framework of the “Tumen Gol” Program. The objectives of the
  “Tumen Gol” Program, one of the largest Northeast Asian cooperative projects of the
  21st century, are to speed up Northeast Asian economic growth by providing
  appropriate infrastructure and production facilities, establishing favorable conditions
  for attracting investment, intensifying regional and transregional trade and cooperation
  on both a bilateral and multilateral basis, and utilizing the comparative advantages and
  available resources of the region. By participating in the “Tumen Bus” Program,
Mongolia will be able to develop its cooperation with other member countries, to have access to the sea, to develop the Dornod region, and to be part of the regional communication and transportation network. Also participating in the “Tumen Bus” Program, Mongolia will be able to strengthen its bilateral and multilateral cooperation with other Northeast Asian countries as well as the Asia-Pacific region as a whole, and to link the Mongolian economy with that of the region. In this way Mongolia can take advantage of its favorable geographic location connecting Northeast Asia with Central Asia, the Middle East, and Europe, and Southeast Asia and South Asia with Russian Siberia. Thus Mongolia will implement regional cooperation activities by:

- providing favorable conditions for developing political, economic, scientific and technological links with the region and beyond;
- providing the necessary conditions for joining in regional integration;
- providing conditions for establishing joint ventures, provided that the projects are economically viable and can be implemented with no harm to national security and the environment;
- increasing economic capacity, resource exports and the production of import substitution goods by upgrading existing factories;
- transforming from a raw materials-oriented economy, developing priority sectors for processing mineral, animal and herbal raw materials to a useful level, and producing products which are acceptable on the world market;
- developing infrastructure, access to seaports, and favorable conditions for transit transport;
- joining the Northeast Asia transportation, information and communications networks;
- developing a world-standard international tourism industry based on the country’s natural historic and cultural heritage;
- introducing regional standards for goods and services; and
- supporting regional trade development.

To provide a more favorable business environment in the region, we will reduce customs and visa problems, make transit trade as unrestricted as possible, improve
transportation services and infrastructure, and support mutual efforts to attract private investment.

**The Main Strategy for the Dornod Region Development and its Linkages with the “Tumen Gol” Program**

Within the framework of the “Tumen Gol” Program we have the following strategy for the development of the Dornod region:

1. Choose and implement the best alternative after studying the possibilities for connecting the Mongolian railway line with the Chinese railway network through Dornod, Sumber, Rashiant or Sukhbat. When this line is constructed, it will provide direct access to the “Tumen Gol” economic development region and to the sea; lessen the burden on the Manchurian railway (which has exceeded its capacity in passengers and goods); help to exploit petroleum, coal and other mineral resources; help develop the Khalka river region; and provide great opportunities for expanding domestic and foreign tourism services.

2. Export the output of the Turmurt mine in Sukhbat Province, and consider constructing railroad lines to Barun-Urt-Buyantumen, Buyantumen-Berkh and Undurkhan-Baganuur.

3. Construct a 160 km-long gravel road in the Choibalsan-Khavirgat border region, a 120 km-long gravel road in the Sumber-Nomgan region, and a 250 km-long asphalt road in Choibalsan-Ulikhan.

4. Expand the asphalt and heavy-weight aircraft runway at Choibalsan airport, and construct a new airport building for international passengers.

5. Solve the energy problems of Sukhbat and Dornod provinces by expanding the power station capacity of Choibalsan city and providing a reliable energy source by connecting the Erdes, Tsav and Ulaan mines with 110 kW high-voltage lines. Build a power station generating 10-15 MW of electricity and a small capacity seasonal hydroelectric station on the Khalha river.

6. Study the feasibility of mining and exploiting metal mixtures/alloys at Ulaan and Tsav; rare earth minerals at Tsagaan Suvraga; uranium at Dornod; and petroleum, coal, natural salt, gold, building materials, and materials for making glass.
7. Establish joint factories for processing meat, wool, cashmere, hides and animal hair, and export the processed product.

8. Consider utilizing the fertile soil of the Dornod and Khalha river region by developing intensified agriculture with the assistance of interested countries.

9. Develop tourism to take advantage of the Dornod region’s virgin nature, rare flora/fauna, ancient historic artifacts, and nomadic civilization and tradition.
Comments on Scenarios for Regional Development

Georgi D. Toloraya
Minister-Counselor,
Russian Embassy, Republic of Korea

Let me start with a general comment on the Northeast Asia Economic Zone concept as promoted by Professor H. Kanamori. His fundamental paper gives a broad overview of the developments since the idea first surfaced about a decade ago as well as a bold prognosis of the scenarios for future development.

It is true that in quantitative terms the progress in exchanges and cooperation between the countries located in the area has been remarkable and was unimaginable in the Cold War era. However, during the period which has elapsed since the end of the Cold War, the division between two zones -- the advanced market economies of Japan, South Korea, and the coastal areas of China on the one hand, and the socialist or post-communist economies of the Russian Far East, North Korea, and Mongolia on the other -- has not only persisted, but has grown even more distinct. The “developed” areas have become even more developed, while the “less developed” have at best stagnated. Cooperation is intensifying at a quick pace among the first group, while the links between the first and the second group as well as inside the second group are still insufficient.

For example, initiatives are under way to set up a version of the G-7 among the Asian countries, reportedly including Japan, ROK, China, Australia, New Zealand, and the ASEAN countries, but excluding the Russian Far East, Mongolia, and North Korea. As a result, the gap in the level and nature of development between these two areas of Northeast Asia is not decreasing to an extent which could enable us to speak with confidence about the future common economic prosperity of Northeast Asia as a whole. The chief obstacle to such a welcome development is not a “clash of civilizations,” as Samuel Huntington sees it, but rather a “clash of stages of modernisation” which needs to be overcome as a prerequisite for any kind of fruitful cooperation and integration in Northeast Asia.
Do the local governments and local entities, which as of today seem to be the primary driving force behind Northeast Asian integration, possess enough capability and vision to overcome the "modernisation level clash"? I think that as important as the local efforts are, only the combined efforts of national governments, based on a clear coordinated strategy and considerable political will, can solve such a Herculean task. We should look with open eyes to the unpleasant truth that unless the "developed zone" countries are prepared to invest considerably (both in material and organizational terms) into the less developed zone, the disparity will tend to grow, maybe even to such an extent that it could become a threat to stability. To my mind, the clearest example of such future efforts is the Korean Peninsula, where long-term, concentrated activities by South Korea would be needed to ease the economic difficulties of North Korea and its economic modernisation, both of which are necessary for its eventual emergence as an advantageous economic player in the region.

The Russian Far East can be cited as another example. Vast in territory and resources, but scarcely populated, the region by itself can play only a passive, tributary role in regional international cooperation. As a matter of fact, its economy is now in decline, the programs of development, including the latest one, are not being fully implemented, and the population is decreasing. The vast potential of the territory is difficult to tackle on purely commercial terms or solely by local efforts. Certain forms of national government involvement and guarantees are essential. Decisions on the development of this area could only be taken and implemented on a federal level and should be well coordinated with the strategy of national development for Russia and its international goals, specifically in Asia and the Pacific. Local efforts are not sufficient even in areas requiring comparatively small-scale international cooperation. This is clearly demonstrated by the problems connected with the institutionalization and operation of the Nakhodka Free Economic Zone.

In the future, comprehensive development of Northeast Asia would also require a serious redistribution of productive forces and industrial potential across the region. Being stationed in South Korea for almost five years, I can testify that this country is literally bursting from within because of its enormous industrial potential and would find
it increasingly difficult to accommodate any new large-scale industrial projects. The obvious choice is to relocate certain industries to nearby territories, which is already a fact of life in the framework of South Korean cooperation with China. However, that kind of trans-border capital and industrial capacity movement would increasingly require coordination and planning on the intergovernmental level.

Another example of the need for serious state attention to the problems of regional cooperation in Northeast Asia is the diversity of concepts concerning the Tumen River delta development prospects. I was a little bit surprised to hear the projection in Prof. Ye Shunzan’s paper of the creation of a multimillion dollar port in the Tumen River delta called “Tumenjiang City.” Not only would Russia not support the prospect of such a city, because it would undercut the business of its own ports, I am extremely doubtful that that kind of undertaking is feasible either economically or politically. The world has changed since the time Hong Kong was leased to the UK, and to my mind Northeast Asia now needs more communication links than new mammoth cities. However, the existence of such diverse views on even the basic parameters of Northeast Asian economic development illustrates the need to join hands in order to get a better picture of what can and should be done and to draw a corresponding “road map.” To that end serious coordinated efforts of the governments of the countries of the region are needed.

We also should consider the political and security dimensions of the regional economic cooperation. Over the last decades, many efforts to promote economic cooperation in Northeast Asia were frustrated because of political barriers. And the progress we have witnessed over the last 10 years is simply the result of businesses getting more breathing space in the course of bringing down some of these barriers. However, this breathing space is not sufficient. Many serious negative political factors are still in place -- the Korean problem, as well as Russian-Japanese, Chinese-Japanese, and Korean-Japanese territorial issues, and China-Taiwanese contradictions to name just a few.

One example how these tensions hamper business is the story of the investment seminar in the Rajin-Sonbong Free Economic Zone last September, which is itself a project of high symbolism for the whole concept of Northeast Asian cooperation. This
seminar, which could have been a manifestation of reconciliation and cooperation, in fact became an indication of continuing hostilities, as the South Korean delegation refused to attend. The subsequent "submarine incident" of 18 September 1996 raised political tensions to an extent that would have made South Korean participation futile in any case.

Currently, the international security network in Northeast Asia is based on bilateral alliances, most of them with the participation of the United States, which has its own interests in the region. The new US-Japanese defence guidelines and a projected similar US-South Korean initiative will hardly raise the level of mutual trust in the region. Bilateral alliances, which by definition are aimed against a third party, even if only potentially, are by their nature insufficient for a truly lasting stability if no multilateral mechanism exists for ironing out differences and the coordination of interests. Only rudimentary forms of such structures for dialogue - the Asian Regional Forum and the semi-academic Northeast Asian Cooperation Dialogue - exist in Northeast Asia. Although other political processes here are multinational in nature, they exclude some of the important players, for example the Korean Peninsula settlement - which is now locked into the "two plus two" format, excluding the lawful interests of other parties concerned, namely Russia and Japan. The obvious prerequisite for creating favorable conditions for economic cooperation on a broad Northeast Asian scale is some kind of a working security consultation mechanism. Many relevant ideas have been floated in recent years, including the Russian proposal for a multilateral conference on the Korean issue, and the idea of a summit of Northeast Asian countries with US participation, but none has gone further than the discussion stage.

The setting up of multilateral economic cooperation is a step in the right direction for better mutual understanding and engagement between the businesses of the Northeast Asian countries. To my mind, this is a necessity as natural economic processes may take too long. Such multilateral mechanisms could function in both governmental and non-governmental formats. They could be created independently or be a subregional extension of existing organizations, such as APEC. For a start, the most obvious priority fields for that kind of endeavor seem to be energy, communications and transportation. Hopefully, the present Forum will result in some practical steps in that direction. One
very promising example could be an international structure for the development and distribution of the East Siberian natural gas resources uniting Russia, Mongolia, China, South Korea (or maybe both Koreas), and Japan. Recent developments, e.g., progress in feasibility studies and multilateral experts' meetings, demonstrate that this project is more than a dream.

I think that drawing up a concept of a regional economic multilateral cooperation mechanism, complete with stages and organization charts, could be a viable challenge for the scholars participating in the present Forum, with an aim of producing a final report to be presented to the governments of the respective countries. Maybe such a project could be undertaken by the East-West Center with the support of the interested parties.
Comment

Steve Cowper
Executive Director, The Northern Forum

First, I would like to express my deep appreciation to the Government of Mongolia and to the Hawaii Asia-Pacific Institute for inviting me to Ulaanbaatar for this important conference. I have always wanted to visit Mongolia, with its fascinating history and traditions. Thank you for making it possible.

My assigned topic in this particular talk is “Scenarios for Regional Development.” I would like to approach this broad topic from the perspective of Alaska, where I served as Governor for four years, because I believe Alaska’s experience may illustrate some of the successes and failures that may result from ambitious regional development plans.

Before I begin, I feel that it is necessary to warn you that I am not a professional economist, so I cannot present the usual impressive mathematical equations, graphs, and charts which often accompany presentations in conferences focusing on economic development. I can only offer some observations based on my 22 years of involvement in economic development decisions in my region. I hope you will find them useful.

Historically, Alaska has always had a close relationship with many of the nations of Northeast Asia. In 1964, Alaska established an economic development office in Tokyo, the first such state office in the nation. Since then, Alaska has also developed an active trade and cultural relationship with China, Korea, and Russia, and we hope to do so with Mongolia. Because of its geography and its prior history of Russian ownership, Alaska thinks of itself as part of the Pacific Rim. By the year 2000, it is estimated that 80% of Alaska’s exports will be to the nations of Northeast Asia, and only 8% to the United States.

Over the past 15 years, a true global market has been created through the rapid exchange of information made possible by technological breakthroughs in communications and computer software. Access to timely information is taken for granted in many countries today, but only a few years ago most countries were largely
ignorant of economic systems prevailing in other nations. And the predominance of
command economies in China, Russia, and other nations made international economic
transactions difficult except when directed through governments.

The creation of a global market has been particularly effective in shaping natural
resource prices. In Northeast Asia this development is critical, because some regions
(such as Irkutsk and Sakha) are potential natural resource providers, and others, notably
Japan and South Korea, are net purchasers of resources. China, of course, is both a major
producer and a major purchaser.

Alaska has always been a provider of natural resources to other areas. This role
began when Russian fur traders procured otter and seal pelts for sale to China and to the
Russian internal market. It continued with the finding of gold in the late nineteenth
century, and with the commercialization of the salmon harvest shortly thereafter. For
Alaskans, the history was the same. The people were able to work until the resource was
depleted, and then the economy became depressed again. So when a major oil field was
discovered on the North Slope of Alaska in 1969, the people of Alaska resolved to make
this good fortune last beyond the depletion of the oil field itself. This decision was based
on a strong belief that the benefits of the oil belonged not just to the present generation,
but to the Alaskans of the future.

As you might imagine, there were many ideas as to how to accomplish the task of
creating permanent benefits from a temporary resource. Some people in the Alaska
government quickly seized upon the idea of creating new industries simply by having the
government spend the money required to start up these industries. Let me comment on
two of these proposals, both of which failed.

The first was to build a petrochemical plant in Alaska, which would supply
plastics to the world. It sounded logical. Alaska had the feedstock at the Prudhoe Bay oil
field, and there was an increasing demand for plastics in all the industrialized nations. So
Alaska made an agreement with a company to produce petrochemicals from our oil.

Did it work? No. It turns out that Alaska is too far from the markets for
petrochemicals, and that it is cheaper and more efficient to ship the crude oil and to
manufacture the petrochemicals nearer to the markets. Also, Kuwait was in the process
of building a huge petrochemical complex there. In order for Alaska to sell its petrochemicals at a competitive price, the government would have to supply huge subsidies for as long as the plant operated. So in time, and after many dollars were spent, the petrochemical idea was abandoned, fortunately before the plant was built.

The second idea was to grow barley for export to South Korea. This required the clearing of enormous tracts of land, paid for by the Alaska government, and the offering of subsidized loans for the farmers to buy equipment and fertilizer. All this was done. But the short growing season and several years of unusually cold weather resulted in no commercial crops for four years. What was actually produced was eaten by wild bison, which knocked down the farmers' fences to get to the barley. When a good crop of barley finally was produced, the Koreans didn't like the taste. Alaska barley sounded like a good idea to government planners, but like the petrochemical plant it was a failure, because it was not consistent with the realities of the market.

Now let me comment on two Alaskan successes.

When I first came to Alaska in 1968, gasoline prices were almost double the prevailing price in the rest of the United States. All this gasoline, and jet fuel as well, had to be shipped on tankers to Alaska from California. In the early 1970s Alaska offered some of its oil to two refining companies, on the condition that each would build an oil refinery in Alaska to serve the Alaska market. The reason there were two was to create price competition; if there were only one refinery, there would be a monopoly and the price to the Alaskan people would not be much less than before.

Today, gasoline and jet fuel prices are lower in Alaska than in most other states. This has reduced the cost of living for Alaskans by a substantial margin, since a lower fuel price means lower transportation costs for food, building materials, and other goods shipped from outside Alaska. And the refineries are profitable and provide a source of jobs for many Alaskans. Why did this plan work? Because it was consistent with market realities.

The second example of an Alaska success is not directly related to any industrial scheme at all. It is the creation of a fund, called the Alaska Permanent Fund, which receives about 25% of Alaska's oil revenues. This money is invested conservatively and
wisely by a Board of Directors which is relatively independent of government. The investment decisions are public. Every citizen is entitled to know what the Alaska Permanent Fund managers are doing with their money. The Alaska Constitution provides that the principal of the fund can never be spent, although the income can be appropriated by the government.

The Alaska Permanent Fund was created in 1977. Today, its principal is $22 billion dollars, which is a lot of money for 600,000 people. What do we do with the income? We give half of it away to the citizens of Alaska, and we put the other half back into the fund as additional principal. Last year, every man, woman, and child in Alaska received $1,100 from this fund. Some day, part of this money will probably be necessary to meet government expenses, but that is a decision for the Alaskans of the future. In this way, we transferred part of the value of the oil to the generations of Alaskans to come.

The Alaska Permanent Fund is an idea which might appeal to resource-based regions. Already we have received questions about it from Sakha and other areas of Russia which are potentially rich in resources. But to be successful, such a fund must operate with simple rules. It cannot be used to invest in schemes which do not meet the test of market reality. It cannot be used to subsidize unprofitable ventures, even though these projects may be politically popular at the time.

In fact, the Alaska Permanent Fund does not invest a substantial part of its principal in Alaska. The reason is because of the cyclical nature of resource-based economies. When the Alaska economy is bad, and Alaska needs the money, it won’t be there if all of it is invested in Alaska’s falling economy. In effect Alaska is not exporting its capital; it is instead importing earnings from the rest of the world. We have diversified our assets from a few oil fields to part ownership in thousands of companies all over the world. Unless the global economy collapses, we will be secure for many years to come.

I would like to thank you for your attention to these tales from the far North. I hope you will find some of them to be useful as you deliberate on the future of Northeast Asia, which has the potential for enormous economic growth in the next few decades and
beyond. Once again, I thank my hosts, and I will be glad to answer questions at the appropriate time.
III

NATIONAL INFRASTRUCTURE DEVELOPMENT PLANS
AND THEIR RELATIONSHIP TO REGIONAL
COOPERATION
National Infrastructure Development Plans and their Relationship to Regional Cooperation: Japan

Noboru Nishifuji, President
Japan Research Institute

The Role of the Comprehensive National Development Plan in National Infrastructure Plans

The Comprehensive National Development Plan (CNDP) of Japan provides the basic framework for National Infrastructure Plans as well as the long-term guidelines by sector for regional development consistent with socio-economic objectives and policies.

The National Infrastructure Plan in the Second CNDP (1965-85)

The development of nationwide transportation and telecommunication networks will influence the direction of economic growth and regional development. The improvement of these networks will induce private industrial investment and increase productive capacity, and improve the overall quality of life.

The Second CNDP covered the period of from 1965 to 1985 and was designed to renovate the system of national management by developing new networks. These new national networks have characteristics different from the previous system. The new network pattern is in the form of a grid or poly-grid, unlike the tree pattern of the old network (Figure 1). If a node corresponds to a city, a city linked with all other cities is a first grade city (N1), and a city linked with all cities in a sector is second grade (N2). There is a gradation between these types of cities, because in a tree pattern the communication between a city and other cities of the same grade has to pass through cities of higher grade. It is very difficult to establish a perfect grid or poly-grid pattern in a short time. However, by reorganizing the existing network step by step, the access to each city will gradually become balanced and the potential for development will be realized.
The grid or poly-grid pattern increases safety and reliability because there are plural links between nodes.

The new network needs advanced technology to achieve large capacity, high speed, high comfort, and reliability. The second CNDP envisioned establishment of:

- a nationwide data communication network
- construction of about 100 airports and the formation of a nationwide airway network;
- construction of about 4,000 km of high-speed railways (Figure 2);
- construction of about 7,600 km of expressways (Figure 3); and
- construction of a new Tokyo international airport and international airports in several other cities.

The CNDP has been implemented and forms the foundation for efficient and sustainable economic growth in Japan.
A New CNDP

The CNDP now under preparation will be the Fifth CNDP with a target year of 2010. It will restructure national systems to make them suitable for the civilization of the 21st century. The existing regional structure, particularly of the Tokyo-Osaka-Fukuoka Megalopolis (often called the Principal National Axis), will be fundamentally reformed and three new national axes created. The three new national axes will be the Northeast National Axis, the Japan Sea Coast National Axis, and the New Pacific Coast National Axis (Figure 4). Each of these national axes has a distinct climate, history, and culture. The new plan intends to create a new urban network complex along the three new national axes which reflects their distinctive characteristics.

Figure 2
High-Speed Railway Network

Source: The Second CNDP
Urbanization on these axes will take a new form. Large cities will be restructured and many small cities will be created as 'eco-polises' with an emphasis on ecology and minimal pollution. High-speed transportation networks such as express motorways and railways will be extended along the new national axes. An advanced information network such as ISDN (Integrated System of Digital Networks) will be completed, and tele-commuting or SOHO (small office, home office) will become common. Commuter transportation will dramatically decrease, and people will have much more time for recreational activities. The new national axes will be suitable for the global exchange of business and cultural activities. This new civilization will be in harmony between advanced human activities and the natural environment, and a new lifestyle will be created.
Figure 4
Images of the New National Axes in the New CNDP
The Basic Plan for Public Investment and the Long-Term Plan for Public Works

The Basic Plan for Public Investment gives the basic direction for infrastructure development in Japan. The existing plan was approved by the Cabinet on 19 June 1997 and covers the period until FY2007. The Basic Plan for Public Investment contains sections on Basic Ideas, Major Policies for Social Overhead Capital Investment, Total Amount of Public Investment, Allocation of Public Investment, and Issues in the Improvement and Management of Social Overhead Capital. To attain these goals, a public investment of approximately 630 trillion yen will be required. Public investments should be allocated taking into account the aging population, the information revolution, and globalization, as well as the increasingly diversified and sophisticated needs of the people. Hence, the percentage of investment relevant to improvement of the living environment, welfare, and cultural functions will be raised from 50-55% in the preceding decade to 60-65% (Table 1).

Table 1
Functional Classifications of Public Investment

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Living environment,</td>
<td>50-55%</td>
<td>60-65%</td>
</tr>
<tr>
<td>welfare, and cultural functions a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>45-50%</td>
<td>35-40%</td>
</tr>
</tbody>
</table>

a. Includes waterworks, sewers, parks, waste disposal facilities, public houses for rent, public facilities relevant to housing and residential lots, local roads, subways, rural sewerage facilities in farming, forestry and fishery villages, green spaces on riverbanks and in commercial fishing ports, welfare facilities, school education facilities, research and study facilities, social education facilities, and sports and cultural facilities. It also includes investment for information-related fields.

The plan also proposes measures for the effective and efficient implementation of social overhead capital, the implementation of environmental assessment for large-scale investment projects, the prevention of steep rises in land prices resulting from the expansion of public investment, and careful consideration of manpower and software in the management of social overhead capital.
Long-Term Plans of Public Works

Under the Basic Plan for Public Investment, long-term plans for public works have been formulated for sixteen sectors such as roads, ports and harbors, airports, public housing, sewerage, flood control, urban parks, etc. (Table 2). Most of the plans cover a five-year period, and have an annual budget.

Table 2
Long-Term Plans for Public Works
(as of August 1997, in billions of yen)

<table>
<thead>
<tr>
<th>Public Work</th>
<th>Planning Period (FY)</th>
<th>Amount of Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood control</td>
<td>1997-2001</td>
<td>24,000</td>
</tr>
<tr>
<td>Erosion control</td>
<td>1997-2001</td>
<td>3,770</td>
</tr>
<tr>
<td>Prevention of landslides</td>
<td>1993-1997</td>
<td>1,150</td>
</tr>
<tr>
<td>Seacoast conservation</td>
<td>1996-2000</td>
<td>1,770</td>
</tr>
<tr>
<td>Roads</td>
<td>1993-1997</td>
<td>76,000</td>
</tr>
<tr>
<td>Ports and harbors</td>
<td>1996-2000</td>
<td>7,490</td>
</tr>
<tr>
<td>Fishing harbors</td>
<td>1994-1999</td>
<td>3,000</td>
</tr>
<tr>
<td>Airports</td>
<td>1996-2000</td>
<td>3,600</td>
</tr>
<tr>
<td>Public housing</td>
<td>1996-2000</td>
<td>3,600 thousand dwellings</td>
</tr>
<tr>
<td>Sewerage</td>
<td>1996-2000</td>
<td>23,700</td>
</tr>
<tr>
<td>Waste disposal facilities</td>
<td>1996-2000</td>
<td>5,050</td>
</tr>
<tr>
<td>Urban parks</td>
<td>1996-2000</td>
<td>7,200</td>
</tr>
<tr>
<td>Land reform</td>
<td>1993-2002</td>
<td>41,000</td>
</tr>
<tr>
<td>Forest projects</td>
<td>1997-2001</td>
<td>5,380</td>
</tr>
<tr>
<td>Coastal fishing grounds</td>
<td>1994-1999</td>
<td>600</td>
</tr>
<tr>
<td>Traffic safety facilities</td>
<td>1996-2000</td>
<td>2,690</td>
</tr>
</tbody>
</table>

In the 1960s and 1970s, economic plans provided the total amount and sectoral allocation of public investment. However, after the New Economic and Social Seven-Year Plan was approved by the Cabinet on 10 August 1979, the plan for both total amount and sectoral allocation of public investment was excluded from economic plans. The Basic Plan for Public Investment replaced the economic plans for providing guidelines for long-term public works. However, the Basic Plan is rather vague in priority of investment allocation, compared with the economic plans. The Basic Plan provides investment allocation in only two sectors, whereas the economic plans showed data for 9 to 12 sectors.
Issues on Regional Cooperation

The international flow of passengers, freight, capital, and information in this region will expand further, and be accompanied by globalization of economic activities and an extension of the division of labor in Northeast Asia. Therefore, international cooperation is a prerequisite for developments in transportation and telecommunication networks in Northeast Asia.

The following issues need specific cooperative action:

• appropriate distribution of super-hub airports in Northeast Asia, and formation of an efficient regional airways network;

• cooperative research on a new ground transportation system that is not excessively dependent on motorization, especially for China and Mongolia;

• cooperative research and development of efficient inter-urban rapid transit and new transportation systems in large metropolitan areas;

• cooperation in the launching and utilization of communication satellites and broadcast satellites; and

• formation of an East Asian Information Network and unification of standards for digital communication technology.

Cooperation in Energy Infrastructure and Environment

Energy demand in Asia has been rapidly increasing, and will comprise one-third of the world energy demand in 2025. Since, in the next century, only Russia will have a surplus supply of oil and gas in Northeast Asia, regional cooperation should be promoted to supply oil and gas from Sakhalin and Siberia to China, Korea, and Japan through transnational pipelines, thus stimulating regional economic development. Furthermore, it is urgent to ensure the safety and security of nuclear power plants. Further, huge increases in energy consumption have brought cross-border air pollution and acid rain. It is thus desirable to strengthen regional technical cooperation in the reduction of pollutants and the development of clean energy.
Infrastructure Development of the Rajin-Sonbong Free Economic and Trade Zone

Li Gi Man, Senior Researcher
CPEEC, Democratic People's Republic of Korea

Dear Mr. Chairman:

It is my pleasure to speak on the development of infrastructure in the Rajin-Sonbong Free Economic and Trade Zone (FETZ) in this meeting dedicated to constructing a peaceful and prosperous Northeast Asia in a 21st century characterized as the “Asia-Pacific Era.”

As you know, the government of the Democratic People’s Republic of Korea (DPRK) proclaimed the establishment of the Rajin-Sonbong Free Economic Trade Zone (FETZ), a part of the Tumen River Area Development Programme (TRADP), in December 1991. This action reflected the demands for economic development in our country as well as a desire to ensure the peace and security of Asia.

The FETZ covers 746 km² of area and is contiguous to Hunchun, China and Khassan, Russia along the Tumen River. We have given primary significance to improving the infrastructure of the FETZ as it is situated at the gate to the continental bridge connecting the Asian and European continents through the East Sea. This is one of the objectives of the Master Plan for Land Development of the Rajin-Sonbong FETZ ratified by the government of the DPRK.

The objectives are as follows:

FIRST STAGE (by the year 2000): enable the FETZ to function as an international transit transportation base by reconstructing and modernizing the infrastructure (including existing railways, roads, and ports), developing tourism, and creating a positive investment climate;

SECOND STAGE (between 2001-2010): develop the FETZ into a comprehensive and modern international interchange base focusing on transit transportation, tourism, services, and export processing.
Present Infrastructure Development in the Rajin-Sonbong FETZ and its Advantages

Ports

There are four free trade ports - Rajin, Chongjin, Sonbong, and Ungsang inside and in the vicinity of the FETZ. At present the total capacity of cargo handling is 12 million tons/year and this will be increased to 130 million tons/year by 2010. The possibilities and projections for these ports are covered in the feasibility study prepared by experts from UNDP and ESCAP.

With the opening of the sea route for containers between Rajin and Pusan by the Hyonting Group (China) in December 1995, a new stage has been reached in the transporting of the transit cargoes through Rajin Port: 3,000 TEU containers were handled last year. Also by laying the Russian broad tracks up to the berths, Rajin can receive Russian wagons without changing the bogies. Now Russian transit cargoes such as fertilizer, alumina, and timber are being shipped through these ports. Last year 203,000 tons of Russian transit cargoes were transported through Rajin Port.

Of course, these amounts are still small, but transportation of transit cargoes through Rajin and Chongjin ports is considered competitive by many cargo owners. At the Niigata Northeast Asia Economic Forum held at the end of January this year, a delegate from the Hunchun East First Hosiery Co., Ltd., a China-South Korea joint venture company, said: "opening the Rajin route was of great effect in reducing the transport distance and saving costs; the cost per TEU container had been US$2,100 from Pusan through Vladivostok to Hunchun but it was now only US$1,300 from Pusan through Rajin to Hunchun." He also said that transportation through the Pusan-Rajin route reduced the time by 3 to 5 days compared to using Dalian.

The future of transit cargo transportation through Rajin and Chongjin is positive. Now under discussion is the opening of a Fukuoka-Pusan-Rajin route and a Rajin-Niigata route. This will expand the infrastructure base for transit cargo transportation as well as the physical distribution of goods in Northeast Asia, and the Tumen River Economic Development Area (TREDA) in particular.
Railways

A 405 km circuit railway has been built along the Tumen River bordering China and Russia. As predicted in the Master Plan for Land Development, the entire section of the railway has already been electrified and 34 km (8.4%) is double tracked.

The existing cargo capacity of the railway is 11 million tons/year. The intention is to improve the equipment and facilities at the border railway stations of Namyang and Tumanggang as the demand for transit cargo transportation increases and, eventually, to create a cargo handling of 1.1 million TEU containers annually.

Capacity of Roads

Like the railway, there is a loop road of 385 km road along the Tumen River. The road is connected to China by bridges at seven points. Right now, 61 km of road between Rajin and Wonjong (bordering Hunchun, China) are being widened through a joint venture with a Hong Kong company. The roadbed will be completed by the end of this year and paving will be completed by next year. Meanwhile, the roads between Chongjin-Hoiryong, Rajin-Namyang, and Chongjin-Rajin will be reconstructed and expanded to meet the increasing demand transportation.

Airports

In preparation for the construction of an international airport at Sombong FETZ, the plan and design have been prepared and the area has been surveyed. Because of the large cost and considerable time required to construct an airport, we have proceeded to construct a new helipad while still using Orang Airport in the vicinity of the FETZ. We plan to eventually open local and international air routes including that between Rajin and Yenji.

Water

There are several reservoirs with a capacity of over 20,000 m³/day, but these cannot meet the increasing demand for water. Development of underground water and a supply of industrial water from the Tumen River are planned, and preliminary exploration of water resources has already been carried out.
Service Facilities

The Rajin Hotel with 200 beds was completed and inaugurated in the FETZ in September of last year on the occasion of the Rajin International Investment and Business Forum. Tourist quarters and facilities have been constructed in several places along 130 km of beautiful coastline. They include five special tourist accommodation sites, including Pipa tourist quarters which consists of ten buildings with a capacity of 200 beds. The present accommodations can handle over 1,000 people.

A ground-breaking ceremony for the first stage of a 200-bed, five-star hotel (total investment: US$180 million), established as a wholly foreign-owned business by Emperor Group, Hong Kong, was held on 1 February this year. The foundation is now completed and the hotel will open in April next year.

In addition, various service facilities are being constructed, including the Rajin People’s Hospital being built by an international catholic association; ground-breaking was in April this year.

Cooperation among Northeast Asian Countries in Infrastructure Development

The Tumen River Area Development Programme (TRADP) has moved from the discussion to the implementation stage with two international agreements and one Memorandum of Understanding adopted in New York in December 1995.

I wish to make some proposals to strengthen cooperation among Northeast Asian countries in infrastructure development.

First, primary attention should be paid to constructing infrastructure within the region. This region consists of three provinces of Northeast China, Mongolia, the Russian Far East, Japan, and the Korean peninsula. It has 300 million people and huge natural resources. And the demand for transportation is rapidly increasing as a result of rapid economic growth. as indicated by the following figures:

- Northeast China
  - Grain output: 50 million tons/year
  - Coal deposits: 70 billion tons
Russian Far East

- Coal deposits: 3 trillion tons
- Timber: 60 billion m³
- Natural gas: 30 trillion m³

Mongolia

- Coal deposits: 100 billion tons
- Phosphorous: 100 billion tons

The problem of inadequate transportation has been the subject of many bilateral and multilateral discussions for regional cooperation. In the efforts to solve this problem, we think it important to adhere to the principle of developing from a lower stage to a higher stage and from simple matters to more complicated matters, and of combining bilateral cooperation with multilateral cooperation.

It is necessary to establish a transnational business to manage transportation and traffic development. This enterprise could build a circuit railway by connecting the railways of the three riparian countries which have already been built or are being built, e.g., Rajin-Namyang-Tumen-Hunchun-Kraskino-Khassan-Rajin. It is also possible to build a trans-continental railway running from Choibalsan, Mongolia through Aershan, China to Changchun-Tumen-Rajin.

Secondly, I propose joint development and effective utilization of the energy resources within the region. Thirdly, attention must be paid to raising regional development funds. In this connection, we again propose the establishment of such institutions as a trust fund and a Northeast Asia Development Bank.

Esteemed Mr. Chairman,

Esteemed delegates,

In conclusion I am certain that you will understand and support our firm will to contribute to a prosperous and peaceful Northeast Asia by further improving the Rajin-Sonbong FETZ.

Thank you.
Comment

Ts. Sukhbaatar, Director  
Department of Economic Cooperation  
Ministry of Infrastructure Development  
Mongolia

Recognizing the fact that this symposium is of great importance to the development of Mongolia and Northeast Asian (NEA) economic cooperation, I would like to express my gratitude for the opportunity to make a brief report on infrastructural cooperation.

Because of Mongolia’s unique characteristics such as its large territory, small population, and harsh climate, the role of infrastructure and its cost are extremely important. Mongolia has been developing its infrastructure by using loans and donations from international organizations and foreign countries. For example, with aid from the World Bank, Japan, and Germany, we have renovated power plants in the Central and Dornod regions to produce major amounts of the nation’s electricity and heat.

We receive about 400 million kilowatts of electricity annually from Russia through high-voltage lines from the west, north, and east. In some provinces, we are about to begin replacing existing diesel generators with more efficient ones. We are also building small hydroelectric power plants and wind turbines in the countryside. We are also planning to discuss soon the issue of developing the electric power supply system in the Dornod region and connecting it to the main power system of the Tumen River zone. The Dornod region is rich in coal, water resources, and uranium and these may be used to power an electric plant. The electricity could be exported to the Tumen River region and thus be a new basis for cooperation among Northeast Asian countries.

Mongolia has huge coal reserves which can satisfy its own demand and be exported to countries in the Asia/Pacific Rim. With the help of the World Bank and Japan, some coal mines are being reformed to play a major role in providing power plants and consumers with coal.

Mongolia’s airline now flies to Russia, China, Japan, South Korea, Thailand, Singapore, and Vietnam. We are considering increasing the number of flights to
Northeast Asian countries and opening new air routes to the Tumen river area. With the help of the Asian Development Bank, the central airport has been renovated and expanded and can now handle larger passenger airplanes. Choibalsan in the Dornod region has a strip capable of receiving large airplanes, and this year, we started to build a new airport there with the help of the Asian Development Bank. Also this year, we began to upgrade air traffic control equipment throughout the country.

Regarding the railroad system, with the help of Japan we have built a large freight transferring station at the border between Mongolia and China. We have also bought about 500 freight and passenger trains with loans and donations from the World Bank and Japan. This allows us to carry more freight and passengers between Mongolia and Northeast Asian countries. Within the scope of the Tumen River project, research is being undertaken on building a new railroad that will connect the Mongolian Dornod region and China, thus providing easier access to Northeast Asia and the sea.

With help from the Asian Development Bank, we have started implementing the Mongolian road renovation project. Under this project, the road that stretches from the capital city to the Russian border to the north will be renovated, and the road to the southern border will be built. We are researching the building of a road between the Dornod region and China.

In the eastern and southeastern parts of Mongolia we have started exploring for oil and natural gas, and the initial results are positive. If we find large oil and natural gas reserves, we may lay a pipeline through southern China and to the Tumen river basin. If a proposal to transmit coal and some minerals by pipeline is approved, the pipeline would run across several countries.

In 1996, Mongolia became a member of the International Maritime Organization, and this year we initiated an international conference on transit transportation for landlocked countries. Mongolia has an agreement with both Russia and China regarding transit for access to the sea. A Mongolian/Chinese joint ocean transport organization has been established and we plan to found a Mongolian/Russian joint ocean transport and fishing organization.
With the support of the Asian Development Bank, Japan, Germany, France, and the Northern Foundation, Mongolia has developed a general plan to develop electronic communications and is proceeding to implement it. As a result, we can now easily communicate with over 130 countries around the globe. We are planning to discuss the issue of connecting the communication system in Ulaanbaatar and the Eastern region with the Tumen river communications system. In the near future, we intend to connect some cities in central, eastern and western Mongolia with Russia and China through optic fiber, and to use space communications systems.

The Mongolian government has emphasized the development of tourism and has passed a special act and plan for that purpose. Mongolia now receives about one hundred thousand tourists each year, most of them from Asian countries. But we believe this can be increased considerably. We intend to draft a new law on tourism and regenerate a general plan to develop tourism. Under the Tumen River project, we are planning to build three resorts in the Dornod region - which has a magnificent combination of mountains, steppes, and desert. One of the tourist sites will be the birthplace of the legendary Genghis Khan.

Regarding infrastructure, Mongolia has a new agreement with Russia, China, and Northeast Asian countries to cooperate on infrastructure development. The Mongolian Ministry of Infrastructure will do all it can to fulfill its responsibilities in this regard. We hope that Northeast Asian countries and international organizations will support us in developing cooperation in this sector by investing, and by training and educating our valuable human resources.
Dear Ladies and Gentlemen,

Please allow me to express my gratitude for the possibility of representing the Chita Region at this forum.

We are witnesses to, and participants in, radical changes in the political and economic relations of states in Northeast Asia. This region is now the center of the world's attention due to its powerful economic potential and important strategic location.

Decisive factors are the decrease in tension and the broadening of cooperation. At the same time, the potential for economic cooperation within the context of Northeast Asia is far from exhausted, which can be demonstrated in particular in the example of the Chita Region.

The Chita Region lies within the eastern Siberian section of the Russian Federation, and occupies a territory of 431,500 km², in which there is a population of 1.5 million people. The Chita Region is rich in forest, water, and biological resources. From the point of view of the long-term economic development of the Chita Region, its main potential lies in its large variety and volume of mineral resources.

The Chita Region presently supplies about 40% of the total Russian output of tantalum and lithium, 15-20% of its molybdenum and beryllium, and much of its gold, silver, cadmium, and tungsten. Resources include 21% of all of Russia's copper, 31% of its zirconium, 28% of its molybdenum, 16% of its titanium, 13% of its silver, 12% of its tantalum, and 10% of its niobium. Gold, tin, lead, iron, zinc, lithium, and uranium resources are also considerable. The majority of the mineral deposits are characterized by their complexity, i.e., the ore which is obtained in them includes, besides its main component, such precious minor components as bismuth, indium, and scandium. There are also large deposits of coal and "brown coal." Twenty deposits have been investigated which can be divided by their composition into "brown coal" and coal.
One of the basic development projects is the construction of a power-supply system based on the Kharanor electric power station. This station will use local coal from the Kharanor deposit located near the Chinese border.

A considerable part of the region is covered by forests which contain major stands of larch, pine, cedar, and birch. Total resources are estimated at 2.6 billion cubic meters. These trees are of high quality and productivity and support the development of the wood and timber industry, one of the main industries of the region. The wood and timber industry produces mainly simple semi-finished and non-complex products.

Rich natural pastures and hay fields support the breeding of fine-fleeced sheep. Pedigree farms have generated an elite type which permits the harvesting of world-class wool in severe climactic conditions. The region is working on the creation of a complete cycle of breeding and the recycling of wool, the lack of which is the main reason for the reduction of stock from four million to 800,000 head, and the practical termination of production at the region’s largest worsted-cloth industrial complex.

The region occupies a key geographical position from the point of view of transportation-connecting Russia, the countries of western Europe, and the states of the Asia Pacific Region. Along with railroads, the mainstay of transportation, the development of aviation has been noticeable in recent years. There is an international airport in Chita, and the landing strip has been completely reconstructed.

Chita was originally a large mining corporation. The mining industry still supplies almost half the funds for production, transportation, energy, finance and credit, agriculture, and social services. The mining industries engage in raw production, with finished products completed mainly in the western and central areas of the former USSR.

In the 1990’s, complex changes in the Russian economy stimulated a steep lowering of production volumes in all branches. The main reason was that production in the industrial centers in the western part of Russia and on “post-Soviet space” was unclaimed, in particular due to exorbitant transportation costs. As a result, there was a reduction of local tax revenues, an undermining of the social system, a lowering of internal demand, and the loss of production funds.
In this situation, the regional administration and leading enterprises actively sought to enlarge external markets and sources of financing for the main branches of production, consistent with the economic structure and geography of the region. Regional cooperation is the most accessible means of stabilizing and increasing our industrial production. The main advantage of the region compared to other areas of Russia is its location on the border, the existence of a developed transportation and communications infrastructure, and the gigantic capacity of Northeast Asian markets to absorb production, particularly China.

The primary goal of Chita’s foreign economic policy is the transition to extensive export production in the mining, wood, and agricultural branches. The Chita Region seeks investment capital and technologies for the development of export-oriented enterprises. The possible intersection of interests between Russia, Japan, China, and the ROK can be realized through joint projects in which Japanese and South Korean financing and technology, Chinese labor, and the gigantic Chinese market are combined to harness the natural wealth and existing production capabilities of the Russian Far East.

All the countries of Northeast Asia can profit from the development of Chita’s mineral resources. First, it is necessary to concentrate on the economic and technological implementation of joint projects and the financial strategy connected with them. The Chita Region Administration supports the idea of conducting serious research to determine the most profitable joint projects and to direct their implementation. This work will have important consequences for the development of trade and political relations in Northeast Asia.
IV

FINANCIAL INSTITUTIONS
AND
MOBILIZATION OF CAPITAL
Financing Northeast Asia’s Infrastructure Requirements: Is a New Development Bank Needed? —A Quantitative Assessment—

S. Stanley Katz
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Introduction

One of the important lessons learned from the East Asian “miracle” is the key importance of infrastructure for promoting and supporting economic development. Simply stated, a basic requirement of self-sustaining economic growth is an adequate base of transportation, communications, energy, environmental and other development-supporting infrastructure. This lesson is especially important for the Northeast Asian economic region, since by most assessments the region’s infrastructure is too weak and fragmented to support development on a sustainable, region-wide scale. To remedy this deficiency will require investments of capital far beyond the region’s savings capacity—which raises the question of how and where the needed long-term financing might be found.

A frequent suggestion is that commercial banks from within and outside Northeast Asia could finance the region’s future infrastructure investment needs. Conventional commercial banking policies and practices suggest, however, that this approach would not be feasible. Infrastructure project costs and associated financing requirements are typically beyond commercial bank lending parameters; returns on such investments are riskier and lower, and requisite loan maturities and grace periods are longer, than commercial banks generally offer; and the economic, technical and financial analysis and documentation required to support financing for infrastructure projects are usually beyond commercial banks’ capabilities.

Furthermore, commercial banks typically lack the specialized knowledge and skills (and deep pockets) required to tap the long-term capital markets of Tokyo, London,
New York and Frankfurt and to transfer intermediate funds borrowed there to developing countries. These are, however, the stock-in-trade of the major international investment houses and the multilateral development banks that have in fact been the main suppliers of long-term capital to Third World countries during the past several decades. For these reasons, to expect commercial banks to supply more than a small part of the long-term capital which Northeast Asia will need to finance future infrastructure investments would be improvident.

Another suggestion is to limit consideration of Northeast Asia’s infrastructure requirements, at least initially, to the Tumen River Economic Development Area (TREDA). While TREDA provides a suitable focus for assessing commercial banking requirements (for current account transfer facilities, credit cards, traveler’s cheques and the like), it provides a less satisfactory framework for assessing infrastructure investment and financing needs. Economies of scale and inter-sector synergy are best captured by infrastructure projects that cover large contiguous “natural” economic areas (e.g., the Mekong Delta). From an economic perspective, therefore, it is preferable to formulate infrastructure projects with as broad a regional reach as is feasible. For Northeast Asia, which is recognized as a “Natural Economic Territory,” infrastructure investment requirements should accordingly address the needs of the region as whole. In this regard, it should be noted that this Asian “Natural Economic Territory” includes the less-developed areas of the Northeastern Provinces of China, the Russian Far East, North Korea and Mongolia (and thus includes the TREDA sub-region), as well as the industrially-advanced nations of Japan and South Korea.

**Infrastructure Investment and Financing Requirements**

As noted, Northeast Asia’s infrastructure is - according to expert opinion - too weak and fragmented to support sustained economic development in the coming decades. Much of the region’s infrastructure dates from the Cold War period and was intended to serve national or regional economies that were essentially insular and command-driven. To remedy the region’s infrastructure deficiencies and raise the needed facilities and
systems to standards capable of supporting commercial and industrial development in the longer term will require a monumental physical and financial effort.

**Infrastructure Deficiencies**

Most of the region's transportation and communications systems were state-of-the-art *circa* the 1950s. Airports, port facilities, railroads, highways, bridges and pipelines are far below the standards needed for sustained commercial and industrial expansion during the next few decades. Similar deficits exist with respect to the region's communications sector. While some upgrading has been undertaken in these sectors during the past few years, projected demand for transportation and communications services indicate that a great deal more than current, mainly *ad hoc* improvements will be required.

It is similarly projected that inadequate energy generation and distribution will impede the region's prospective commercial and industrial growth. Recent efforts have addressed this problem, and energy supplies in the immediate Tumen River area are reported to be at least temporarily in surplus. In the longer term, however, unless remedied, energy shortages will act as a brake on the region's economic development. Environmental rehabilitation and ecology-system safeguards, including urban water and waste treatment facilities, reforestation, natural resource management, and a range of other environment-related infrastructure requirements, will also involve large new capital investments.

These observations barely scratch the surface of the region's future infrastructure needs. They are set out simply to underscore what many expert studies have concluded: that without major improvements, Northeast Asia's infrastructure will not be able to support satisfactory economic growth and development in the future.\(^\text{4}\)

**Investment and Financing Requirements**

An initial question, then, is how much in financial terms would it take to raise the region's infrastructure to acceptable standards. Past studies fortunately shed some light on this question. A 1991 report to the UNDP by a team of experts estimated that to develop the TREDÁ sub-region *alone* would require investments in infrastructure (including related social overhead) of some USS30 billion over a 20-year period—that is,
about US$1.5 billion a year. An econometric model places TREDAs infrastructure investment requirement somewhat higher, at US$36 - $42 billion.

In terms of the Northeast Asian region as a whole, a macro-economic model developed some years ago by the International University of Japan's Research Institute for Asia Development estimated that gross investment of some US$47 billion a year would be required to raise the capital:labour ratio of Northeast Asia by 2005 to the level achieved by South Korea in 1983. Net of projected savings, the annual requirement for external capital would, according to this model, amount to some US$22 - $28 billion.

While the specifications and conclusions of these models can be questioned, they do provide useful insights into the amounts of external financing that might be required to fill the gap between the region's potential capital needs and its putative future savings. However, the potential demand for external capital for infrastructure investment projected on a macro-economic basis can rarely be matched by effective demand for such capital. The reason for the difference is simply that putting together an infrastructure project that is technically, financially and economically feasible, and "bankable," is a complex and time-consuming undertaking.

To illustrate, to get from the drawing board to the commissioning stage, project authorities and technical staff must: articulate and agree on basic project concepts, objectives and locations; prepare preliminary designs and plans; investigate and evaluate alternative cost-benefit investment possibilities; prepare technical, economic and financial plans, feasibility studies and specifications; draw up and issue internationally acceptable tender documents; evaluate competitive, responsive bids; select project managers; award contracts; monitor physical progress; approve progress payments; and, last but not least, arrange financing for shortfalls or over-runs. These steps, moreover, must conform to internationally accepted procedures and standards as well as to the lending criteria of the private and/or multilateral development banks (such as the World Bank and the Asian Development Bank) from which financing may likely be sought. As a consequence, the gestation period for a typical infrastructure project if all goes well is four or five years, and the fall-out rate of unsuccessful projects is high. It is estimated that one-half of the
projects in a multilateral bank’s loan pipelines may be dropped during the course of a project preparation-funding cycle.

A major factor for the shortage and delay in generating infrastructure investments in developing countries has been insufficient numbers of staff able to perform the requisite detailed, technical, project-specific work. A similar human constraint is likely to affect the tempo of Northeast Asian infrastructure investment as well and it is reasonable to assume that an inadequate supply of viable infrastructure projects will constrain Northeast Asia’s capital absorptive capacity. Therefore, the amount of long-term financial resources the region could effectively invest in infrastructure during the next few decades is likely to be substantially less than the macro-economic models suggest.

Based on the experience of other developing nations and regions, the shortage-of-projects constraint could reduce Northeast Asia’s effective demand for external capital during the next decade or two to perhaps one-half or even one-third of its hypothetical aggregate level. On that basis, it is possible that the region could effectively use only some US$7.5 billion a year of external long-term capital for infrastructure investments. That eventual level of annual infrastructure investments does not appear out of line for a less-developed, multi-country region that encompasses some 3.5 million square miles (slightly less than the United States) with a population of some 315 million. This projected level of annual infrastructure investment would, of course, be reached in steps over a period of years.

**Sources of Long-Term Infrastructure Financing**

While an indicative external capital inflow requirements figure of US$7.5 billion is much less than the amount derived from macro-economic projections, it is still a very substantial total for an “economically challenged” region such as Northeast Asia to find abroad. The next question, then, is whether it would be possible to raise (eventually) as much as US$7.5 billion a year in foreign capital markets to finance Northeast Asia’s
infrastructure investments; and, if so, how and by whom. Some preliminary answers to these questions are presented in the following paragraphs.

Most long-term capital channeled to developing countries for infrastructure investments during the past three or so decades was raised in foreign capital markets—in the U.S., Japan, Germany, the United Kingdom, and a handful of other capital-exporting countries. The main vehicles for these transfers were: (1) the Multilateral Development Banks (MDBs)—for Asia, the World Bank (IBRD) and the Asian Development Bank (ADB);9 (2) bilateral official development assistance provided by America’s USAID, Japan’s JICA and OECF, and other bilateral assistance agencies;10 and (3) private foreign direct investment, trade-related credits, commercial bank loans, and in the case of a few fiscally stronger countries, direct borrowing in overseas capital markets.11

As reviewed in more detail below, private foreign direct investment and private loan financing for Northeast Asian infrastructure is expected to increase during the coming years, but the amounts provided are likely to be modest compared with the region’s needs. Bilateral official development assistance has been declining in real (and in some years nominal) terms in recent years and that trend is likely to continue. As for the multilateral banks, there is some doubt that the industrialized nations (which in better times established the Bretton Woods Organizations, the regional development banks, the OECD, DAC, GATT, and other development-related organizations) can muster the political will, leadership, and financial support needed to permit these banks to undertake substantial new capital lending activities in Northeast Asia.

There is as a consequence a growing perception that existing private and public long-term financing institutions and arrangements may not meet Northeast Asia’s future infrastructure investment requirements.12 This concern has led leading members of the Asian business and banking communities, academia and governments to propose that a new sub-regional development bank should be established to supplement the capital intermediation efforts of the World Bank and the Asian Development Bank for Northeast Asia. Such a new institution would effectively open a new borrowing “window” in foreign capital markets for Northeast Asia and would thereby increase the long-term financing available for the region’s infrastructure investments.
The growing consensus that a new sub-regional bank will be needed for financing Northeast Asian investments reflects a number of specific considerations, including the following:

**Private Direct Investment**

Some long-term capital for Northeast Asia’s infrastructure investments would no doubt continue to come in the forms of private direct investment and, to a lesser extent, trade-related credits. Such private financing should be encouraged—so long as the equipment, technology and processes are appropriate for the Northeast Asian economy, and so long as the tenor of the financing is appropriate for the projects involved.

Private sector direct financing for the region’s infrastructure will presumably take a variety of forms, including straight equity, retained profits, loans from parent firms, technology transfers, supply of equipment, public-private joint ventures arising from privatization programs, and bond (debt) purchases.\(^{13}\) In the transport sector, direct investment in the region’s highways and bridges could include Build-Operate-Transfer (BOT), Build-Own-Operate (BOO) and Build-Transfer-Operate (BTO) schemes similar to those employed elsewhere in Asia. Capital transfers via trade-related credits would be especially attractive to suppliers of high-tech equipment for the transportation, communications and energy sectors. On the other hand, infrastructure investments that carry high risks and involve long, uncertain returns would presumably not prove attractive to many private investors. It should be noted in this connection that in recent years, most private direct investment has involved transfers within or between transnational firms, has been directed to manufacturing and processing rather than to infrastructure, and has been between and among firms of the industrialized countries.

In considering the possible magnitudes of future private investments in Northeast Asia, it is instructive to note that the *UNCTAD World Investment Report for 1996* reports that in 1995 only US$100 billion—about one-third of total cross-border private investment flows—went to developing countries. Asia accounted for US$65 billion of that amount, with China’s share amounting to some US$38 billion.\(^{14}\) Since most private direct investment was directed to production and processing plant and equipment, only a relatively small amount was for infrastructure. The *UNCTAD Report* observes in this
connection that “the financial requirements for investments are vast...,” but that “FDI [foreign direct investment] in infrastructure is...low.”¹⁵ The London Economist in an earlier review of this issue noted that the amount of private capital provided for infrastructure in emerging markets has been “disappointingly modest” and that “the vast majority of [infrastructure] deals still require a mix of government support, loans from development banks...and state-financed risk insurance....”¹⁶

In this perspective, it can be assumed that while some of Northeast Asia’s future infrastructure requirements will be financed by private direct investments, trade-related credits and direct borrowing, the amounts involved are not likely to be very large. Based on UNCTAD’s 1995 investment data, it would be quite surprising if private direct financing for infrastructure investments in this region eventually amounted to as much as US$500 million a year. That figure would equal 0.5% of total private sector investment flow to developing countries in 1995 and no doubt greatly overstates the real prospects for infrastructure financing from private sources. Nevertheless, for illustrative purposes (and to present as “rosy” a scenario as possible), for indicative purposes it is assumed that private investments in Northeast Asian infrastructure will amount to US$500 million a year by the early 2000s.

**Bilateral Sources**

An additional share of Northeast Asia’s projected infrastructure investment requirements would likely be met from official governmental bilateral sources. The outlook for significant amounts from these sources is, however, not encouraging. The main sources of project-specific infrastructure financing in the past three decades have been Japan, the United States, the United Kingdom, the Nordic countries, and a few other West European nations.

Japan is the only major donor that has increased bilateral assistance in recent years, and Japan has consistently been the largest OECD contributor of such assistance. This having been said, Japan’s total Official Development Assistance (ODA) in 1995 of ¥1,385.4 billion (on a net disbursements basis) represents a year-on-year increase of less than 1 percent and remains below the ODA level reached in 1991. While Japan, again alone among the major OECD countries, announced plans to increase its official
development assistance in 1996, the Japan Times of 7 April 1997 reported that “Japan’s overseas development assistance in 1996 had ‘plunged’ by 35% from the previous year to $9.58 billion, marking the first decline in dollar terms in seven years....” Consequently, while it is reasonable to hope for some future support for Northeast Asian infrastructure investments from Japan’s bilateral assistance and credit programs, the amounts are not likely to be large.

As for the United States, the past two decades have seen growing aid-fatigue, an alarming indifference to Third World development needs, and falling levels of bilateral development assistance. USAID is a shadow of its former self, and the Agency’s independent status and its programs in Asia face an uncertain future. In the current American environment, very little financial support for Northeast Asia’s infrastructure projects can be expected from U.S. bilateral assistance programs in the coming years.

In the United Kingdom and Western Europe, bilateral support for Asian economic development has varied from country to country, but overall it has been relatively modest. Europe’s official bilateral assistance has been increasingly directed to other European Community members, to Africa and, to a lesser extent, to Central America. Since the fall of the Berlin Wall and the implosion of the USSR, the focus of West European official assistance has shifted dramatically to Central and Eastern Europe.

On balance, therefore, substantial amounts of financing for Northeast Asia’s infrastructure cannot be expected from past official bilateral assistance sources. These expectations are in line with the assessment of the Development Assistance Committee (DAC) Development Cooperation Report for 1995, which summed up the development assistance scene as follows: “...it is hard to imagine that the volume of ODA will increase dramatically in the near term.”

Nevertheless, and on the basis of what could be called “irrational exuberance,” it might be hoped that official bilateral financing for Northeast Asian infrastructure could reach US$500 million a year by the early 2000s. That would be the equivalent of 5% of total new long-term DAC member countries’ “Bilateral Development Lending” in 1994 (of US$9,371 million) and of nearly 10% of these countries’ total development assistance (of US$5,121 million) to the Far East Asian region, excluding China, in 1994. It is
highly unlikely that Northeast Asia could capture so large a share of DAC countries' future official bilateral assistance; but a figure of US$500 million is used here for indicative purposes.

**Multilateral Development Banks (MDBs)**

It can be assumed that the MDBs, in particular the World Bank, the Asian Development Bank, and (for the Russian Far East) the European Bank (EBRD), will finance new infrastructure projects in Northeast Asia in the coming decades. For reasons outlined below, however, the amounts of new lending that could be reasonably expected from these banks are likely to fall well short of the region’s projected capital inflow requirements.

The IBRD, ADB, and EBRD have extended substantial amounts of loans to member countries of their institutions that, in whole or in part, comprise the Northeast Asian region. Russia, for example, is a member of both the World Bank and the European Bank and has received very substantial amounts of loans from these two institutions. Russia may in the future join the Asian Development Bank (but not as a borrowing member country). China is a member of both the IBRD and the ADB (but not of the EBRD) and has similarly received large amounts of loans from those two banks. Mongolia has received financial assistance from the World Bank and the ADB but is not a member of the EBRD. North Korea is not a member of any of the MDBs but has considered applying for membership in the ADB in the past and may do so again in the future.

While the MDBs have provided substantial amounts of financing for projects (and programs) in Russia and China, with few exceptions their financing has been directed to areas of those countries other than in Northeast Asia. It is reasonable to assume that the World Bank, the ADB and the EBRD will continue to extend loans to these two countries and that some future loans might finance infrastructure projects in the Northeast Asian region. But development of the relatively remote Northeast Asian area (remote, that is, from Moscow and Beijing) has not been, and is not likely to become, a high priority either for the countries concerned or for the MDBs.
More specific limitations on increased lending for Northeast Asian infrastructure by the MDBs include the following:

Capital Resources

The World Bank, the ADB and the EBRD are limited in terms of the amount of loans and guarantees they can have outstanding by their respective unimpaired capital and surpluses, which in turn sets a ceiling on the amounts each can borrow in capital markets. To maintain adequate lending levels in their present client countries, these banks must periodically seek increases in their authorized and subscribed capital. Such increases have become increasingly difficult to negotiate as major shareholders’ national budgets have become tighter and their priorities have shifted increasingly to domestic issues. In this context, there would seem to be little enthusiasm on the part of major shareholders for increasing the MDBs’ authorized capital in order to permit them to borrow additional funds for financing infrastructure projects in Northeast Asia. Rather, the major shareholder members of these institutions seem to prefer restricting the size and scope of these institutions’ future development-supporting activities.

Long-Standing Client Country Relationships

Related to these policy and funding constraints is the fact that the existing MDBs have had long relationships with their client countries in terms of past and prospective loan, guarantee, and technical assistance levels. The banks would find it virtually impossible to change the ground rules of these relationships in order to make room for new infrastructure lending to Northeast Asia. Nor would client countries willingly agree to forego future loans in order to make room for lending to Northeast Asia.

Borrower Country Exposure

It is of paramount importance to the MDBs to maintain their AAA credit ratings in the international capital markets. To do so they must ensure a reasonable balance of loan exposure among borrowing countries. As of this moment, China and Russia are the World Bank’s largest borrowers: China is one of the ADB’s largest borrowers; and Russia is the largest borrower from the EBRD. In view of their existing large loan exposures in these two countries, the banks might have credit rating problems if they extended...
substantial amounts of additional new financing to China or Russia for infrastructure projects in their Northeast Asian reaches.

Diverse Shareholder-Members

Each of the MDBs has its own set of member countries that have contributed to the institution’s capital, staff and management and in most cases may also be its major beneficiaries. Since the banks are precluded from extending assistance to non-member countries, none would be able to participate in projects that involved a non-member—North Korea. For this reason, region-wide projects that could otherwise be financed on a consortium basis would have to be divided, if possible, along country lines to ensure that only eligible countries received funding from the appropriate bank(s). The EBRD, for example, could finance only the Russian component of a multinational Northeast Asian project; the ADB could not finance any Russian components. These restrictions would raise obvious difficulties for projects of a region-wide reach.

Staff and Administrative Constraints

The MDBs are currently operating under ever-tighter constraints on personnel, travel and consultants. Increases in such resources are not likely in the near term. Staff are assigned to specific countries and country-defined sectors, projects, and programs. A new set of regional demands for Northeast Asia lending superimposed on already-stretched staff and budgets would be difficult to accommodate.

Differences in Policies and Working Methods

Each of the existing MDBs was organized to meet a defined set of objectives and needs. Each has accordingly developed its own “institutional culture” and its own sets of corresponding policies and procedures. The EBRD, for example, is focused primarily on private sector development and 60% of its loans must go to private sector projects. For that reason, EBRD financing for public sector infrastructure projects in Northeast Asia would at best be modest. The ADB has developed a working modality that caters particularly well to its small Pacific island nations and its poorest members but would not suit Northeast Asia’s needs. The World Bank has increasingly focused its assistance on policy and institutional and program reforms, conditions that would not comport with Northeast Asia’s needs.
Based on these considerations - limited capital resources, commitments to existing client countries, already-heavy exposure in Russia and China, disparate membership, staff and administrative constraints, and differences in policies and methods—it must be concluded that the World Bank, the Asian Development Bank and the European Bank would find it difficult to meet more than a modest part of Northeast Asia’s projected infrastructure financing requirements.

Having said this, it is possible on the basis of these MDBs’ recent lending activities to adduce in very general terms a hypothetical and indicative amount of financing each might provide for future infrastructure investments in Northeast Asia. World Bank loan commitments in fiscal year 1995, for example, amounted to some US$16,900 million for 134 projects—an average loan amount of about US$126 million per project. For the ADB, ordinary capital (OCR) lending in calendar year 1995 was US$4,049 million for 37 projects, or about US$110 million per project.24

Using these benchmarks, if: (1) the operational and policy constraints summarized above could be overcome; (2) the World Bank and ADB could add six or seven new projects to their respective annual work programs for Northeast Asian infrastructure; (3) the IBRD could direct the equivalent of 5% of its total 1995 new commitments to Northeast Asia; (4) the ADB could direct the equivalent of 14% of its 1995 loan commitments to this region; and (5) the EBRD could come up with US$100 million of infrastructure loans annually, then the existing three MDBs could hypothetically provide US$1.5 billion a year of financing for infrastructure investments in Northeast Asia. That amount would be equivalent to 7% of these banks’ total commitments in 1995 and is no doubt wildly optimistic. Nevertheless, for indicative purposes, it is assumed that combined annual lending of US$1.5 billion by these three MDBs for Northeast Asian infrastructure investments would be, at least theoretically, possible.

On the basis of these obviously highly optimistic assumptions, private, public, and multilateral funding for Northeast Asia’s future infrastructure needs might take the following shape:
Despite the highly optimistic scenario assumed for each prospective source of financing for Northeast Asia’s future infrastructure, these indicative figures suggest that a substantial gap—some US$5.0 billion—would remain between the region’s projected US$7.5 billion need for, and ability to absorb, external capital and the US$2.5 billion of financing that might be available from existing private, bilateral, and multilateral sources. This prospective financing gap underlies the consensus now developing within the region that a new *Northeast Asian Development Bank* will be required to supply intermediate additional funds to meet more fully the financing needed for Northeast Asia’s future infrastructure investments.

**Rationale for a New Northeast Asian Development Bank**

In summary, the rationale for a new Northeast Asian Development Bank rests on these following considerations:

- The Northeast Asian economy is seriously deficient in terms of infrastructure, including environment-related investments, required to support future viable economic and commercial development;
• Upgrading and expanding the region's infrastructure to adequate standards will require large amounts—as much as US$7.5 billion a year—of external long-term financing;
• Existing private, bilateral and multilateral institutions cannot be counted on to meet more than perhaps one-third, i.e., US$2.5 billion, of the region's projected effective need for external long-term capital; and
• A new, regionally-oriented development bank could provide an important part of the additional financing that could be effectively employed in expanding and improving Northeast Asia's infrastructure base.

Organization and Funding of a Northeast Asian Development Bank

Appropriately funded, organized and managed, a new Northeast Asian Development Bank (NEADB) could neutralize many of the institutional impediments that now stand in the way of a substantial increase in infrastructure financing, in particular by the existing MDBs. Its characteristics might be as follows.

Capital Structure

The capital structure of the NEADB could broadly follow the patterns of other regional development banks. For example, the Bank's initial capitalization could be set at US$20 billion (approximately 0.5% of the region's GDP), with subscribers to pay-in one-half of their subscriptions in convertible currencies in annual installments over a three- or five-year period, and with the balance to take the form of subscribed callable shares.25 Majority shares and voting power could be held by the founding Asian members (including Russia), with the balance allocated to other regional and non-regional members, including the United States, Canada, Australia, New Zealand, the United Kingdom, Germany, France, Italy, the Nordic Countries, et al. As in the case of the other MDBs, regional countries' shares in the NEADB would be allocated on the basis of national GDP, adjusted to ensure adequate representation for smaller and lesser-developed member nations.
As is the practice of the ADB and World Bank, the new Bank’s callable capital in convertible currencies would be used as collateral for bonds to be floated by the Bank in international capital markets, the proceeds of which would be used to fund approved infrastructure projects in the region. As in the case of the ADB, special funds could be established, funded by contributions from concerned member countries, that could be used for such purposes as lowering interest costs and lengthening maturities for selected projects and recipient countries.

For purposes of comparison, the ADB’s authorized capital in 1993 was approximately US$23 billion. In the last four years (1992-95), the ADB processed some 25 - 30 ordinary capital (OCR) loan projects each year with an average loan amount of approximately US$110 million. ADB borrowing in capital markets during this period (the timing of which was determined mainly by the Bank’s liquidity position and market conditions) ranged from a low of US$1.3 billion in 1994 to a high of US$3.0 billion in 1992.

The proposed capital structure of the NEADB could similarly support borrowings of $1 - $2 billion a year and (after a reasonable period) a lending level of US$2 - $3 billion a year. That amount of additional capital intermediation and in-region on-lending would contribute significantly to meeting the gap between the region’s projected needs for infrastructure investment and the financial resources that might be provided by existing private, bilateral, and multilateral sources of long-term capital.

Organization and Management

An important distinction between the proposed NEADB and the existing MDBs would stem from its distinctive pattern and distribution of majority share ownership and voting power. When the existing MDBs were organized, most of the economic clout—foreign exchange reserves, surplus savings, and capital—was in the hands of the Western industrialized countries. It was only natural that the majority shareholding patterns in the World Bank and European Bank would reflect this fact. In the Asian Development Bank, the situation differs only at the margin. The ADB’s major shareholder is Japan (with 15.6%), followed by the United States (with initial parity with Japan but now reduced to 8.0%). However, while the voting power of non-regional members is only 31.7%, that
share when combined with the votes of the more industrially-advanced Japan, New Zealand and Australia - results in a situation in which the bank’s policies and programs are substantially determined (or vetoed) by the industrialized member nations.27

These are the very same countries that now face domestic adjustment and budgetary difficulties and are now focusing increasingly on their own internal resource needs and problems. Moreover, the Cold War, which drove much of these countries’ development assistance efforts in past decades, has ended. The conventional prescription for economic development in the Third World has changed to free markets, less government - and less external assistance. As a consequence, economic development of the less-developed countries does not enjoy the priority in the industrialized countries that it did in past years. As majority shareholders of the MDBs, the more industrially advanced countries have found it necessary to impose funding, policy, and program constraints on the MDBs. These constraints would make it difficult, if not impossible, for these Banks to mount substantial new lending programs for infrastructure projects in Northeast Asia.28

On the other hand, in more recent years the balance of international economic strength—in terms of GDP growth, export expansion, foreign exchange reserves and the like—has been shifting to Asia and the Pacific. Most forecasts point to this trend continuing. The organization and structure of the proposed Northeast Asian Development Bank could take these shifts in international economic strength into account. As noted, the Bank could be established with the majority of its shares owned by countries from the Northeast Asian region—including Japan, South Korea, China, Russia, North Korea, and Mongolia29—countries that, together with other Asia-Pacific shareholders, would have a particular interest in the economic development of the Northeast Asian region.

Given the importance of adequate infrastructure for achieving that objective and the financial considerations outlined above, Asian and Pacific nations could be expected to support the founding of a NEADB that could serve as a vehicle for bringing new long-term capital resources to the region’s development. It could also be anticipated that these regional nations would provide the corresponding political will and leadership needed to
launch the new Bank and, more specifically, to ensure it was endowed with adequate capital and borrowing authority, and with forward-looking policies, programs and management.\textsuperscript{30}

**Next Steps**

The proposal for establishing a new Northeast Asian Development Bank has been discussed in international conferences with increasing interest and urgency during the past several years, and a consensus in favor of a new Bank has been growing. In order to advance this proposal further, additional work would be appropriate in the following areas:

1. **Projected Infrastructure Needs.** Qualitative and quantitative estimates and projections of the region’s infrastructure requirements should be collected, collated, refined and specified on a sector-by-sector basis in order to establish and document with as much clarity as possible the requirements for new and up-graded infrastructure.

2. **Financing From Existing Sources.** The amounts of long-term capital that could be expected from existing institutions and private and public sources during the early years of the coming decade should be assessed and quantified on the basis of more extensive research, including contacts with representatives and experts from each prospective funding institution and source.

3. **Building Political Support.** Efforts should be intensified to develop a broad base of awareness of the needs, and the attendant political support, for the proposed new Bank among concerned countries and leaders. To this end, the importance, need, rationale, purpose, structure, etc. of the proposed Bank should be discussed with and impressed upon key leaders and opinion-makers in the public and private sector of concerned countries both within and outside the region.

4. **Organization and Funding.** Organization and funding options for the proposed new Bank should be set out, analyzed and discussed with informed and concerned individuals and organizations, including such matters as initial capitalization, regional and non-regional membership and representation, voting arrangements, board of directors
size and composition, location of headquarters, operating policies and modalities, respective responsibilities of the president and vice presidents, staff numbers and qualifications, and representation in major capitals.

Notes

1 Robert A. Scalapino. The United States and Asia: Future Prospects. *Foreign Affairs* Winter 1991-92: pp. 19 - 40. Most of the discussion of Northeast Asia in this paper refers to the region’s less-developed areas and therefore excludes Japan and South Korea.

2 The provinces of Liaoning, Jilin and Heilongjiang.

3 The Maritime Kray, Amur Oblast, Khabarosk Kray, Sakhalin Oblast, Yakuts ASSR, Magadan Oblast and Kamchatka Oblast.


7 Hiroshi Kakazu, Regional Cooperation and the Northeast Asian Development Bank, *Conference Proceedings Fifth Meeting of the Northeast Asia Economic Forum, Niigata, Japan*, pp. 106 - 111. Also see Hiroshi Kakazu. The Possible Organizational Structure and Funding of a Northeast Asian Development Bank, supra n. 4, pp. 54-68.

8 For perspective, the total net flow of financial resources to the Newly Industrializing Economies (Hong Kong, the Republic of Korea. Singapore and Taiwan) was $8.2 billion in 1993 and $16.7 billion in 1994.

9 The European Bank for Reconstruction and Development (EBRD) is not expected to be greatly involved in financing the region’s infrastructure investments for reasons noted later in this Chapter.

10 Capital markets implicitly finance bilateral capital assistance to the extent that governments borrow in these markets and use the proceeds for, among other things, bilateral assistance programs.

Infrastructure investment requirements during the next decade in East Asia alone have been estimated by the World Bank at US$1.4 trillion, about one-half for China. UNCTAD, supra n.11, p. 20.

Portfolio investments might be a further possibility but the amounts would likely be limited.

World Investment Report supra n.11.

Ibid.

The Economist. August 26, 1995. p. 63. It is assumed that direct borrowing in capital markets for infrastructure would be minimal because of country exposure and creditworthiness considerations.


Ibid. p. 9.


North Korea applied for membership in the Asian Development Bank some years ago but has not provided the economic and financial information the bank requires to determine the borrower status of the country or the number of shares it might be allocated. The Russian Federation is reported to have applied for membership in the Asian Development Bank but it presumably would not be eligible under the Bank’s Charter provisions to borrow from the Bank’s resources.

The Russian Far Eastern provinces are some 6,000 km from Moscow.
23 As of the end of FY95, World Bank loan commitments to China were US$9.9 billion and to Russia were US$6.4 billion. ADB loan commitments to China (31 December 1995) were US$1.2 billion.

24 The comparable figure for European Bank loans approved was ECU2,855 million (US$3,654 million) most of which were for private sector industrial and services projects.

25 This section is based on the work of Hiroshi Kakazu, in “The Possible Organizational Structure and Funding Sources of A Northeast Asian Development Bank (NEADB) in [source] n. 4, pp. 54-68. A special fund for concessional lending might be considered at a later date.

26 ADB’s authorized capital was subsequently raised to (approximately) US$51 billion in 1994 in order to support a higher level of borrowing in capital markets.

27 Kakazu notes that “Except probably for the ADB, none of the existing regional development banks are controlled by the regional borrowing countries.” Although the regional countries hold 64% of the total voting power at ADB, OECD countries account for more than 50% of the total, supra n. 25, p. 59.

28 As a case in point, the International Herald Tribune of January 19, 1997 reported that “after seven rounds of often testy negotiations,” the Asian Development Bank’s 23 donor member nations agreed to provide $3 billion to fund the ADB’s soft-loan window (the Asian Development Fund) for the next four years, a reduction of nearly one-third from the prior four-year level.

29 Taiwan’s membership in the proposed Bank could be considered, perhaps along the lines of its ADB membership. Participation of concerned Provincial and City Governments in the proposed Bank should also be explored.

30 As an alternative to a new bank for Northeast Asia, it has been suggested that concerned countries might establish a special “Northeast Asia Fund” in the IBRD or the ADB that could be used to help finance the region’s infrastructure development. While this might be a useful interim measure, it would not be without problems. Cash would have to be contributed by countries first to establish the fund and then to replenish it every few years as it was drawn down. Such added budget expenditures would not be welcomed by many countries at this time. Moreover, a special fund in an existing institution would not overcome the institutional problems outlined above. Most importantly, the fund could not serve the essential purpose of capital intermediation since it would have no callable capital or other assets to pledge as collateral against borrowings in foreign capital markets.
Comment

Tomoo Hayakawa, President
Asian Finance and Investment Corporation, Ltd.

It is my great honor to deliver my remarks on the occasion of this important Northeast Asia Economic Forum in this impressive capital of Mongolia, Ulaanbaatar. Before I focus on the subject at hand, I would like to briefly describe the Asian Finance and Investment Corporation (AFIC) and its activities. AFIC is a regional financial institution promoted by ADB to meet the diverse financial needs of private sector enterprises in the Asia-Pacific region. It was established by ADB in 1989 and its shareholders are ADB, which has a 30% stake as the largest shareholder, and 25 other prominent financial institutions from all over the world. It offers direct equity investment, medium-term loans, and a range of financial services such as guarantees, underwriting, and syndication. As of 30 June 1997, its total number of projects was 162 and the aggregate amount of its commitment was US $830 million as of 31 December 1996. Its services are spread over 16 countries in the region.

The AFIC has produced dividends for the shareholders every year since 1994. As of 30 June 1997, its total assets were US $370 million, consisting of a loan portfolio of US$275 million, and equity investments of US$80 million. The financial resources for these assets are paid-in capital and borrowing including bond issues. AFIC received US $35 million in capital from the ADB and the remaining US$310 million is all from private capital resources. Thus, of its total resources, public funding makes up only 10%, whereas the rest is from the private sector, or a ratio of 1 to 9. ADB’s initial capital attracted private money 9 times its value and thus ADB played an important catalytic role in the success of the AFIC.

AFIC is thus both an investor and a financier. Thus my viewpoint is derived from experience in the real business world and I will explain what AFIC does as an investor and financier and what investees or borrowers should do. From an investors’ point of view there are millions of investment opportunities. To be frank, most investors in the business world do not care too much about social and economic development issues.
Poverty alleviation, education or water supply are not their concerns. Most investors invest their money based on profitability, security, and liquidity. Money is now available at any time, anywhere, for any purpose. The key is how to attract money to specific projects.

Many infrastructure, manufacturing and service projects have been planned, designed, and discussed. Although some have been implemented, others are still pending due to lack of financial resources. Obviously, mobilization of resources is a critical matter for the implementation and operation of any project. Why is it that some projects have attracted the interest and confidence of investors and others have not? Also what resources are now available for such projects and how can they be accessed?

In July 1944, as World War II was ending, official representatives from 44 countries gathered together at Bretton Woods and, after intensive discussions, agreed to establish the IMF and the World Bank. This was the beginning of the Bretton Woods Institution. Since then, the Inter-American Development Bank, whose responsibility is the Americas, was established, and in 1966 the ADB was established to assist economic and social development in the Asia and Pacific region. From the end of the War to the late 1980s, financial resources set up at Bretton Woods focused mainly on the flows of official funds into developing countries as well as foreign exchange control.

At the time, world economic activity was very slow and international private capital resources were very limited. Availability of money was restricted and capital controls were quite tight. Therefore, the majority of available capital flows into developing countries were official funds and these flows were mainly concentrated on public infrastructure projects proposed by governments. Consequently, only a small portion of the resources went into the private sector.

In the 1970s, after the increase in oil prices, the situation began to change. In the late 1970s, petrodollars began to be recycled through the commercial banking system and substantial amounts of petrodollars flowed into developing countries through private international banking channels. Most of these funds were used for the modernization and industrialization of the developing countries.
However, in some developing countries, some of the capital was not necessarily used for the most constructive purposes. Indeed, some developing countries borrowed money far beyond their productivity and manageability. In the late 1970s, the United States started to enact tight monetary policies for domestic reasons. This change has gradually affected other countries, and the overall world economy started to slow down. In 1982, the debt crisis occurred. In 1982 at the World Bank Annual Meeting in Toronto, the Government of Mexico defaulted on its debt service. This was the beginning of the debt crisis for Latin American countries. The IMF, the World Bank and other institutions, including commercial institutions, had difficulty in restructuring and adjusting their financial arrangements and occasionally were forced to write off their claims and assets in some developing countries. New, fresh private capital flows into developing countries almost stopped. In 1983 I was assigned to the IADB to raise money from Tokyo and inject it into Latin America through the IADB. At one time, the IADB depended on the Tokyo Market for about 80% of its annual funding.

In December 1994, Mexico had another credit crisis. The Mexican peso was devalued and the Mexican economy collapsed. US private capital left the emerging markets and returned to its mother market - Wall Street. This reverse flow of capital caused deterioration of the major emerging markets. The IMF and other institutions infused about US$50 billion into Mexico and the economy returned to normal. Now Asian currencies have started to devalue beginning with the Thai baht, followed by the Philippine peso, the Indonesian rupee, the Malaysian ringgit, and even the Singapore dollar.

Since 1996, a significant amount of capital was injected into Thailand’s real estate market. This created a bubble economy which burst. The Thai economy slowed due to a substantial decrease in its exports and on 2 July 1997, the Bank of Thailand devalued the Thai baht. In order to protect the value of their currencies, each Central Bank in Asia raised interest rates, but this reduced corporate earnings and will negatively affect the economy over the longer-term. Most of the stock markets in Asia have continued to fall, pushing investors away from the market. The IMF, the World Bank, the ADB, the Export-Import Bank of Japan, and some Asian countries will extend credits to Thailand.
worth up to US$16 billion. Japanese commercial banks will lend around US$5 billion, thus providing more than US$20 billion for a total emergency rescue of the trade balance and the financial community. The concern is that Thailand's problems may spread to other Asian countries and create a debt crisis in the region.

In the past several years, a significant amount of money has started to flow into Asia. In 1996 the net flow of financial resources into Asia was US$60 billion, out of which less than US$15 billion was concessional funds. Private investors have become rather timid and are avoiding risks.

Given this background, there are several reasons why private capital is currently attracted to developing countries:

(a) National budget constraints in the developing countries;
(b) Policy changes in the host countries such as privatization; and
(c) A greater role by private industries in developing countries' economies.

State-owned industries in many developing countries have faced many difficulties. Many have gone bankrupt and tax revenues have deteriorated while expenditures continued to increase. Thus, some governments do not have enough money to finance new projects or maintain the operation of inefficient industries. These governments have changed their policies and invited the private sector to play a more important role in national development.

However, from the viewpoint of capital exporting countries and communities, there are several constraints to such investment:

(a) The domestic markets are maturing and there is insufficient opportunity for new investment;
(b) Production costs, including wages, are increasing;
(c) The value of home currencies is appreciating and thus the economies are gradually losing their competitiveness in exports;
(d) Pressure is mounting to set up production units in overseas markets.
These factors link together and cause an acceleration of outflows of private capital into overseas direct investment, as well as financing.

What attracts investors' interest and their confidence?
(a) Continuity and transparency of political and economic policies;
(b) Macro-economic stability;
(c) Deregulative reform such as in the price mechanism, trade freedom, assurance of capital repatriation, technology transfer, and efficient use of human resources;
(d) A stable financial system and financial infrastructure; and
(e) Reliable market practices regarding the legal and regulatory framework, the tax system, and disclosure requirements.

Private capital is always very cautious and looks for security, liquidity and profitability. A dramatic change in policies and an unstable economic situation certainly increase the caution of investors and financiers and discourage the inflow of private capital.

In addition to these fundamental conditions, the following factors are very important, particularly for projects sponsored and operated by the private sector:
(a) Entrepreneurship, creditworthiness and financial strength of the sponsor;
(b) Sound management;
(c) Validity of the project, including a sufficient cash flow and reasonable profitability; and
(d) Sound structure of securities/collateral and its enforceability.

From our experience, most investors expect a return on investment of at least 12% to 15% per year. This may seem very high, but AFIC itself has an equity investment yield on average of 13.35% in 1995 and 13.71% in 1996. In loan financing, AFIC’s average yield margin is more than 200 bp (25) over 6 month LIBOR. Again, this looks expensive for borrowers. However, considering the risk AFIC is taking, this spread margin is quite reasonable.
AFIC now has 11 projects in China. Out of the 11, four projects are for equity investment, five projects are a combination of equity investment and loans, and two projects are loans only. From AFIC’s point of view, the disclosure requirements, the legal system, and the enforceability of securities in China are not completely clear. These projects are all in the implementation or early operational stage. Fortunately, none are having difficulties. However, in a worst case scenario, AFIC would not be sure how to recover its loans. The International Finance Corporation, a subsidiary of the World Bank, has 25 projects in China and they have not had any occasion to enforce the collaterals. However, the IFC is not confident yet about the enforceability of its security.

Since some of AFIC’s projects are located in developing countries, the foreign exchange issue is also important. The value of the local currencies is always fluctuating. Normally, AFIC converts its international currencies into local currency for investments. A rapid devaluation gives investors great difficulties. For instance, during the last Asian currencies turmoil in July 1997, starting with the Thai baht, even AFIC lost millions of invested dollars within one week. Such drastic devaluation has a very negative impact for future investment in developing countries. Investors attempt to avoid such unexpected risk, but in the end have to decide whether they are going to invest their money or not. In the infrastructure projects, such as electric power or highways, all income from the projects is usually paid in local currency such as Chinese renminbi or DPRK won. If the currency is drastically devalued, the value of the investment as well as the U.S. dollar debt servicing will be negatively affected.

Official Capital Resources
(a) National government budget;
(b) Investment and finance by national development agencies in the host country;
(c) Funds raised under government guarantees;
(d) Government-to-Government bilateral aid; and
(e) Resources from multinational development banks such as the World Bank or the ADB.
The World Bank and the ADB have played a very important role in infusing resources into developing countries, particularly in the transportation, telecommunication, and other infrastructure sectors. China is a major borrower from multinational institutions such as the World Bank and ADB. Because of China's traditional capabilities, its huge market, its tremendous population, and great diplomatic and professional skills, it can attract resources from multinational and private sector institutions. In 1995, the inflow of non-concessional funds (US$8.7 billion) into China was 2.35 times larger than that of concessional flows (US$3.7 billion). Russia is also active in World Bank activities, particularly since its change of government. However, Russia is not a member of ADB, although it is now applying. If Russia is accepted, it will be in addition to some Central Asian countries such as Kazakhstan, and thus a “Double Entry.”

South Korea stopped borrowing from ADB in 1985. Its outstanding balance owed to ADB as of 31 December 1996 is US$444 million, which is the amount borrowed before 1985. South Korea became an OECD member in November last year and is expected to contribute to the financing of developing countries. The DPRK is not a member of the IMF, the World Bank, or the ADB. Thus despite their needs they have not borrowed a single dollar from multinational institutions. Mongolia is borrowing only through soft loan windows from the World Bank and the ADB. The 1995 net inflow of concessional money into Mongolia was only US$200 million while the inflow of non-concessional funds amounted to only US$150 million. However, the World Bank has provided some additional financial assistance since 1995.

Except for China, developing Northeast Asia’s borrowing is rather minor compared with that by other regions in Asia. There are several reasons for this. Government officials and private financial communities do not understand developing Northeast Asia because of the lack of a dialogue, few bankable projects insufficient human resources, and its distant location. The financial community and the countries of developing Northeast Asia have to pay more attention to each other. Moreover the disclosure, legal, and security systems are still uncertain.
The small allocation of resources to Northeast Asia has resulted in a call within the region for a Northeast Asian Development bank. Although the idea is quite interesting, I am personally not optimistic about the creation of such a development Bank, for several reasons.

The potential co-donor countries are Japan, the United States, South Korea, and maybe China and Russia. And possible borrowing countries are North Korea, Mongolia, and maybe China and Russia. Official budgets of these potential donor countries are constrained, and even Japan for the first time in its history will reduce its official aid fund by 10% in 1998. I think it will be difficult at least for the time being to establish a consensus among the big players to create a Northeast Asian Development Bank. Even now, the United States is still opposing the extension of ADB concessional soft loans to China. And both the United States and Japan oppose the DPRK's membership in the ADB, and the ADB will not propose DPRK membership unless Japan and the United States agree to it in principle.

Other Asian countries such as Taiwan, Hong Kong, and Singapore are possible candidate donor countries. However, these rising Asian countries, even if they wanted to contribute, would prefer to extend their support bilaterally rather than through multinational institutions. For example, when the ADB tried to set up the ADF VII last year, the ADB projected US$6.3 billion as the ADF VII total fund to cover the next several years. Out of this total projected amount, they obtained a commitment of only US$2.6 billion from donor countries as fresh money. Of this US$2.6 billion, 35% came from Japan, 15% from the United States and 3% from other Asian countries such as South Korea, Taiwan, China, Malaysia, and Thailand. Thus, one cannot expect too much from Asian countries. Moreover, with the recent currency turmoil and possible economic slowdown in many Asian countries, they will be preoccupied with their own domestic problems.

Rather than establish a new Bank, I believe more and better mobilization of the resources in the existing system is possible. For ADB, their gearing ratio is only 50.2% and thus there is a significant amount of head room for borrowing and lending. The World Bank and the ADB should pay more attention to developing Northeast Asia.
Establishment of a “Special Fund” for this region by the multinational institutions is another possibility as bilateral support funds from Japan or even Singapore. The Government of Singapore Investment Corporation (GIC) is very active in the Asian region. However, some rich Asian confucianist countries will sometimes extend support, but not on a cost-free basis. They believe cost-free money is not necessarily good for the people and country. In the case of Japan’s Overseas Economic Cooperation Fund, out of its total outstanding commitment the Asian portion is 80%, but of this, only 20% is committed to Northeast Asia. Excluding China, Japan’s OECF commitment in the region is very minor and not a single Japanese Yen has been committed to the DPRK.

The private sector represents a major, relatively untapped source of funds. The huge markets in the Western hemisphere such as New York, London, Frankfurt, and Zurich have enormous liquid assets. However, the beneficiaries of the market are principally only the “Establishment.” Investors in these markets basically have no interest in extending its support to beneficiaries who are requested to provide collateral. The markets are also relatively remote from Northeast Asia except perhaps for Russia, which is close to Frankfurt. Investors in such major international markets have many opportunities for their investment rather than infrastructure projects in Northeast Asia.

In that sense, Asian markets in Singapore, Hong Kong, or Tokyo might be reliable sources for the region. But Asian and Tokyo investors are primarily seeking security, liquidity, and profitability. Some investors and financiers have had problem loans in some Asian countries. Some have been written off and some are still pending. However, these investors may be ready to take a fresh look at projects on a project financing basis or through loans or bond issues. Although the Tokyo bond market used to be available only to multinational institutions and sovereign issuers, the private sector has recently been allowed to issue bonds in Tokyo.

New innovative financing methods have been introduced into the market such as BOT (build-operate-transfer) and BOOT (build-own-operate-transfer). For instance, AFIC has a 108-megawatt power plant in Mindanao based on BOOT at a total cost of US$100 million. AFIC has a 5% equity share and a portion of the loan. AFIC is
eventually supposed to transfer the ownership of the plant to the Philippine National Power Corporation. The annual return on AFIC's investment as of this year is 14%.

Another source of private equity resources is "Funds." In the past several years, many funds have been established in Asia and targeted to infrastructure projects. Most of them are searching for equity investment, although some are seeking loan opportunities. All participants in the infrastructure projects are supposed to benefit from the involvement of such funds. By offering a mix of sectoral/regional expertise, and a pooling of project risk and liquidity, such infrastructure projects might be able to attract longer term resources.

However, many such projects are still in the experimental stage. For example, the recent devaluation of the Thai baht and Thailand's situation have destroyed the economic validity of Hopewell's Bangkok Elevated Road and Train System. Clearly, there are many obstacles and difficulties ahead but those of us involved in the real world of financing will have to do our best to solve such problems.
Comment

Keith G. Chiddy
General Manager
ING-North East Asia Bank

ING Bank of the Netherlands has long been recognized as a pioneer amongst commercial banks—and not only because of its banking presence in Vladivostok and Pyongyang. In Vladivostok, ING Bank - opened in early 1995 - was the first, and still is the only, commercial foreign bank to establish a representative office. In Pyongyang, ING Bank was the first international bank to establish a joint venture bank—in 1996.

ING Bank’s decisions to open its Vladivostok office and its Pyongyang joint venture bank were driven by the desire to be not only the first international bank in these locations, but more importantly to reflect ING Bank’s confidence in its ability to identify bankable opportunities in these areas.

ING Bank could call on its experience in Latin America, Eastern Europe, and other parts of Asia in order to be able to contribute in terms of:

1. Supporting foreign investors by agreeing to share risks/provide finance and, very importantly, hands-on advice;

2. Assisting local banks and corporations with their international trade-related activities and remittance business—relatively simple activities, but surprisingly difficult to get right every time; and

3. Supporting local and central governments in their efforts to attract foreign investments, and offering timely assistance with foreign debt management problems.

ING Bank has built up a significant presence in Asia as a whole, with branch offices in fourteen countries. In addition, a major problem in Barings in Singapore a few years ago enabled the ING Group to become better known by its surprise decision to buy Baring Securities, which has strong equity and bond trading businesses and a major presence in Asia. In addition, ING Insurance, which is the largest life insurance company in the Netherlands, is present in eight Asian countries.
My current position in ING Bank is General Manager of ING-North East Asia Bank in Pyongyang, DPRK. I took up my position in mid-1996, but I had visited Pyongyang several times from 1990 onwards. I have thus had a year’s experience in managing the first foreign banking venture in the DPRK.

Previously, I had handled most of the early marketing activity by ING Bank in the Russian Far East and had marketed extensively to Vietnam and Cuba. Given my previous experience in these former socialist and still socialist countries, I had a good vantage point from which to tackle many of the problems I knew I was going to have to face.

But I also went to Pyongyang with concrete ideas as to how I feel ING Bank could add real value to the DPRK. For example, I felt ING Bank could:

- Advise the authorities of the DPRK with respect to its foreign debt problems;
- Assist in the structuring, negotiating, and processing of countertrade deals and tolling structures;
- Give specific assistance to foreign clients seeking to trade with or invest in the DPRK; and
- Identify new sources of finance for commercial projects in the DPRK.

The DPRK currently lacks the ability to generate finance internally for even a small proportion of its development and infrastructural needs. Foreign investors in commercial projects are advised to bring not only large amounts of equity capital, but also to arrange the debt portion themselves, including the sourcing of short-term working capital. The lack of commercial finance is, of course, a major impediment and considerably raises the project cost and risks for an investor. Further, while there may be overseas Koreans whose patriotism and funds can be tapped for commercially-sound projects in the DPRK, the country’s lack of effective domestic demand and a hard, convertible currency to back it up are major disincentives to investors.

At present, the DPRK authorities and the country’s main banks are unable to persuade foreign banks to provide even short-term trade-related credit. This is because the DPRK banks are mostly owned by the DPRK state, which is not currently considered
creditworthy as it has no recognizable foreign currency reserves. Just as the DPRK state does not reveal its balance of trade and balance of payments data, the country's commercial banks do not produce financial statements.

Indeed, the activities of the domestic banks in the DPRK are still a mystery to me, but I feel that they are well-equipped to handle currency transfers and simple foreign exchange. I have yet to identify signs which would point to the existence of domestic interbank activity in any form.

In short, the DPRK faces numerous hurdles of which the authorities of the DPRK are often unaware. The first major hurdle which has to be cleared is that of the authorities' and state-owned exporters' and importers' poor access to information about the international financial system; international commodity markets; the specific roles of and constraints faced by financial intermediaries; and the role of financial institutions in other developing nations, and the general lack of willingness or inability to apply the information gained. As long as the DPRK lacks a detailed understanding of the problems the domestic banking system faces, and does not get hands-on advice and assistance in implementing far-reaching changes, including the recapitalization of its banks, it will be impossible to rehabilitate the DPRK banking sector so that its members can function as banks.

While the authorities of the DPRK have expressed a willingness to learn about the international financial system, I have yet to see a willingness to apply specific information and hands-on assistance of the type that ING Bank is giving to commercial banks in former socialist countries or individual banks in Latin America, Africa, and Asia. The authorities' emphasis will probably continue to be on meeting current needs for imported fuel, raw materials, food, and medicine, rather than on developing the preconditions for accessing new foreign bank loans, supplier credits, and international capital markets.

The second major hurdle is the DPRK's foreign debt. The DPRK has to publicly show a willingness to tackle its foreign debt problem. That means it must be willing and able to reach meaningful agreements with creditors which address the problem and do not impose unrealistic demands on the economy of the DPRK. It is obvious that the DPRK
should qualify for and obtain a high level of debt forgiveness from its creditors in light of the problems it faces.

The DPRK, for its part, has to provide clear evidence that it is willing to live up to its commitments—at least the new commitments it enters into. The DPRK authorities have to realize that a country’s willingness to pay its new debts does not mean that it must turn its back on socialism. Not only financial commitments have to be serviced but commitments entered into under countertrade and tolling deals must also be met. This will be important in building up the trust of potential sources of new credit - be they commercial banks; investors; development agencies; or suppliers of commodities, raw materials, plants and machinery.

In order to build confidence, the DPRK has to:

• Specify which of its state-owned companies’ commitments will be backed up by the state; and
• Confirm that the new liabilities entered into by such companies will be honored at all costs.

A third hurdle is the lack of a functioning legal system. The DPRK lacks effective laws relating to bankruptcy and insolvency which meet international standards and comprise a workable legal system. Although we are relatively new to the DPRK, our inability to use the legal system has damaged ING-North East Asia Bank’s ability to do business and our confidence in the ability to call in loans even from a local bank. If banks cannot take each other to court and are not properly regulated by the Central Bank, all interbank business will be done on the basis of cash settlement. There will be no foreign exchange deals entered into, and banks will not lay off their surplus deposits with each other - in short, there will be no short-term money market. A precondition for building confidence is that banks should be obliged to publish audited financial statements. But with no auditors operating in the country, this problem is unlikely to be solved in the near future.

A fourth problem is that the DPRK continues to have a monetary system based on a local currency which has little, if any, purchasing power. Most trade is undertaken in
foreign currencies or Won-denominated foreign exchange certificates which can be bought against payment in major foreign currencies but can not always be sold back to the issuing authority, the Foreign Trade Bank.

Another barrier to the mobilization of capital is the lack of membership of the DPRK in a multilateral financial institution, such as the ADB or World Bank. Unfortunately, a significant amount of time may pass before the DPRK fulfills the conditions for full membership. Nevertheless, any progress in this area would be very welcome to banks such as ING-North East Asia Bank. The DPRK authorities will need foreign assistance in order to put in place the mechanisms to collect, analyze, and take action on macroeconomic data. There is an almost total lack of data on the net foreign debt, GNP, money supply, trade flows and balance of payments, foreign currency reserves, unemployment, or any other meaningful but basic index or macroeconomic variable. The DPRK could play an important role in this regard, but the first step is to convince the DPRK authorities of the merits of the DPRK revealing what data it already collects and how it can be interpreted. The ADB should set up a preliminary office in Pyongyang in order to begin to understand the exciting challenges and opportunities that await the DPRK’s full membership in the ADB.

Having identified some of the problems, it is appropriate to identify positive developments—that is, specific projects which are capable of being financed because the source of repayment is an offshore entity. A number of projects are currently being considered in the Rajin-Sonbong Free Economic and Trade Zone which will be important to the economic success of the Zone. But any area seeking major foreign investment needs to be able to demonstrate its ability to provide a reliable and stable source of electric power. A leading foreign company has expressed a willingness to undertake a commercial power project in the Zone. The outcome of discussions with the foreign contractor and supplier will be a function of the DPRK’s willingness to allow foreign companies to use innovative financing schemes to meet its very real infrastructural needs.

ING North-East Asia Bank has had positive experiences and it might be useful here to give a brief outline of the Bank’s activities in the DPRK, how the Bank obtained a banking license and how the Bank is structured. ING-North East Asia Bank is a
commercial bank, registered in Rajin-Sonbong, and structured as a joint venture with the DPRK's state-owned non-life insurance monopoly, Korea Foreign Insurance Company. At present, the Bank operates out of a branch in Pyongyang.

Again, being first was positive in that the Bank was able to link up with a powerful, internationally experienced financial institution which, unlike a local bank, would not encroach on the joint-venture bank's activities. After only fifteen months, the Bank has already broken even with respect to its local costs and has identified specific niches which enable it to generate income, minimize risks, develop relationships with clients, and train its staff. Such niches include transfers, foreign exchange, short-term trade finance, and consultancy services.

The Bank's license is fairly broad and it can accept deposits in foreign currencies and Won-denominated foreign exchange certificates, but not local currency. There are no regulations on the movement of cash into and out of the country, although money brought in and taken out of the country has to be declared at the port of entry or exit. The Bank's local staff are chosen by and seconded from the local partner, but the Bank now has the right to select its staff through extensive interviews and tests.

There is also no formal black market in the DPRK, proof that inflation is not a major problem and that the government so far has control of the money supply. In the Rajin-Sonbong Free Economic and Trade Zone, the authorities recently abolished the foreign exchange certificate altogether and the domestic Won can be freely exchanged for U.S. dollars at the local bank, the Golden Triangle Bank. The rate was initially fixed at W210 against the U.S. dollar and is expected to move in line with supply and demand. This measure was introduced at the beginning of June and accompanied measures to free up the labor market and to allow the residents of the Zone to setup free enterprise activities. This is a very healthy development and will reassure foreign investors in the Zone.

Being the first international bank has certainly had its merits and there is no doubt that other foreign investors will also benefit from entering the DPRK and setting their own standards by which all other competitors will be judged. The country has huge
potential for development and ING Bank, through its subsidiary in Pyongyang, wishes to play an active part in that development.

Thank you for your attention.
V

COOPERATIVE DEVELOPMENT STRATEGIES FOR NORTHEAST ASIA’S TELECOMMUNICATIONS INFRASTRUCTURE
The Current Scenario for Northeast Asia's Telecommunication Collaboration

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Strategic Planning Committee Chair,
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Executive Summary

There is clearly a relationship between telecommunication and information infrastructure and social/economic development. The relationship is multi-faceted and complex. Without completely resolving this complexity we can say with some certainty that a regional information infrastructure (RII) in the Tumen River area must be an integral component for the overall success of the project.

Long-range planning of the regional telecommunication infrastructure must take into account global technological trends such as digitization, rapid adoption of the Internet, reliable optical fiber trunking and increasing use of various means of wireless access to the network. In addition, selection among the various technologies available will depend upon accurate analysis of the applications for which the infrastructure will be used, e.g. commercial, residential, and social/governmental.

One of the keys to success in the transfer of technologies in the region will be appropriate attention to and institutional structure for cooperative investment, training, R&D and management of the infrastructure itself. Management of technology transfer is but one example of the range of projected problems in the development of a regional information infrastructure. Institutions must be put in place to deal with each of these projected problems.
A process has been proposed that includes stages of preliminary discussions, a regional summit, establishment of an organization, and the implementation of the RII. This complex process requires further elaboration. The five key elements in carrying this process out include:

1. Commitment to multinational/regional economic development;
2. Building technical and strategic intellectual capital;
3. National-level recognition of the importance of the information infrastructure (II);
4. Harmonized strategic analysis; and
5. Institution building.

Introduction

Investments in telecommunication infrastructure whether technical, services or human resources have long-term positive impacts on the social, political, and economic status of national, regional or global development. It is for these reasons that pursuit of common-benefit strategies, while complex and often long-term in nature, has significant positive returns. The primary purpose of this paper is to set out cooperative development strategies for Northeast Asia’s telecommunication infrastructure. Toward this goal we will establish some benefits of, and strategies for, creating new institutions/mechanisms which will have appropriate technical, economic, political, and social considerations for the region. In the paper we will:

- Explore the social/economic benefits associated with appropriate telecommunication infrastructure development for the region;
- Explore recent dynamic shifts/convergences in emerging telecommunication and information technologies and how these fit with regional telecommunication development;
- Identify appropriate technical telecommunication alternatives and their characteristics and benefits;
• Explore mechanisms for appropriate and regionally sensitive telecommunication technology transfer;
• Identify key stakeholders in the telecommunication infrastructure establishment in/outside the North East Asian region;
• Explore projected tactical and implementation problems with regional telecommunication infrastructure development; and
• Propose specific future strategies for the next steps in this important regional telecommunication infrastructure development effort.

Infrastructure Development for the Region: Social/Economic Benefits Associated With Telecommunication

Research has established strong links between telecommunication infrastructure development and advancements in national economic and social development.¹ Gross Domestic Product per capita is linked with investments in telecommunication, human resources, and R&D capacities. In other words, investments in information technologies/telecommunication contribute directly to national economic growth. Similar outcomes could be surmised for joint efforts expended for the region.

National information infrastructure (NII) efforts in the Asian region are well underway. China, for example, has launched NII 2020, a series of “Golden Projects” under the MPT that initiate efforts toward creating an information society. Malaysia is actively pursuing major information technology (IT) efforts in its “multi-media corridor”. In 1994, South Korea established its NII 2003 national plan to be directed by the Ministry of Information and Communication. These and other Asian NII initiatives have been summarized as follows²:
<table>
<thead>
<tr>
<th>Location</th>
<th>Launch Time</th>
<th>National Plan</th>
<th>Steering Agency</th>
</tr>
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<tbody>
<tr>
<td>Singapore</td>
<td>March 1992</td>
<td>IT 2000 Intelligent Island</td>
<td>National Computer Board</td>
</tr>
<tr>
<td>Taiwan</td>
<td>August 1994</td>
<td>NII 2005</td>
<td>NII Steering Committee</td>
</tr>
<tr>
<td>South Korea</td>
<td>1994</td>
<td>NII 2003</td>
<td>Ministry of Information and Communications</td>
</tr>
<tr>
<td>Japan</td>
<td>May 1994</td>
<td>Establishment of High-Performance Communication</td>
<td>Telecommunication Council of the Ministry of Posts and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infrastructure Program</td>
<td>Telecommunications (MPT)</td>
</tr>
<tr>
<td>Thailand</td>
<td>1995 (IT year)</td>
<td>IT 2000</td>
<td>National IT Committee</td>
</tr>
<tr>
<td>Philippines</td>
<td>1994</td>
<td>National Information Technology Plan (NITP) 2000-</td>
<td>National IT Council</td>
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<td></td>
<td></td>
<td>Smart Philippines</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>February 1991</td>
<td>NIT, part of Malaysia Vision 2020</td>
<td>Ministry of Technology</td>
</tr>
<tr>
<td>Vietnam</td>
<td>August 1994</td>
<td>IT 2000</td>
<td>National Program on IT Steering Committee</td>
</tr>
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Adapted from Wang Hsiao-Hui, 1997

It is clear that many nations see the development of a telecommunication infrastructure as fundamental to long-range development. The 1995 Communications Outlook (OECD) points out that the Gross Domestic Product (GDP) is increased by 3% for every one (1) telephone line per thousand developed in a country. It has been pointed out that “while it is true that information is the most valuable commodity in today’s world, it does not come cheap. The World Bank estimates that Asia’s Low Income Countries (LIC) will need $90 to $120 billion just to meet basic telephone demand by the turn of the century. The three billion people now living in Asia have only 25 million telephone lines between them.”

The World Bank has set out OECD and Asian country interventionist approaches to promoting information technology uses. While telecommunication is by no means the only factor in economic development, Wang’s 1997 study of Taiwan pointed out a “strong correlation between increased national IT use and economic growth...” and that “Taiwan’s economic development can be best explained by science and technology, human resources and basic telecommunications services”.

Among the studies that are specifically relevant to Northeast Asian countries was that conducted by the Triple-T Task Force (Transportation, Telecommunication and Tourism) for the Pacific Economic Cooperation Council (PECC) and reported on in...
September 1992. The following nine areas of beneficial effects of investment in telecommunication infrastructure were identified in the Triple-T study.

1. **The potential comparative advantages in trade of the developing region are heightened.** Both domestic and foreign producers find it possible to gain access to capital goods, labor resources, and land. The opportunity for easy integration of these resources into global production systems allows developing economies to make the best use of whatever comparative advantages they have in production for international markets.

2. **There is an overall reduction in costs of production.** Accelerated production cycle times, decreasing business travel, decreasing inventory costs, more efficient coordination of shipping and billing, and more efficient monitoring and management of production processes all lead to substantial and important reductions in costs of production which add to comparative advantage. (This factor may be so important in some fields that without satisfactory telecommunication infrastructure there would be no investment in production within developing economies.)

3. **The telecommunication infrastructure becomes the vehicle for access to global markets.** Export-oriented industrial policies assume the ability to discover and target world markets for specific goods and services. The telecommunication networks and services are the means by which such markets become known and by which goods and services are accurately designed and efficiently offered for those markets. Moreover, telecommunication links facilitate awareness of current global prices and demand for goods and services. This allows optimization of sales opportunities, and may even permit participation in the setting of global prices.

4. **There is a reduction in the pressure for increased urbanization.** Coordination of geographically-dispersed economic activities by means of telecommunication networks and services makes it possible to spread economic development and economic opportunity throughout a region, reducing the incentive for the problematic--and all too familiar--flood of migration out of the countryside and into growing cities.
5. As telecommunication services diffuse, they make the lifestyle options of developed economies observable, creating a demonstration effect. Telephone and television communication opportunities (and increasingly WWW/Internet activities) make it possible for the people in developing regions to learn of the socioeconomic effects of economic development, stimulating individual demand and the motivations for work, savings and consumption.

6. The development of telecommunication to facilitate economic development in a region necessarily means creation of a market for telecommunication equipment and services. Much of this new market will be served by the appearance of local vendors, systems integrators, maintenance contractors, construction contractors, etc., all of which will significantly add to local economic growth.

7. More traditional economic sectors in the region, such as agriculture, will enjoy improved efficiency and productivity by means of their better access to information about market conditions and improved production methods.

8. Economic sectors in the region, such as agriculture, will enjoy improved efficiency and productivity by means of their better access to information about market conditions and improved production methods.

9. Telecommunication systems created for their value in economic development will be able to serve in emergency and disaster situations to reduce local isolation and minimize damage and suffering.

10. The telecommunication infrastructure will facilitate the achievement of social policy objectives in areas such as education, training, and health communication.

It is clear that nations see the social and economic benefits of developing a strong information infrastructure. How a regional information infrastructure would benefit associated nations is under longer-term development. For example, the Asian Information Infrastructure Declaration set out in Bangkok in 1995 identified the urgent need for Asian regional cooperation, standardization, training IT human resources, etc. The Global Information Infrastructure Commission (GIIC) Regional Meeting identified three elements which must be addressed (http://www.gii.org/egi00061.html). These are:
• Applications (delivering health care, education, electronic commerce and government services) must be recognized as a driving force in developing the information infrastructure to help achieve developmental objectives.
• Governments must increasingly work in partnership with the private sector to find cost-effective solutions to developing and effectively utilizing the information infrastructure.
• Countries must create policy and regulatory environments that tap competitive forces in encouraging investment in human as well as financial capital - especially in the use of information technologies in training and educating current and future generations.

These and other commonly-developed structures may be the basis for long-term telecommunication infrastructure relationships among countries in northeast Asia. Given developments in the movement of goods and people (supertankers, giant container vessels, and jumbo jet aircraft) it is now possible to engage in economic activities on a global basis with far less regard for the physical distances separating resources, manufacturers, distributors, and consumers.

Managing and coordinating such geographically dispersed economic activity, however, requires the movement of information with similar disregard for distance. Satellite and other wireless telecommunication technologies, along with optical fiber communication systems, are realizing this elimination of distance in the communication of economic information. It is now commonplace for clothing made from wool produced in New Zealand, dyed in Hong Kong, knitted into fabric in Korea, and sewn into garments in China, to be sold to retailers in the United States and Canada by trading companies in Japan. The coordination of all of this activity around the Pacific Basin is accomplished by elaborate voice and data networks. In order for an economic development project in the Tumen River region to lead to participation in this kind of global economic activity, there will need to be a development of telecommunication systems that are interconnected to these networks.

Moreover, a prime market for the products of an economic development project in the Tumen River Region consists of the developing countries in the region themselves.
China, Mongolia, the Russian Far East, and the Democratic People's Republic of Korea are all in the process of significant economic transformation and development, and therefore make up growing markets. Telecommunication networks and services among them, however, are limited. If these countries are to be able to make use of their comparative advantages relative to their neighbors, there will need to be transparent interconnection of their telecommunication infrastructures, in order to facilitate trade among themselves.

An economic development project undertaken by these countries collectively should, at a minimum, include a program for the creation of the telecommunication infrastructure necessary to link the project to the markets and economic institutions of all of the participating countries.

In addition, the proposed cooperative international project for economic development will need communication systems to assist in far more than the facilitation of exchanges of goods and services. Significant social change having to do with the development of a skilled and motivated labor force, the development of a consumer market, and the provision of social services to a multicultural, multilingual, urbanizing and growing population will also have to be planned for and managed. All of these areas of social development will be facilitated by the use of modern telecommunication systems.

Recent Dynamic Shifts/Convergences and Emerging Trends

Telecommunication and Information Technology Trends

Four current technological trends in information and communication industries should be carefully considered in the process of planning a telecommunication infrastructure for new economic development. All four trends point to a future in which network architecture and services quite different from those that are the norm today will be both more economical and more capable. The trends are:

1. Conversion of all communication into digital format for transmission and storage;
2. The steady increase in the use of connectionless data communications networks (the Internet, intranets, or TCP/IP) to more efficiently handle the transmission of messages that do not absolutely require a circuit-switched real-time connection;

3. The replacement of hierarchical trunk and feeder networks composed of various media with a mesh network (also called a network of interconnected, survivable rings) of optical fiber; and

4. The use of the radio spectrum for wireless access to the network, by means of both terrestrial transmission and low earth orbit (LEO) satellites.

Each of these important development trends will be discussed in some detail.

Digitization and Convergence

When telephone networks first digitized voice communication channels for the long haul in order to reduce noise and increase efficiency in that portion of the network, they began a process that has gradually led to the use of digital signal formats for the transmission of all types of communication. The convergence of all communication to digital formats has made it increasingly possible to design networks, at least in their backbone elements, that can carry all kinds of communication services over the same digital facilities, thus achieving significant economies of scale and scope.

In order to efficiently integrate multiple traffic types and to accommodate very large combined traffic flows, the industry has standardized a pair of networking protocols--asynchronous transfer mode (ATM) carried in synchronous digital hierarchy (SDH)--that will be the standard for telecommunication trunking for at least the next generation of network technology. More than likely, all planning for the Tumen River Region telecommunication infrastructure should be done in accordance with these standards.
Connectionless Data Communications Networks

The world is rapidly adopting the connectionless data communication system known as the Internet. The standard telecommunications signalling protocol called Signaling System Seven (SS7) is also a connectionless data communication system. It is possible to link signaling data from the telephone network into an Internet to provide information services as an enhancement to telephone communication. This last aspect of technological convergence in telecommunication is called computer/telephony integration (CTI). It, along with Internet voice and video technologies, stand at the leading edge of the rapid ascendance of the use of connectionless protocols.

Mesh Network

As more and more commercial activities have become dependent on telecommunication links for their successful operation, business customers have increasingly demanded reliable services that can survive faults without service outages. This has led network service providers to redesign their networks so as to eliminate single points of failure. The results are variously known as “interconnected rings,” a “mesh network,” “distributed switching,” or a “geodesic network”.

Whatever the name applied, the architecture is based on the deployment of automated switching and cross-connection equipment throughout a network in such a way that there are multiple paths which will allow connection between any two points in the network. This redundant routing allows the network to be automatically reconfigured after the loss of any link or node in the network so that end users do not experience service outages. While the traditional telephone carriers around the world have had to redesign their networks in order to provide this kind of assured service availability, planning for a new telecommunication infrastructure can be done with this requirement in mind at the beginning.
**Wireless Carriers**

The wireline networks of twisted pairs of copper wires that represent the means of access to the network in most of the developed world comprise a substantial asset of the traditional telecommunication carriers. Such a network is, however, no longer the most efficient way to provide network access where it does not already exist. For voice and low-speed data access, a combination of fixed and mobile wireless access with frequency reuse (cellular) is both more cost-effective and more easily scalable as demand grows within a market. For high-speed data and video services, a local multipoint distribution service (LMDS) approach is, again, more scalable and affordable than wireline access.

There will certainly be telecommunication users--industrial, commercial, or governmental entities--that have such large telecommunication demand that they will require direct optical fiber connection to the optical fiber mesh network of the service provider.

For most customers, however, the wireless approaches will be more cost-effective, more modular in that service can be provisioned as demand arises, and more scalable as demand grows. In thin route areas where there is not sufficient demand to justify terrestrial transceiver and antenna deployment (or where such a level of demand has not yet developed but eventually will), there is now the alternative of low earth orbit (LEO) satellite access. For the present this is limited to voice and low-speed data, either on a switched basis (Iridium or Globalstar) or on a store-and-forward basis (Orbcomm). Within the next few years, however, there will also be high-speed data access (Teledesic or Celestri). The following table sets out the details of each projected system:
Appropriate Technical Telecommunication Alternatives and Their Characteristics and Benefits

The key to identifying “appropriate technical telecommunication alternatives” for use in the infrastructure in the Tumen River region will be a focus on the applications for which that infrastructure will be used. As noted earlier, the first “finding” of the Asian Information Infrastructure Commission’s Asian Regional Meeting in Bangkok, November 1995, was that “applications must be recognized as a driving force in developing the information infrastructure to help achieve development objectives.” Before choices can be made among technical alternatives, the services for which there is demand must be identified. For a project such as the Tumen River region economic development zone project, those services will be in three categories: commercial, residential, and social/governmental.

Commercial telecommunication services are those directly related to the economic development goals of the project. These will include both telecommunication applications that support industrial production and trade in goods (Electronic Data interchange (EDI), inventory control systems, computer integrated manufacturing (CIM), etc.) as well as applications that amount to trade in services in themselves (on-line financial, insurance, advertising/marketing and legal services, etc.). Support for these
kinds of applications will require reliable, secure, high-capacity trunks with gateways to the international network.

The issues that must be addressed to assess technical appropriateness will include security, reliability, and easy, transparent interconnection to the international network—especially to the networks of major trading partners, financial institutions, and transportation providers. A strategy for making technical choices in serving this market must plan for the growth of demand, making sure that early decisions and deployment facilitate scalable growth while at the same time not loading too much of the cost on the early deployment.

Residential telecommunication services in an economically developing region will also need to be planned so as to facilitate growth and scalability. At the outset, the issue will be one of providing very economical and very quickly deployed means of communication with individuals, both by economic and governmental institutions and by other individuals.

Low levels of experience with telecommunication and low levels of disposable income will mean that every newly available residential or individual service will have a slow diffusion period. But for a small proportion of households at the very outset - and for a growing proportion as economic development gathers momentum - telecommunication services (including mass media services such as audio and video as well as point-to-point services like voice, messaging, and Internet access) will be perceived as necessities.

As with commercial services, the objective will be to make technical choices that allow the early adopters to be served immediately and also allow for the system to scale up rapidly and cost-effectively as demand grows. Since there is likely to be considerable effort spent in long-range land use planning, telecommunication infrastructure should be designed into residential buildings and neighborhoods in anticipation of growing demand, and the locations of such things as switching equipment, active optical nodes, radio transceiver equipment, and antennae sites should be included in the early planning.

Among “social/governmental” telecommunication applications are such services as education, health services, disaster and emergency communication services,
police/fire/safety communication systems, and systems for administration of social welfare policies in areas such as housing or employment.

In general, these kinds of applications can be seen as a hybrid of the previous two. On the one hand, governmental organizations are large bureaucracies that require elaborate voice and data communication networks for the setting and implementation of their policies. On the other hand, these same bureaucracies must be accessible to—and be able to gain access to—individuals who are the subjects of their work. This means that these kinds of applications require both high capacity, dependable, secure communication networks and widely available, economical systems for communicating with individuals and households (both point-to-point and broadcast).

Since the Tumen River region project will involve participation by three to six governments and take place within the boundaries of at least three nations, there are special considerations to be dealt with regarding how these kinds of services will be performed and by whom. There are also questions about the links of local administration back to each of the participating governments that must be addressed before the telecommunication requirements will be clear.

Once there is clarity as to the kinds of applications that the telecommunication infrastructure must support, there is a large range of technical alternatives, each of which deserves attention as a candidate to serve some portion of the demand. The following comments are meant as examples of the kinds of alternatives that should be considered. This discussion is by no means exhaustive.

Early connectivity and connections in remote areas may be best served by satellite services, especially Very Small Aperture Terminal (VSAT). For some relatively low-speed data communication demands in the commercial market (such things as monitoring of water levels and flows at remote hydroelectric plants or rolling stock inventory control on remote rail lines), it may be possible to use store-and-forward data messaging services on so-called “little LEOs” such as Orbcomm.

In the long run it seems likely that both security and capacity issues will dictate that the commercial applications be served by an optical fiber grid, interconnected to the global network by undersea cables and by terrestrial fiber trunks. (In planning and
developing the terrestrial portion of an optical fiber grid, substantial economies of scale may be achieved by sharing construction with other infrastructure such as the electric power grid, railways, roads, and water systems. In each case there will be preparation of rights of way and excavation. Using the same rights of way for optical fiber trunks and feeder plants as for one or more of these other systems will result in savings.) Within larger buildings or complexes it may be that coaxial cable or even twisted copper pairs may be the most effective medium for access. Many varieties of wireless technologies must also be considered, including fixed wireless local loop options, cellular and microcellular mobile communication systems, and broadband wireless data and video systems—both one-way and interactive.

For residential connectivity, especially at the outset, it may be that relatively simple services such as a combination of voicemail service and paging, or a CT2 system may be most appropriate. One of the first steps in the planning for the telecommunication infrastructure of the project must be the construction of a matrix of all of the possible technical alternatives held up against all of the required applications. Such a matrix will make it possible to compare technological approaches to supporting each of the required applications for their affordability, efficiency, scalability, security, reliability, and a variety of other criteria.

**Mechanisms of Telecommunication Technology Transfer**

International technology transfer (TT) plays a key role in establishment and acceleration of regional development. This involves critical and creative balances between governments, international organizations and private sector players in order to meet telecommunication industry needs and to facilitate technological learning. The complex interactions of diverse factors have been set out at the national level. Most, if not all, of these factors will need to be addressed at the regional level. Some of these can be summarized as follows:
1. Government (inter-governmental) orchestration with large corporate organizations in achieving ambitious growth objectives and supporting the lowering of R&D costs;

2. Balancing of participation by local/regional entrepreneurs and large multinational corporations;

3. Building human resource skills and intellectual capital;

4. Export-oriented strategies for stimulating technology learning from foreign customers and partners; and

5. Significant increases in R&D investment.

While technology transfer vis-a-vis regional (multi-national) telecommunication infrastructural development is somewhat unique, the elements of technological capabilities and the modes are similar to nationally initiated activities.

Foreign direct investment (FDI), foreign licenses, equity participation, or joint R&D technology sharing are mechanisms for technological transfer. One activity in the Free Economic and Trade Zone (FETZ) Tumen River Project provides an example. The Free Economic and Trade Zone (FETZ) has awarded a 27-year concession to develop and operate telecommunications services to Loxley Plc of Thailand. Loxley Plc will form a 70/30 joint venture company with the Pyongyang government. Currently the infrastructure is wholly inadequate with 2,000 lines for the 140,000 residents. Obviously, other modes of telecommunication technology transfer and infrastructure development should and will be pursued.

Central to all of this is technological learning. It is not sufficient to merely construct a telecommunication infrastructure. Initial and ongoing understanding of the technologies, the economics, organization, regulation, management, and socio-cultural impacts are essential for long-term success. The mechanisms for this must be part of the establishment of a RII and will be discussed in some detail later.
Projected Problems of Regional Telecommunication Infrastructure Development

Large-scale telecommunication infrastructure developments require comprehensive and long-term planning. Multiple perspectives are required whether national or regional projects are undertaken. Breiner has pointed out that "many telecommunications projects have in the past frequently fallen short of their objectives." The 1994 World Telecommunication Development Report sets out some of these problems at the national level. Many of these translate to regional level problems. They are:

1. **Lack of re-investment**—at least 50% of the telecommunication revenues are required for rapid development;
2. **Poor quality of service**—outdated equipment and inadequate maintenance;
3. **Foreign exchange scarcity**—limited hard currency due to external debt and/or international revenues transferred to central bank instead of being used directly for telecommunication development;
4. **Investment inefficiencies**—cost per line of installing telephones is higher than average figure of $1,500 U.S. in urban areas and even higher in rural areas. New/promising telecommunication technologies (e.g. LEO/Cellular noted earlier) overlooked as alternatives for rural areas;
5. **Lack of universal access policy**;
6. **Inadequate private sector involvement**—overlooking opportunities for private sector investment;
7. **Insufficient regional cooperation**—cooperation and coordinated purchasing, co-training, have not been developed; and
8. **Organizational limitations**—monopoly/government organizations dominate. Difficulty in maintaining trained staff.

Each of these re-inforces the 1994 Maitland Commissions findings which identified problems in funding, low priorities of telecommunication development, imported equipment, and service in rural areas.
One of the most comprehensive research efforts investigating the telecommunication gap was recently conducted. This section will draw heavily from Ono's award-winning work, which explores the nature of the telecommunication development gap, the obstacles to narrowing the gap, and strategies for addressing/resolving the obstacles from developed and developing country perspectives. These concerns seem central to successful development of an RII.

Ono sets out twelve dimensions of the telecommunication gap. Understanding these seems key to telecommunication infrastructure development in the Northeast Asian region. They are:

Unbalanced distribution: sheer number of telephone sets;
Low teledensity: low telephone/population ratio;
Insufficient capacity: total network capacity is too low;
Long waiting period: average waiting time for line installation is too long;
Poor line quality: telephone line quality is unacceptably low;
Poor network condition: frequent breakdowns and faults--long repair periods;
Domestic gap: poor distribution within urban/rural regions of a country;
Limited services: non-voice services are seldom available;
Lack of understanding: catalytic role of telecommunication infrastructure is not well understood;

Unsuitable technologies: technologies applied in countries are not compatible with local needs/culture;

Lack of financial resources: financial resources are insufficient for development; and,

Lack of human resources: human resources are not sufficiently developed to maintain telecommunication infrastructure.

Understanding the nature of the gap is important to developing a telecommunication infrastructure in a region--especially in a less-developed multinational setting. There is little doubt that there are a number of constraints to long-term telecommunication development in less-developed countries or regions. Some commentators see these obstacles as falling into a number of categories. These include:
Policy and regulatory, organizational and administration, finance, technology, human resources, knowledge, and politics. A well-informed approach to the development of an RII should take these obstacles into account.

Each of these carries an extensive range of characteristics which inhibit development. For example, unchanging policies and regulations, high tariffs, or incomplete liberalization policy may be examples of problems in the policy and regulatory category. Organizationally or administratively there may be unclear goals of assistance from international and/or regional telecommunication organizations. Financial obstacles to development may include small market sizes, unsatisfactory conditions for foreign investment or too much dependence on international and/or regional funding. Technically, the transfer may not have been appropriate or designed for the local needs. With regard to human resources, insufficient training, high staff turnover, and "brain drain" are often seen as problems. This leads to knowledge obstacles which come from lack of impartial advice, low knowledge, or low update of knowledge. Finally, political obstacles often involve limited views of the role of telecommunication and overall development or restrained discussions between political leaders and telecommunication operators.

Each of these obstacles require more extensive attention. Clearly, an adequate discussion of a regional, multi-national project must go beyond exploring the gap and identifying the obstacles of establishing the infrastructure. Strategies for addressing these important issues and hopefully overcoming many of them in the development of a Northeast Asia telecommunication infrastructure is central to our goals and will be discussed in the following section.

Future Strategies for the Regional Telecommunication Infrastructure Development Effort

Any telecommunication infrastructure should be designed and built from an overall or holistic development perspective(s). At this stage of a complex and long-term multinational effort it is important to establish specific strategies and mechanisms for
addressing those factors which could facilitate positive directions and minimize complications for all stakeholders. The legitimate stakeholders must have a structure around which positive actions may be taken. The following may be useful in understanding who the stakeholders are and how they may function in an RII consortium.

This Northeast Asian Regional Information Infrastructure Consortium (NEARIIC) will involve stakeholder entities of four general types: (1) core countries (China, DPRK, Russia, Mongolia); (2) companies in the telecommunication and information industry, especially those with significant experience in Northeast Asia markets; (3) international institutions (NGOs, including relevant non-governmental organizations such as APEC, APT, ADB and PECC and governmental bodies, especially the telecom and commerce ministries of nations interested in the economic development of the Northeast Asian region); and. (4) academic/R&D/consulting. A Northeast Asian RII Consortium (NEARIIC) should be established which would address the complexities at hand.
Again we can draw from some of Ono's efforts\textsuperscript{12} and suggest future strategies which have Less Developed Country (LDC) and Developed Country (DC) perspectives of telecommunication implementation and concerns at their core. Operationally the telecommunication and information industry, NGOs, and academic/R&D/consulting participants would contribute in a relatively non-biased manner toward the evolution of a viable consortium. Because Ono's work draws primarily from national development, only those items which apply to (or could be modified to apply to) a regional telecommunication infrastructure will be included in this preliminary design. More details can and should be contributed later in the final consortium design.

At the outset of establishing the North-East Asian RII consortium (NEARIIC), the stakeholders should explore possible actions which could set up mechanisms to overcome long-term telecommunication infrastructural development problems. These elements may include: organizational and administrative concerns; politics, policy, and regulatory actions; planning and implementation needs; financial obstacles; technology transfer alternatives; and human resource and knowledge development. Each of these elements is very complex and will require the NEARIIC settling on a focused agenda for cooperation and actions. The following are only examples of items or actions which should be explored.

**Organizational and administrative politics, policy and regulatory actions.** Develop a regional regulatory body with clearly elaborated frameworks/mechanisms for policymaking and administration. Access to regional telecommunication markets must be limited and must be predicated on attention to serving regionwide needs. International seminars on privatization, liberalization, competition and technology strategy development should be conducted.

**Planning and implementation.** Establish mechanisms for short- and long-term planning for the installation, operation, and maintenance of a region-wide (urban, rural and remote) telecommunication system. Conduct an in depth telecommunication and information opportunities study for the region.

**Financial obstacles.** Explore the creation of a region-wide telecommunication financing institution. Explore foreign investment, establishment of global loans,
telecommunication assistance programs, or service-provider development funds. Develop a regional "critical mass" for potential investors.

**Technology transfer alternatives.** Examine options for requiring outside companies with access to the regional market to spend a negotiated percentage of their contract/revenues to develop regionally-based companies. Make access/technology transfer contingent upon establishing local manufacturing/service capabilities.

**Human resource and knowledge development.** Early establishment of expert and staff training in telecommunication and information areas including technology, management, policymaking, etc. Establish incentives for those trained to return to the the region for work in the telecommunication and information sectors. Develop research and development capabilities based upon region-wide opportunities.

Some of these should be done early in the RII effort, and others should be organized as part of, or after, an RII summit involving all stakeholders. Before a summit of this magnitude and importance is undertaken, it is important to do sufficient groundwork in a neutral environment.

While it is impossible to achieve total neutrality, it is possible that an organization such as the Pacific Telecommunication Council (PTC) via its annual conference could offer a positive venue for the exchange and testing of positions and ideas for subsequent summit negotiations and the ultimate formulation of a NEARII. The PTC is a Hawaii-based 20-year old, non-profit telecommunication organization which offers international forums for government, industry and academic professionals to discuss positive developments and issues of the emerging era.

The overall process for evolving a regional information infrastructure would have the following stages:

![Diagram showing stages: Prelim Discussions, RII Summit, Est. NEARII Org, Est. NEARII]
Preliminary discussion meetings and subsequent mid- and high-level training/exchange seminars could be conducted at the East-West Center in Hawaii. The meetings would involve core countries and other potential stakeholders. The educational/training activities would offer core country officials a program of telecommunication technologies, services, planning, and management courses.

It is too early to determine where or when the RII summit should take place, but active and staged pacing is important. The technical training base and the economic/social/political and cultural comfort levels should be sufficient to facilitate appropriate decisions to move into the summit and RII organizational stages.

In summary, there are five key elements in the development of this Regional Information Infrastructure:

1. **Commitment to multinational/regional economic development**: A balanced and firm commitment of all stakeholders and an understanding that it is in each stakeholder’s best interest to work together to achieve this RII goal;

2. **Building technical and strategic intellectual capital**: Early training (telecommunication technologies and services) of mid- and high-level decision makers;

3. **National-level recognition of the importance of the Information Infrastructure (II)**: For each of the core countries to persuade their own top national policy makers that the information infrastructure is crucial to economic development in the region;

4. **Harmonized strategic analysis**: an institutional procedure for coordinating the identification and gathering of requisite data for the region must be elaborated and implemented; and

5. **Institution building**: the creation, at a summit meeting of stakeholders, and post-summit establishment of a viable regional information infrastructure administrative organization.
Notes


5 Wang *supra* n.2.


I agree that it is an important matter to improve the communications infrastructure in the Rajin-Sonbong Free Economic Trade Zone (FETZ), which is a component of the Tumen River Economic Development Area (TREDA). We have established the Northeast Asia Telephone and Telecommunication Company as a solid base for the provision of communication services within the FETZ and for connecting regional communication networks.

Up to the present, international telecommunications in the FETZ have been provided through the Pyongyang International Gate Station. The use of optic fiber cable is the most rational way to ensure high-quality connections with the communication centers in the special development zones of the riparian countries in the TREDA. Following the first stage of the plan for the construction of a modern communication network in the Rajin-Sonbong FETZ, a comprehensive digital exchange network with a 5,000-line capacity has been constructed, and all exchange stations have been connected by optical fiber cable. Communication services for people, government organs, and businesses with foreign investments are being provided by utilizing this system and exchange network and it is being expanded as communication demand increases. Construction has begun on the headquarters and base stations for a mobile communication system capable of providing services in both Rajin and Sonbong, and preparations are being made for expanding the network to the whole FETZ and connecting it to the TREDA network. A separate satellite earth station is planned for the Rajin-Sonbong FETZ.

We attach great significance to employing optic fiber cable in the formation of communication networks in the TREDA. Optic fiber cable already connects the Rajin-Sonbong FETZ with Hunchun, China, and will be in operation soon. Installation of optic
fiber cable is planned up to the Friendship Bridge in order to connect with the TREDA of the Russian Far East, and preparations to complete the link are in progress.

Construction of the Rajin-Sonbong FETZ communication network to promote the economic development of Northeast Asia will proceed in the following stages:

   • construct the Rajin-Sonbong International Communication Center with modern service facilities;
   • increase the comprehensive digital exchange system to a capacity of 15,000 lines;
   • expand the mobile communication system;
   • establish a link to the Intelsat (International Telecommunications Satellite Consortium) stationed over the Indian Ocean; and
   • expand the optic fiber cable network.

2. 1999-2000
   • establish a link to the Intelsat stationed over the Pacific Ocean;
   • create a data communication network;
   • provide video conferencing services;
   • provide Internet services;
   • provide Inmarsat (International Maritime Satellite Organization) services;
   • expand a comprehensive digital exchange network;
   • provide cable television services;

By constructing, managing and operating modern communication facilities in the Rajin-Sonbong FETZ, we will be able to provide many communication services including voice, data, and video services, required by residents, government organs, and business entities. Thus, not only will local and international communications be available, but also such relay services as Inmarsat and Internet.

We think it important to settle matters of principle, regarding the construction plans for each step and the coordination of communication between regional and international networks. I thus think it necessary that the representatives from the telecommunications sectors of the TREDA countries consult regularly on the
coordination of technical and practical matters arising from the organization and rational operation of the regional communications networks.
Comment

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Thank you very much. We appreciate Professor Wedemeyer and the Northeast Asia Economic Forum for providing us with this opportunity to present our ideas regarding cooperation in the construction of the foundation for a telecommunication system for Northeast Asia. Before commenting on the paper presented, I would like to make brief remarks on the current situation and prospects for the overall communication industry in the ROK.

As in most of the other countries, there are gaps between policies, regulations, and their application in the communication industry, and these gaps are increasing. Communication policy and regulation are under the management of the Ministry of Information and Communication (MC) while CATV, DBS, and public broadcasting are under public relations. The MC is responsible for licensing new business enterprises, fair competition policy, a continuous supply of universal service, the construction of super-rapid communication networks, the establishment of a communication society, and research, development, and training policy.

As mentioned by Professor Wedemeyer, another important policy element is cooperation in the establishment of the communication infrastructure in Northeast Asia. The economic activities and development of the Tumen Region will positively influence in the middle and long run not only the countries sharing their borders but the neighboring countries as well. It is essential to build a consensus in regards to incentives and contributions to communication development so that economic development in Northeast Asia will be considered a common achievement.

In this regard, Professor Wedemeyer suggests an approach which includes international organizations, government and private organizations, industrial organizations, and academic circles with the core of cooperation being a Northeast Asia Information Infrastructure Consortium. This is a positive approach to the building of a
cooperative plan to develop the basic foundation for communications in Northeast Asia. But only after determining whether it is possible to promote an efficient, intermediate and long-term communication system through the cooperation suggested by Professor Wedemeyer would it be appropriate to give other countries the opportunity to participate in the core country system. Thus it is first necessary to organize the core countries to provide mutual assistance in funds, manpower, and technology and its application, all of which are necessary for the cooperative construction of the basic foundation of the communication system for Northeast Asia.

The ROK and the Korean Telecommunication Company intend to actively participate in such cooperation not only with the countries of the Northeast Asia Economic Forum, international organizations, industrial organizations, and academic circles, but also with the East-West Center by helping to construct, implement, and promote the foundation of a communications network.
Cooperative Strategies for Northeast Asian Telecommunication Infrastructure

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The Current Situation in the Telecommunications Sector

One of the major factors in maintaining steady economic and social growth in Mongolia is the development of infrastructure. The policies and strategies of the telecommunications sector are focused on intensively developing this sector, achieving technical and technological reform, and introducing a new organizational structure that is suitable for a market economy. Development in the telecommunications sector is very important to stabilizing the Mongolian economy, increasing domestic production, raising the public standard of living, and building the basis for strong future growth.

In the 1990s, an E-10 digital telephone station with a capacity of 40,000 users was built and put into service in Ulaanbaatar through trade loans and grants from France. Also, an automated digital station NEAX61E for international long distance calling and an Intel Sat-A landstation were built and brought online through a donation from Japan. These systems make it possible for Mongolians to communicate directly with the outside world, to reform the basic telephone system, to expand telephone service, and to make noticeable the improvement in quality of service. Today, Mongolia can communicate directly with over 130 countries in the world through about 140 channels.

The Mongolian electronic telecommunications system consists of over 3,000 km of analog line connecting Ulaanbaatar and the centers of the provinces (except for Zavkhan, Khuvsgul, Arkhangai, andUvs), about 1,000 km of digital radio relay line, and about 30,000 km of towered line connecting the centers of the provinces and towns. There are over 350 interconnecting stations (ATS-automated telephone stations) throughout the country, and the total capacity of these stations is 106,000 users, 77,800 of
whom are receiving service.

The General Plan to Develop the Telecommunications Infrastructure

The general plan to develop Mongolia’s telecommunications infrastructure until the year 2020 was devised in 1993 with technical help from the Asian Development Bank. According to the general plan, projects are being implemented to

• Build a digital automated interconnecting station for 16,000 users;
• Install a cable line for 48,500 users in the cities of Ulaanbaatar, Darkhan, and Erdenet;
• Construct a digital radio relay connecting these three cities;
• Change the power generators for the radio relay stations which are not connected to the central power supply system; and
• Install solar electricity generators.

The goals of the telecommunications sector are:

• To fully implement the general plan;
• To broaden service, raise its quality, and to meet international standards for the main characteristics of the telecommunications infrastructure, and
• To shift the development of telecommunications infrastructure towards the establishment of a Mongolian information infrastructure, placing special emphasis on the countryside.

The strategic policy of the telecommunications sector is:

• To organize telecommunications in the Mongolian countryside in an economically efficient way, and to connect the countryside to the centralized system;
• To develop an electronic communications system in Ulaanbaatar which keeps pace with modern information technology advancement; and
• To centralize the postal system in order to make it fast, reliable, and efficient.
The Opportunity to Be Connected with the Telecommunications Systems in Northeast Asia

Mongolia is researching possible ways to be directly connected with the main telecommunications systems of countries in Northeast Asia, especially with the Russian Federation and the People's Republic of China. In order to accomplish this, we digitized the radio relay line between Ulaanbaatar-Darkhan-Sukhbaatar, Ulaanbaatar-Bulgan-Erdenet, and Dashinchilen-Arvaiheer. We are preparing and will implement several projects to install a high-speed fiber optic cable system between Sukhbaatar to the north and Zamiin-Uud to the south, improve telecommunications in the eastern provinces, and renovate automated telephone stations and cable lines in the centers of the eastern provinces.

Dornod, Sukhbaatar, and Khentii provinces in the eastern part of Mongolia have a total territory of 207,000 km² and a total population of over 137,000 people. These provinces have a relatively well-developed infrastructure and abundant natural resources. Khentii, Dornod, and Sukhbaatar provinces are connected to the main telecommunication system through an analog radio relay line. Air lines and steel lines are used in the local telecommunications systems in the provinces. There are 1,800 automated telephone stations (ATS) in the center of Dornod province, 800 ATSs in the center of Sukhbaatar province, and 1,000 ATSs in the center of Khentii province. Television broadcasting is directly received from the Asiasat-2 satellite.

The following difficulties and problems in telecommunications have been observed in these three provinces:

1. The analog radio relay stations have high costs, diesel power, ATSs, and air lines, all of which require technological improvement;
2. Because of the shortage of power supply in the provinces and towns, the normal functioning of the telecommunications equipment is often interrupted;
3. Because provinces and towns are located very far apart and connected by air line channels, they are very vulnerable to exterior conditions such as
strong winds and forest fires which bring unexpected damage and impede normal functioning; and

4. Telecommunications equipment parts are very scarce.

To overcome these difficulties we need to supply radio relay middle stations with solar power, make technical and technological improvements in automated telephone stations and radio relay stations, increase the capacity of ATSs in the provincial centers, use narrow band radio relay and satellite communications in remote areas, maintain a reliable power supply, decrease the export of precious metals, and increase the supply of educated human resources.

We have done preliminary research to replace the telecommunications systems in the Eastern region (Khentii, Dornod, Sukhbaatar, Selenge, Tuv, and Dornogobi provinces) with modern radio and space telecommunication systems, spending 15 million Deutsche marks loaned by Germany. We plan to implement this project in 1997-1998.

Between 2000-2005, we intend to replace the main radio relay line in the above provinces with a digital radio relay line. Moreover, we have made a proposal to install new digital ATSs in the provincial centers in the eastern region. We also plan to build a telecommunications system in Choibalsan.

The Mongolian Eastern Region in Relation to the Tumen River Basin Development Program

Mongolia has recognized the great importance of the Tumen River project, and has prepared a strategic plan to participate in it. By implementing the plan, we can develop an intensive cooperative relationship with the participating countries, and obtain access to the sea. In addition, with the implementation of the plan, it will be possible for Mongolia to be linked with the Tumen River Economic Development Region through information, communication, and transportation systems. This in turn will boost tourism in Mongolia. Thus we are working towards reforming the long-distance communication system equipment in the Eastern region. There are two proposals which require financing through foreign investment: The reform of Choibalsan city’s main telecommunications
systems, and the establishment of the Ulaanbaatar-Dornod-Tumen River region’s main telecommunications system.

**Conclusions**

Dividing the territory into regions for purposes of telecommunications planning is essential for the further development of the Mongolian economy. To achieve this, the following must be undertaken:

1. Correctly divide the country into regions by evaluating the strategic policy for each sector, and then combine these plans and obtain its approval;

2. Strenuously develop cooperation with Northeast Asian countries to open the new window to the sea and develop the Dornod region as an internal part of the Tumen River Project;

3. Reform the current communication system’s technology and equipment, improve telecommunications systems within the regions, and obtain more sophisticated equipment with multiple alternatives, such as fiber optics, narrow band radio, and satellite systems; and

4. Make adjustments in the projects, integrate them into the main development program, and take immediate action to implement them.
VI

COOPERATION IN ENERGY INFRASTRUCTURE
Introduction

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Tottori Prefecture Government, Japan

Good afternoon, ladies and gentlemen, government representatives and distinguished guests.

My name is Isao Takeuchi of the Tottori Prefecture Government. I am sharing the honor of being the chair of this session with Mr. Sukhbaatar from the Ministry of Infrastructure Development of the Mongolian Government.

As usual, after the lunch break at an international conference, particularly on the second day of the Forum, some people are carrying out lobby diplomacy and others might feel sleepy. However, this energy infrastructure session is one of the most essential parts of our Forum and is organized with a view to establishing multilateral cooperation in energy such as an intergovernmental consultation system or an energy community in Northeast Asia. Thus, I hope everybody will pay special attention during this session. The goal is to facilitate mutual interdependence through economic cooperation in energy.

Recently, there have been several interesting trends and changes in the energy policy of this region. First, natural gas has been recognized as a major energy source in the next century because it is environmentally friendly. Second, the huge natural gas reserves in Russia and large scale multilateral projects such as Sakhalin 1 and 2 are already being developed in cooperation with U.S., Japanese and European companies. Third, the development of a natural gas pipeline network is now being seriously considered by policy makers.

Regarding the environmental benefits of natural gas, the Japanese local government referendum held in Niigata last year on the building of a nuclear power station showed that the “nuclear allergy” is strong enough to modify the nuclear policy of Japan. I think that this anti-nuclear feeling is not confined to Japan but is a growing global trend. The United Nations conference on global warming will be held in Kyoto, Japan this December. Many people have recognized that natural gas, due to its low
emission of CO₂, is the most suitable source of energy from an environmental point of view.

Finally, as several people have pointed out, one of the obstacles to development in this region is the relative passivity of national governments such as that of Japan. The reasons for this passivity are the instability of the Korean Peninsula, and the Northern Territories issue. However, it is clear that the Japanese government has recently turned toward constructive engagement, e.g., by promoting economic cooperation with Russia regarding energy issues. Of course, the Japanese local governments of Niigata, Shimane, Hyogo, Toyama, Ishikawa and Tottori are extremely interested in promoting economic cooperation in this region.

Considering these positive recent developments, I am optimistic about realizing the benefits of mutual interdependence by combining labor, natural resources, capital and technologies in Northeast Asia. In particular, securing environmentally friendly energy such as natural gas is a common interest in this region. I believe that the establishment of an intergovernmental energy consultation in the field of energy is paramount and that this institutionalized framework will play an important role.

Let me introduce our first speaker, Dr. Fereidun Fesharaki, Director of the Program on Resources at the East-West Center. He is going to speak on the subject of “energy supply and demand in Northeast Asia.” Dr. Fesharaki will describe the global energy pattern and the characteristics of the energy demand structure in the Asia-Pacific region. In analyzing the outlook for energy demand and supply to 2020, he will illustrate the importance of preparing governmental policies that respond to expected changes in the global energy market.
Energy Supply and Demand in Northeast Asia

Fereidun Fesharaki, Sara Banaszak, and Kang Wu
Program on Resources, East-West Center

Executive Summary

• Northeast Asia, defined here to include China, Japan, South Korea, and North Korea, is one of the most dynamic subregions in Asia and the Pacific. Except for North Korea, every country in this subregion has enjoyed spectacular economic growth at various times for over four decades. The economic growth rate was accompanied by explosive growth in energy demand. Rising energy demand will require a tremendous amount of infrastructure and investment which can themselves bear influence on fuel choices.

• China, Japan, and South Korea have all identified natural gas as a cleaner and/or underutilized fuel and plan to increase its share of primary energy consumption. All three also have ambitious nuclear power programs, geared to meet electricity demand in areas of concentrated development but limited or no resources. The future role of nuclear power remains something of a wildcard, however. Failure to meet nuclear energy goals will affect the shares of oil, coal, and gas in these countries and in Northeast Asia.

• Oil and gas demand growth will take place concurrently with a decline in the availability of local, low-sulfur crudes placing pressure on regional oil and gas markets. The region will become more dependent on imports of Middle Eastern crude, resulting in a higher-sulfur crude slate. Existing and planned refinery complexes will lack the capacity and the flexibility to fully satisfy product demand. The consequence will be a higher level of refined product imports.

• Oil and gas trends will impact the global oil market and raise issues such as the safe and environmentally-sound transportation of ever larger amounts of oil and gas. Forecasted natural gas demand, rising both quantitatively and in its share of total demand, represents a notable shift in the fuel mix of Northeast Asia and implies a
significant expansion in gas field development as well as in gas exploration. Several large natural gas projects that are currently on hold such as the Natuna field in Indonesia and Sakhalin are likely to be developed.

- North Korea, or the Democratic People's Republic of Korea (DPRK), has a demand shortfall of all energy resources. It must import all of its oil, while it does not import nor commercially produce natural gas. The world's tenth largest coal producer, North Korea has mostly anthracite and some lignite deposits, and like South Korea, must import most of its bituminous coal needs. More than 50% of power is generated by hydro; the remainder is thermal. South Korea plans to build a power station in North Korea as one of the first inter-Korean public works projects and is investigating the possibility of supplying electricity to North Korea. Major political changes such as reunification or military conflict would naturally alter all energy outlooks significantly.

**Introduction**

The decade of the 1980s was the Pacific decade. Spectacular economic growth rates in the Asia-Pacific region; the emergence of the export-oriented newly industrialized economies of Singapore, South Korea, Taiwan, and Hong Kong; the opening of the Chinese economy; and the rise of Japanese economic power have now placed the region firmly in the pivotal position within the world economy. In the 1990s, the momentum of the Asia-Pacific region's high economic growth continues, as economic reforms in China deepen and Southeast Asian Economies continue to grow rapidly.

Northeast Asia, which is defined here to include China, Japan, South Korea, and North Korea, is one of the most dynamic subregions in Asia and the Pacific. Except for North Korea, every country in this subregion has enjoyed spectacular economic growth at various times for over four decades. The economic growth rate was accompanied by explosive growth in energy demand.

For the Asia-Pacific region as whole, virtually every commercial form of energy has shown a spectacular rise in consumption, and the oil demand growth rate is the fastest
of any region on earth. Pressure will come to bear on the region’s oil and gas markets, since demand growth will take place concurrently with a decline in the availability of local, low-sulfur crudes. The region will become even more dependent on imports of Middle Eastern crude, which will result in a higher-sulfur crude slate. Moreover, we expect that the existing and planned refinery complexes will lack the capacity and the flexibility to fully satisfy product demand. The consequence will be a higher level of refined product imports.

The global and Asia-Pacific energy markets are heavily dependent on fossil energy. Fossil fuel consumption has continued to increase, despite several oil price shocks, active government policies to reduce energy use through efficiency gains, and the environmental debate on the problems associated with carbon-related fuel combustion (Wu and Fesharaki 1994).

Figure 1 provides a comparison between the global and Asia-Pacific primary commercial energy demand patterns. In the global energy pattern, oil remains prominent at 40%—down 5% from its 1970s share. The share of natural gas has risen somewhat from 19% in 1970 to 23% in 1995. Coal, with a share of 27%, remains the second-largest energy source. Nuclear power and hydroelectricity account for 7% and 3% of the total, respectively. In contrast, the Asia-Pacific region is heavily coal dependent. Coal accounts for 46% of total regional energy consumption, followed by oil at 38%. Natural gas makes up 9%, while nuclear energy and hydroelectricity constitute 5% and 2%, respectively, of energy use. The Asia-Pacific region’s energy demand structure, especially the high share of coal consumption, shown above is heavily affected by China, the largest energy and coal consumer in the region.

Within Northeast Asia, each country’s energy demand and supply situation differs from the others’. Oil’s share in total primary commercial energy consumption is more than half in Japan and South Korea. Both countries have a near total dependence on imported energy. North Korea produces and consumes a large amount of coal, but the country is 100% dependent on imported oil. The country also needs to import a certain amount of coal for its steel industry. China is the only energy resource-rich country in the region. However, the country is now a net oil importer and will soon join the ranks of
Japan and South Korea to become one of Northeast Asia's major oil importers. In this paper, we examine some of the long-term energy issues facing Northeast Asian countries. The prospects of energy demand over the next 25 years and the supply security issues will be discussed on a country-by-country basis except for North Korea. The rest of the paper proceeds as follows. Section 2 examines Asia-Pacific's rising dependence on and vulnerability to energy imports. In Section 3, the current situation and future prospects of energy demand and supply in China, Japan, and South Korea are discussed, followed by a summary of the regional issues and concluding remarks in Section 4.

**Rising Import Dependence for the Asia-Pacific Region**

With the recent growth rates seen in Asian energy consumption and oil demand, regional crude production is already unable to satisfy existing regional oil demand, and the gap between supply and demand will continue to widen. The result will be a major increase in oil import dependence.1

The Asia-Pacific region has a huge refining capacity. In 1995, distillation capacity in the region was about 16 million barrels per day (b/d), which represents a substantial increase over the 1990 capacity of 12.6 million b/d. Several countries have over 1 million b/d of crude distillation capacity including Japan (4.8 million b/d), China (3.7 million b/d), South Korea (1.7 million b/d), India (1.1 million b/d), and Singapore (1.1 million b/d).

In light of the rising oil demand, many countries in the region have major plans to expand their refining capacity and upgrading capabilities. However, the plans vary from country to country. For the region as a whole, additions of about 1.8 million b/d by 1997 are firmly planned, with an additional 1.3 million b/d of likely capacity by 2000. During the period 2000-2005, a possible 4 million b/d of new capacity could be added to the region, but many uncertainties exist. Associated with current plans are 1.3 million b/d of planned cracking capacities (FCC/RCC, hydrocracking, visbreaking, and coking) by 2000, of which about 60% of the additions will be completed by 1997. The huge and expanding refining capacity in the Asia-Pacific region implies that crude oil will account
for most of the oil import dependence, and dependence on the Middle East to supply the region's crude needs will be inescapable.

In 1995, the net oil import requirements of the Asia-Pacific region amounted to 10.4 million b/d, about 59% of the regional petroleum product consumption. Based on our forecasts and projections, the region's overall oil import dependence is expected to rise from 59% in 1995 to 66% in 2000, to 72% in 2005, and by 2010 to 77% (Figure 2).

Currently, the Mideast accounts for approximately 76% of the region's total crude oil imports (including Asia-Pacific intraregional crude imports). The dependence on Middle East crude will go up to 83% in 2000 and 90% in 2005 (Figure 3). By 2010, 93% of all crude imports of the region are expected to come from the Middle East, unless alternative sources of petroleum supply can be found. This sharply contrasts with the United States, where Latin America, Canada, and the North Sea will remain key exporters for the U.S. market, in addition to the Middle East.

Energy Policies and Energy Demand in Northeast Asia

CHINA

Energy Policies

China's energy economy has long been characterized by a policy of self-sufficiency and coexistence of both large- and small-scale production and consumption. The Chinese government has repeatedly stressed the importance of developing the country's own energy resources, and plans to meet most of the country's future energy demand with indigenous resources. Energy development is therefore considered by the policymakers as a key to the success of China's future economic development.

For almost three decades before the "open-door" policy introduced by the Chinese government in 1978, energy policy was part of China's overall planning economy. The formation of the energy policy was heavily rooted in the Soviet-style central planning system, which was adopted during the early 1950s, and the "self-reliant" development, which lasted from 1960 to the late 1970s. Since the late 1970s, China has begun its sweeping economic reforms and achieved rapid economic growth. In 1980 the
government officially announced the target of “quadrupling the national product by the year 2000.” The huge energy requirements for China to realize this ambitious economic target led the government to officially recognize that energy is the most critical issue in the development of the Chinese economy.

During the reform era, the Chinese government’s terminology for its economy has evolved from “socialist commodity economy” to “socialist market economy”. The latter assumes that state corporations can act as profit-making entities under loose government guidelines. Since the mid-1980s, this policy has led to the breakup of the old centralized industry monopoly that had prevailed in the energy sector for the previous three decades. Today, China’s upstream oil sector, downstream oil industry, coal industry, power industry, and chemical industry are all governed by different ministries and state energy corporations. Although the state oil corporations assume many of the functions held previously by ministries, they act increasingly like state oil companies elsewhere in the world, albeit with Chinese “characteristics”.

Both central planning (including the government’s “guideline plans” and sometimes “imperative plans”) and a certain degree of marketing are at work in China’s energy sector. The scope of central planning has been decreasing since the early 1980s. However, the government deems energy vital for economic development in China, and considers state control of energy important; progress in reforming and decentralizing the energy sector has been slow, compared with progress in other sectors.

China’s energy planning is reflected in its five-year plans and long term social and economic development plans. The year of 1996 marks the first year of China’s Ninth Five-Year Plan. In March 1996, the National People’s Congress—China’s parliament—passed a resolution on the Program on the Ninth Five-Year Plan and the 2010 Long-Term Targets for China’s National Economy and Social Development. Under this national program, increasing coal production and ensuring coal transportation and consumption have retained top priority. Generally speaking, coal remains the cornerstone of China’s energy policy. The government attaches great importance to integrated production, transportation, and consumption plans for the coal industry. A huge amount of investment is allocated each year to strengthen production in traditional fields and to
improve the infrastructure for coal transportation. Price reform has also been expedited to provide incentives to develop coal mines. On the other hand, the government also intends to close the inefficient and unsafe small mines, which have caused many environmental problems.

In the petroleum sector, China’s most recent strategy is to stabilize production in the eastern fields, develop the western fields, lay equal emphasis on oil and gas, and further open the industry. The strategy reflects the realities that the oil fields in East China have reached the mature stage and that China’s gas exploration has been neglected in the past. If successful, the strategy will prevent China’s crude oil production from declining and increase gas production rapidly.

In other areas, the development of hydropower is the traditional focus of China. The tradition will continue for a while, which is exemplified by the construction of the Three Gorges Hydropower Plants. However, over the longer period of time, hydroelectricity production growth will be steady but moderate. The Chinese government has recently sought to develop nuclear power in provinces whose economic growth is coming up against a shortage of energy resources. At the present time, two nuclear power plants have been completed and a few more are in the planning stage. China’s energy policy objectives include developing new energy resources such as solar energy. But given the limitations of Chinese investment in energy and the constraints of indigenous technologies, large-scale development of these new sources is unlikely in the foreseeable future in the country (Fesharaki and Wu 1992).

The future direction of China’s energy policy centers on both the energy planning and the comprehensive and often very technical guiding policies for energy sector development. Under the Ninth Five-Year Plan and the long-term development targets mentioned earlier, the government has called for putting electric power industry at the center of China’s energy development and for founding China’s whole energy industry on the basis of coal. The government has also vowed to strengthen exploration and production of oil and gas, and to actively explore and develop new energy sources (People’s Daily, March 20, 1996). China’s comprehensive guiding policies for energy
sector development also include the following: (1) improving the structure of primary energy; (2) giving priority to the exploitation of hydropower; (3) building nuclear power stations in those regions economically advanced, but short of energy; (4) putting equal emphasis on the exploitation of natural gas and the exploitation of oil; (5) improving energy utilization efficiency and strictly enforcing energy conservation measures; (6) rationalizing the utilization of oil and natural gas resources, improving the processing of crude oil, and the allocation of oil products; (7) modernizing the technologies of coal processing, burning, and conversion, improving coal allocation, and enhancing the comprehensive utilization of coal; (8) improving the urban residential energy structure and meeting the reasonable energy demands of urban residents; and (9) giving more attention to environmental protection in energy production and use. Given the limited funding of many state projects and programs in China, some of the policies may remain only on paper without vigorous implementation.

The Outlook for Energy Demand and Supply to 2020

China is the world’s third largest energy producer and consumer. On an absolute basis, China has an abundance of coal, oil, and hydropower, and its potential reserves of natural gas are believed to be substantial. Yet on a per capita basis, the energy resources of China are below the world average. Coal dominates both energy production and consumption: measured in terms of tonnage, China is the world’s largest coal producer and consumer. The modern oil industry arose in the late 1950s and 1960s, after giant oil fields were discovered and developed in northeastern China. The natural gas resources are presumed to be abundant, but are the least developed conventional energy sources in China, owing to the lack of transport and technology. In 1995, coal accounted for 77% of total primary commercial energy consumption followed by oil at 18.8%, natural gas at 1.9%, hydroelectricity at 1.9% and nuclear power at 0.4% (SSB 1996, British Petroleum 1996). Altogether, China consumed 17.3 million barrels of oil equivalent (boe/d) of primary commercial energy.
China's primary commercial consumption has some unique characteristics compared with the rest of the Asia-Pacific region. In terms of the energy production structure, China has a much larger share of coal and lower shares of oil and gas than the world average. In 1995, the share of coal in the total primary commercial energy output of the rest of the Asia-Pacific region was only 27% (excluding China), compared with 77% in China. Figure 4 depicts the structure of primary commercial energy consumption in China and in the rest of the Asia-Pacific region. For oil, the share in China was 19%; it was 51% for the rest of the Asia-Pacific region. Natural gas accounted for only 2% of China's primary commercial energy consumption but 13% of the primary commercial energy consumption in the rest of the Asia-Pacific region.

These comparisons show the vast differences in energy consumption when China is compared with the rest of the Asia-Pacific region. Together, coal and oil account for more than 96% of total primary energy production in China. The characteristics of this pattern have a profound impact on the country's energy development strategies and policies.

Both energy production and consumption in China are expected to continue to grow because of the government's efforts to increase domestic energy supply, and the economic needs for more energy. We now discuss the current situation and future prospects of primary commercial energy for each of the individual energy resources, namely, coal, gas, hydropower, and nuclear power, and the supply options available to China.

**Coal**

China has vast potential coal deposits. According to estimates made by the Chinese energy agencies, the coal potential within a depth of 2,000 meters (the broadest definition of coal resources in China) reaches 4,500 billion tonnes. The recoverable reserves are reported to be 986.3 billion tonnes, about 30% of which (295.9 billion tonnes) is considered proved reserves in place (SETC 1994). The BP Review of World Energy, however, placed China's proven coal reserves at the end of 1995 at 115 billion tonnes, which is still the third largest in the world after the former Soviet Union and the
United States. Of the 115 billion tonnes of proven reserves, about 54% is anthracite and bituminous coal, and 46% is sub-bituminous coal and lignite.

As mentioned earlier, coal accounts for about three-quarters of both primary energy production and energy consumption in China. During the past 15 years, coal consumption in China increased at an average annual rate of 5.4% a year, faster than the average growth rate of 5.1% a year for total primary commercial energy consumption during the same period. In 1995, China produced a total of 1.29 billion tonnes of coal and exported 28.6 million tonnes, imported a small amount (1.6 million tonnes), and consumed 1.27 billion tonnes.

It is expected that coal will continue to dominate China's energy picture in the future, although its share in total primary commercial energy consumption is likely to decline. Over the next 25 years, coal consumption in China is forecast to grow at an average annual rate of 2.8% under our base-case scenario. Based on this forecast, coal consumption is expected to increase from 13.3 million boe/d in 1995 to 20.8 million boe/d in 2010 and 26.9 million boe/d in 2020. The share of coal in primary energy consumption is forecast to decline from 77% in 1995 to 69% in 2010 and 64% in 2020. If the economy grows faster or oil prices becomes higher, coal consumption in China could go up more rapidly at an average rate of about 3.5% a year during the period 1995-2020. However, the growth rate of coal consumption could be as low as 2% a year on average during the forecast period if other energy sources exhibit stronger growth rates.

The Chinese government has vowed to produce enough coal to meet its domestic demand and is striving to export a certain amount. Under our base case scenario, it is expected that China will produce 1.5 billion tonnes of coal in 2000 and will have enough coal for the projected demand by 2010. (Under the Ninth Five-Year Plan, the production target for 2000 is 1.4 billion tonnes.) There are many uncertainties beyond 2010 but the country should not be significantly short of coal.

Oil

As in the case of coal, China's claims about its oil reserves are different from the estimates of independent industry sources outside China. The Chinese official estimate
refers to so-called oil resources in place, or total overall oil resources, which amounted to 686 billion barrels (bbl) in 1994 (SETC 1994). China does not usually release the figures of proven oil reserves. *BP Statistical Review of World Energy* lists 24 bbl as proved reserves for China. At 24 bbl, China’s oil reserves would represent only 2.4% of the world’s total. This share could change, however, when additional reserves are added to the proven pool.

The development of China’s modern oil industry dates from the late 1950s, when the Daqing oil field was discovered in the Songliao Basin of northeast China. After more than three decades of development, China has become the sixth largest oil producer in the world. In 1995, China produced 2.98 million b/d of oil, which accounted for 17.9% of the country’s total primary energy production. The domestic refining industry underwent a transformation during the decade and half after China opened its doors to the outside world in the late 1970s. As a result of heavy investment in refining, together with the infusion of new foreign technology, China’s crude distillation capacity of 4.1 million b/d has become the fifth largest in the world.

China’s overall oil consumption, which is defined as consumption of petroleum products plus other uses of oil, amounted to 3.3 million b/d in 1995, up from an average of 1.7 million b/d in the 1980s. Although the annual growth rate of petroleum product consumption in China was only 4.9% during the period 1980-1995, the growth accelerated to 7.3% on average between 1990 and 1995. Over the next twenty-five years, overall oil consumption in China is forecast to grow at an average annual rate of 4.4% under the base-case scenario. By 2020, China’s oil consumption is forecast to be around 9.5 million b/d. The high-case scenario is associated with faster economic growth and lower oil prices. Under this scenario, oil consumption in China can reach 11 million b/d at an average growth rate of 5% during the period 1995-2000. On the other hand, if oil prices increase sharply, consumption growth could shift into lower gear, at about 3% a year on average, which would raise total oil consumption to only 6.8 million b/d in 2020.

China’s crude oil production is expected to increase steadily but at a rate much lower than oil consumption. For the first time in more than two decades, the country became a net oil importer in 1993. In 1995, net oil imports amounted to 230,000 b/d. It
is forecast to increase to 2 million b/d in 2005 and 3.1 million b/d in 2010. By 2020, the import requirements of oil can be very huge. Even if China has a quicker addition of crude producing capacity during the period of 2010-2020, the import requirements may still reach 5.5 million b/d or higher under our base-case scenario. This development adds a unique dimension to energy supply security in Northeast Asia. During the next century, China, Japan, and South Korea, or perhaps a united Korea, will all be giant oil importers in the Asia-Pacific region.

Natural Gas

China has huge but largely undeveloped natural gas resources. The overall gas could be as high as 38 trillion cubic meters (m³). However, at the present time, China's proven natural reserves are estimated to be 1.7 trillion m³ or 59 trillion cubic feet (tcf), which represents about 4% of the world's total (British Petroleum 1996). During most of the 1980s and early 1990s, the change in gas production has been closely related to the trend of proven gas reserves: when reserves go up significantly, so does gas production; when reserves remain flat over time, production stagnates. This relationship shows that the magnitude of annual gas production in China is affected by the government's efforts to explore for natural gas.

In 1995, China produced and consumed 17.6 billion m³ of natural gas. The 1995 gas consumption was equivalent to 324 thousand boe/d, which was up only moderately from 261 thousand boe/d in 1980. Over the next 25 years, however, gas consumption is forecast to increase rapidly, thanks to new discoveries and development of gas fields both onshore and offshore China. Gas demand in China is forecast to grow at an average annual rate of 9.2% during the period 1995-2020, raising total consumption to 1.5 million boe/d in 2010 and 2.9 million boe/d in 2020. Its share in total primary commercial energy consumption is expected to increase from 1.9% in 1995 to 7% in 2020.

The majority of the gas demand is expected to be met by domestic production up to the year 2005. Beyond that year, imports of liquefied natural gas are likely. China is confident that it can increase its annual gas production to 25 billion m³ by 2000 and to as
much as 80-100 billion m³ by 2015. Based on our forecasts, China needs 78 billion m³ of natural gas in 2010 and 154 billion m³ of gas in 2020.

Hydroelectricity

According to Chinese officials, the hydropower energy potential in China amounts to 676 gigawatts (GW) of power generation capacity. The recoverable potential is about 290 GW. In 1995, China’s installed hydroelectric capacity was 52 GW, accounting for 17.9% of the recoverable potential. The highest hydroenergy potentials in China are in the southwest, northwest and south central regions. Hydropower construction in Hubei Province (central China) has been developed rapidly, and the country's largest hydropower plant—the 2.7 GW Gezhouba Hydropower Plant—came on stream in the early 1980s. Hubei Province and neighboring Sichuan Province (in southwest China) are poised for even greater development of hydropower, since construction of the huge Three Gorges Dam began in 1993. Upon completion, the Three Gorges Dam will be the world’s largest hydropower plant—with a capacity of about 18.2 GW, consisting of 26 700-megawatt (MW) generators—and perhaps the world’s most controversial and expensive power project as well.

In 1995, hydroelectricity consumption in China was about 323,000 boe/d, which demonstrated the highest average growth rate (7.9% a year) among all primary energy sources except for nuclear power. Over the next 25 years, China will continue to invest in the hydropower sector but its consumption growth rate is forecast to slow down to 4.4% a year on average during the period 1995-2020. By 2020, hydropower consumption is expected to be 947,000 boe/d, about 2.3% of the total primary commercial energy consumption.

Nuclear Power

Until 1982, China did not elect to build any nuclear power plants, in spite of the country's long development of indigenous nuclear technology. Between 1982 and 1993, nuclear power construction proceeded rather slowly. The country's first nuclear power plant, at Qinshan in Zhejiang Province, with a capacity of 300 MW, came on-stream in December 1991. After the completion of two 900-MW nuclear power units at Daya Bay,
Guangdong Province, China’s current nuclear power capacity stands at 2.1 GW. China currently has ambitious plans to build additional nuclear power plants in Liaoning, Guangdong, and Zhejiang Provinces.

Nuclear power is an expensive option for China, especially with imported equipment and technology. However, it is suitable for provinces such as Guangdong and Zhejiang, where the severe lack of energy sources would otherwise impede rapid economic growth. In 1995, China’s nuclear power consumption was about 66,000 boe/d. As new capacity is added, the consumption is expected to grow at an average annual rate of 14.2% during the period 1995-2020. By 2020, China’s installed nuclear power capacity is forecast to reach 58 GW and the consumption will be 1.8 million boe/d, accounting for 4.4% of the country’s total primary energy consumption.

Table 1 summarizes the growth rates of different kinds of primary energy sources in China. During the past 15 years, the primary energy consumption in China grew at an average annual rate of 5.1%, about half of the GDP growth rate of 10.2%. Over the next

Table 1
Growth of Economy and Primary Commercial Energy Consumption in China

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Source: East-West Center.
25 years, the GDP growth is forecast to be 6.6% per year and the total primary commercial energy consumption in China is forecast to grow at an average rate of 3.6% a year. Under our base-case scenario, China's primary energy consumption is forecast to increase from 17 million boe/d in 1995 to 30 million boe/d in 2010 and 42 million b/d in 2020 (Figure 5).

JAPAN

Overview

Japan's energy situation and forecast reflect its unique role as the first of the economic miracles to occur in the Asian region. Today, energy demand policy and outlook is influenced by a host of factors, although the most important is still a heavy dependence on oil and gas imports. Steps towards deregulation and privatization will increasingly affect energy markets in Japan, while environmental concerns both nationally and globally impact government forecasts, policies regarding fuel choice, and how energy demand is actually met. East-West Center base-case forecasts for the next 25 years assume slower economic growth (GDP average annual growth rate of 2.3%) and are accompanied by low growth (1.7%) in fossil fuel use with natural gas accounting for a growing share of Japan's energy pie.

Historical Context

The average annual growth rate of GDP was over 10% for Japan in the 1960s, but slowed down to the 4 to 5% range for the 70s and 80s. A GDP growth rate of only 0.6% in 1994 depicts recent economic stagnation, a situation which should now begin to improve. The timing and pace of Japan's growth impacted the energy choices which have fuelled economic development. As shown in Figure 6, the share of oil in Japan's primary energy supply grew from 38% in 1960 to over 70% in 1970, peaking at 77% in 1973. After this point, reliance on oil imports was reduced (to about 57% of primary energy supply), largely by increased use of natural gas and nuclear power.

In the 1960s, Japan pioneered Asia-Pacific trade in liquefied natural gas (LNG), using what was then newly-established commercial technology to bring natural gas from
Alaska. By 1980, the share of natural gas in primary energy supply had grown to over 5%, and by 1990 it had doubled to over 10%. Underscoring this, the average annual growth rate of natural gas consumption for the period 1980-95 was 5.9% in contrast with that of oil, 0.8% (see Table 2). In addition, nuclear power, which showed parallel growth in the 1980s, has also accounted for approximately 10% of energy supply in the 90s.

Energy Demand and Policy in Japan Today

Given only incidental indigenous fossil fuel reserves and production, the most notable feature of Japan's energy situation today is its continued reliance on oil imports. Oil accounts for about 55% of energy consumption in Japan in contrast to only 40% of world consumption and 38% in the Asia-Pacific region. (The share of oil in Asia-Pacific consumption rises to 54% if one excludes China and India, two giant coal consumers.) In the 1990s, 70-80% of oil imports have come from the Middle East, which has also been true for the Asia-Pacific region as a whole. By comparison, only about 25% of the U.S. import slate comes from the Middle East with a large portion coming also from Venezuela, Canada, Mexico, and the North Sea. For the last several years, the United Arab Emirates has been the largest oil supplier to Japan, followed by Saudi Arabia and then Iran and Indonesia.

Japan's heavy reliance on oil is explained in part by its direct burning of crude for power generation. Use of crude for direct burning ranged from 300,000 to 450,000 b/d in the 1990s or about 8-10% of oil imports. Within the power sector, however, Japan has worked to establish a so-called “flexible switching system,” enabling a switch from one fuel to another should a serious energy shortage occur. Meanwhile, over 4.0 billion b/d of crude is processed by Japan’s extensive refining system to meet petroleum product demand. While Japanese government has been heavily involved in the national oil industry, steps towards deregulation are being taken. In particular, a ban on product imports was lifted as of April 1996. The impact of this change is not yet clear; however, it should have a greater influence in the long run as Japan faces increasing demand for the lighter end of oil products and stricter product specifications. Japan already has the
strictest petroleum product specifications in the Asia-Pacific region. In 1997, it will further reduce the regulated sulfur content of automotive diesel from 0.2% weight to 0.05% weight.

Environmental concerns, in fact, are a driving force behind energy policy in Japan, influencing not only the choice between fuels, but also how each fuel is utilized. Coal-fired power plants, for example, must have the most advanced flue-gas desulfurization (FGD) equipment, and only crudes of less than 0.1% sulfur are burned in power plants. A growing environmental movement is also influential in the country, where local protests have blocked development of nuclear power plants which is already constrained by the increasingly limited number of potential sites for locating such facilities. As discussed below, goals for emissions control, especially of carbon dioxide (CO₂), continue to influence government plans for the future fuel mix resulting in ambitious targets for both LNG and nuclear fuels.

**Outlook**

The East-West Center base-case outlook for energy demand in Japan is based on an assumed average annual GDP growth rate of 2.3% through the year 2020. This is shown in Table 2 along with forecasted growth rates for various fuels. Figure 7 shows what these growth rates imply for shares of fuels in primary energy consumption. Two important trends are that the share of oil is likely to decrease while that of natural gas will increase. The future role of nuclear power in Japan remains something of a wildcard. Few believe that official government targets for its nuclear power program will be met; lack of suitable sites for plants and opposition from local governments remain obstacles. Increased use of natural gas is likely to substitute for nuclear shortfalls while at the same time determine the extent of decreased reliance on oil.

Even with a decreased share of oil, total oil imports will continue to rise significantly. Paralleled by an increase in oil imports to the Asian region, this suggests a much greater amount of oil travelling by sea, primarily from the Middle East. Thus, safety of shipping lanes could become a more important issue in the future, along with environmental considerations of crude shipping by tanker and pipeline. Japan is already
increasing its double-hulled tanker fleet, but the nature of tanker shipping and the high seas in general will look very different in tomorrow's world. The extent to which increased natural gas imports travel by LNG tanker will only magnify these issues.

Forecasted natural gas demand, which will rise both quantitatively and in its share of total demand, implies a significant expansion in the development of gas fields as well as in gas exploration. Several large natural gas projects that are currently on hold such as the Natuna field in Indonesia and Sakhalin are almost certain to be developed. When considered in combination with forecasted Korean demand and even potential demand from elsewhere in Asia, this will represent a notable shift in the fuel mix of Northeast Asia.

SOUTH KOREA

Overview

The primary features of Korea's energy sector are similar to Japan's in many ways, with a few key differences. While Korea's economic boom began about 10 years after Japan's, it remains today one of the strongest developing economies in the world. Korea has no oil or gas reserves, a driving force in energy policy which centers on diversification and environmental concerns. Korea shows more potential for staying on target with its nuclear program and also has plans for expansion of natural gas use. Base case forecasts for the next 25 years assume an average annual GDP growth rate of 5.4% and average growth in fossil fuel use of 3.4% annually.

Historical Context

South Korea's economy experienced an average annual growth rate (GDP) of 9.3% in the 1980s and 7% for the past five years. Figure 8 shows the evolution of Korea's energy diet, in which oil has accounted for a maximum of 63%. Nuclear power was first used in 1977 and expanded its share rapidly during the 1980s. LNG imports began in 1986 and comprised the fastest growing fuel demanded for the period 1980-95 (see Table 3). Although the share of coal in energy demand did not begin decreasing
until after 1990 when domestic anthracite production began falling, imports of bituminous coal have been increasingly steadily over the years and now account for the bulk of domestic coal use.

**Energy Demand and Policy in Korea Today**

Energy consumption in Korea today is dominated by oil imports which account for over 60% of primary energy consumption. Over 70% of these imports come from the Middle East, 30% from Saudi Arabia. Iran, United Arab Emirates, and Oman follow as the next main sources of Korea’s crude slate. Throughout the 1980s, Korea has been diversifying its crude slate with increasing imports from Indonesia, Ecuador, Malaysia, Brunei, and others.

The Korean refining system is currently undergoing a major expansion; by the end of this year, refining capacity will have grown by about a third over the 1995 level. This will ease some petroleum product imbalances, but naphtha, which fuels a growing petrochemicals industry, will continue to be a major import. In recent years, Korea has only been able to meet product specifications (particularly sulfur content) for diesel and fuel oil by exporting high sulfur cargoes and importing lower sulfur fuel. Increased refining complexity will ease this at least temporarily, but the problem of an increasingly sour (high sulfur) crude slate of Middle East imports will persist for both Korea and the Asian region as a whole. Long-discussed plans for deregulation of the oil industry include a freeing of prices, lifting of the ban on entry to refining distribution, and removal of import/export restrictions on oil and products. Impetus for these changes may increase now that Korea has joined the OECD.

Imports of coal are also significant in South Korea, accounting for over 15% of primary energy consumption. Supply is fairly well diversified with half coming from Australia, Canada, and the U.S., and the other half coming from a variety of other countries. Much of the imported coal is used in the power sector, now accounting for about one-fourth of generation. The share of coal use in the power sector has been growing steadily, and the government plans continued expansion of coal-fired capacity.
While current power plant emission standards can be met with available low sulfur coal, the tightening of sulfur dioxide (SO₂) standards in 1999 will necessitate the installation of additional emission control equipment.

First introduced in 1986, LNG imports are also used heavily in the power sector. Currently, LNG accounts for little over 5% of primary energy consumption, but government plans to triple imports by 2010. As in Japan, LNG could become the substitute fuel of choice if ambitious nuclear power plans are not realized. However, unlike Japan, South Korea does not have the same problem siting nuclear power plants, and popular opposition to nuclear power does not thus far appear to be as great an obstacle. Contributing to relatively greater confidence in South Korea's nuclear power program has been the ability of the Korean utility Kepco to complete nuclear power plants ahead of schedule (Hagen, 1996).

Brief mention must be made of what is known about North Korea's energy situation since it has the potential to greatly impact South Korea and the rest of Northeast Asia. The Democratic People's Republic of Korea (DPRK) has a demand shortfall of all energy resources. It must import all of its oil, while it does not import nor commercially produce natural gas. Two major refineries have a total capacity of 42,000 b/d, and a third is planned. The world's tenth largest coal producer, North Korea has mostly anthracite and some lignite deposits and, like South Korea, must import to satisfy most of its bituminous coal needs. More than 50% of power is generated by hydro; the remainder is thermal. Three nuclear power plants have been under construction. Environmental concerns do not appear to be a force in energy policy of the DPRK government which is struggling otherwise with a stagnating economy and food shortages.

Outlook

With an assumed average annual growth rate for GDP in South Korea of 5.42% through the year 2020, a base case outlook for energy demand is shown in Table 3. Like Japan, the role of oil in energy demand is expected to decrease, while that of natural gas and nuclear will increase and quantitative consumption of all fuels will rise (Figure 9). Realization of its nuclear power program is still a variable as are many of the issues that
were relevant for Japan such as the high volume of Middle East oil imports and how they will be transported.

In addition, the evolution of South Korea’s relations with North Korea will not only have obvious political and economic effects, but they will also impact the energy sector. South Korea currently helps to provide cargoes of fuel oil to North Korea and has reported plans to build a power station in North Korea as one of the first inter-Korean public works projects. South Korea is also investigating the possibility of supplying electricity to North Korea. Motivating for such plans comes in part from the ulterior goal of moving towards eventual reunification. Major political changes such as reunification or military conflict would, needless to say, alter all energy outlooks significantly.

Summary and Concluding Remarks

Examining individual countries within Northeast Asia enables one to identify a variety of important trends as well as unique features related to energy demand and policy. There is strong economic growth in the region as a whole and in each of its member countries with the exception of North Korea. This has been and will continue to be accompanied by growth in energy demand. How each country attempts to address this demand is influenced by the available domestic resource base along with other considerations such as environmental concerns or policies of energy diversification or self-reliance. In addition, rising energy demand will require a tremendous amount of infrastructure and investment which can themselves bear influence on fuel choices.

All three countries discussed – China, Japan, and South Korea – have identified natural gas as a cleaner and/or underutilized fuel and plan to increase its share of primary energy consumption. All three also have ambitious nuclear power programs, which would hopefully meet electricity demand in areas of concentrated development but limited or no resources. Failure to meet nuclear energy goals will affect the shares of oil, coal, and gas in these countries and in Northeast Asia as a whole.

Individually, China will continue to develop its fossil fuel reserves while hydroelectric energy will grow more slowly through 2020 due to increasingly limited
opportunities. As China becomes a major oil importer like Japan and South Korea, it will accentuate a dramatic trend in Northeast Asia and the greater Asia-Pacific region. This trend will impact the global oil market and raise issues such as the safe and environmentally-sound transportation of ever larger amounts of oil (and gas). As noted above, energy consumption in Japan and South Korea will feature increasing shares of natural gas and nuclear power and decreasing shares of oil (despite quantitative increases). In this way, energy demand together with government policy of Northeast Asia and the Asian region as a whole will contribute to a change in global energy markets away from their historically oil-dominated focus.

References


Notes

1 Import dependence is defined as the share of net oil import requirements (total petroleum product consumption minus regional crude production) in the region’s total petroleum product consumption.

2 If the intraregional imports are excluded, the Middle East accounted for over 90% of the Asia-Pacific region’s actual imports of oil (crude and products combined) in 1994.
Northeast Asian Pipeline Grids: Options and Issues

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Research Director, Mitsubishi Research Institute, Inc., Tokyo, Japan

Introduction - Clean Energy of the 21st Century

Natural gas has the highest combustion efficiency and the least environmentally harmful emissions of all fossil fuel energy sources and thus will be the prime energy source of the 21st century. Its emission of sulfur oxides (SO\textsubscript{x}), nitrogen oxides (NO\textsubscript{x}), and carbon dioxide (CO\textsubscript{2}) is considerably lower than those of coal per unit heat value (Figure 1).

The proven reserves of natural gas calculated by projected field life (proven reserves to annual production or r/p ratio) totals 68 years, compared to 43 years for oil and 235 years for coal. Due to advanced exploration technology, the proven reserve of natural gas is growing rapidly. The reserves of natural gas are well diversified geographically – 30% are in the Middle East, and 40% are in the former Soviet Union (FSU), primarily the Russian Far East and Siberia. In contrast, 70% of petroleum reserves are concentrated in the Middle East (Figure 2).

Historically, the world’s primary source of energy shifted from wood to coal to petroleum, a transition which resulted in changes of lifestyle, economic development, and increased world population. The energy supply in the first half of the 21st century is forecast to depend largely on natural gas, because of growing concern with unhealthy air, industrial waste, and environmental degradation.

Demand and Supply of Natural Gas

The International Energy Agency (IEA) forecast that the world’s total demand for primary energy would increase from 8,080 million crude-oil-equivalent (coe) tons in 1993 to 11,793 million coe tons, or by 2.2% per annum, while the demand for natural gas
would grow more rapidly at 2.9% per annum during the same period. This growth of demand for natural gas will be much faster than that for oil, coal, nuclear- and hydro-energy sources.

Figure 1
Environmentally Clean Natural Gas
(Combustion of natural gas compared with oil and coal; coal=100)

Figure 2
Regional Distribution of Natural Gas (1994)
The Japanese Ministry of Trade and Industry’s Comprehensive Energy Research Board estimated that overall demand for primary energy in Asian countries (Japan, China, Taiwan, Korea, and six of the ASEAN nations) would grow from 1,502 million coe tons in 1992 to 3,009 million coe tons in 2010, or at a 3.9% annual rate of increase, while the demand for natural gas would expand at a more rapid 5.9% annual rate due to the rapid increase in demand from power generation and industrial use (Figure 3). The growth in total demand for oil in Asian countries will increase oil imports from outside the region to about 70%, of which most will be from the Middle Eastern countries (Figure 4). At the same time, natural gas imports from outside the region will increase only to about 27% by 2010 (Figure 5).

Theoretically, the shortfall in natural gas supply within the region could be made up by imports from the Middle East and the FSU. However, the “energy security” of the region would be enhanced by importing the bulk from the FSU. Thus, natural gas should be recognized as a “strategic resource” rather than a simple energy source.

Transmission of Natural Gas

Eighty percent of the world’s natural gas transmission is through an international pipeline located mainly in Europe and North America. The balance of 20% is carried by LNG tankers largely to the Asian Far East (Figure 6). Main natural gas pipelines currently in operation total 800,000 km in Europe, and 440,000 km in the United States. However, in Asia the only transnational pipeline is between Malaysia and Singapore (Figures 7 and 8).

Natural gas pipeline transmission is more economical for distances shorter than 5,000-7,000 km, while LNG tanker shipping is economical over distances more than 5,000-7,000 km (Figure 9). Therefore, the development of an Asian pipeline system would greatly enhance the efficiency of natural gas transmission from Central Asia, Eastern Siberia, and Sakhalin, as well as from ASEAN countries and Australia.
Figure 3
Asia’s Primary Energy Demand Projection

Crude-Oil Equivalent Million Tons

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Oil</th>
<th>Gas</th>
<th>Nuclear Hydro etc</th>
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<tr>
<td>1980</td>
<td>900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>2000</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3009</td>
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</tr>
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</table>

Figure 4
Asia’s Oil Consumption, Production and Dependency on Outside Regions

Crude-Oil Equivalent Million Tons

<table>
<thead>
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<th>Year</th>
<th>Consumption</th>
<th>Production</th>
<th>Dependency on Outside Region</th>
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<tbody>
<tr>
<td>1980</td>
<td></td>
<td></td>
<td>50.4%</td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td></td>
<td>55.4%</td>
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<tr>
<td>2000</td>
<td></td>
<td></td>
<td>62.9%</td>
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<tr>
<td>2010</td>
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<td>69.2%</td>
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</table>

Figure 5
Asia’s Natural Gas Consumption, Production and Dependency on Outside Regions

Crude-Oil Equivalent Million Tons

<table>
<thead>
<tr>
<th>Year</th>
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<th>Production</th>
<th>Dependency on Outside Region</th>
</tr>
</thead>
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<tr>
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</tr>
<tr>
<td>1992</td>
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<td></td>
<td>9.0%</td>
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<tr>
<td>2000</td>
<td></td>
<td></td>
<td>10.0%</td>
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<tr>
<td>2010</td>
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<td>12.0%</td>
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</table>

出所：1980年、1992年は、IEA "ENERGY BALANCES OF OECD COUNTRIES"、"ENERGY STATISTICS AND BALANCES OF NON-OECD COUNTRIES".
資料：総合エネルギー調査会 国際エネルギー部会合同報告(1996)
There is no technical obstacle to the laying of pipelines, including trans-ocean pipelines. The technology for the latter was proven by the Trans-Mediterranean Pipeline laid in 600 m of water.

The Idea of An Asian Energy Community

Considering the growing natural gas demand and the underdeveloped energy infrastructure in Asia, it is necessary to organize an international community—an "Asian Energy Community"—whose goals should be to secure a stable supply of energy, to achieve efficient, environmentally safe use of energy, to avoid excessive external dependence on energy, and to enhance Asian regional security through interdependence.

The Asian Energy Community would carry out the following tasks:

- Develop or promote and supervise a Trans-Asia Natural Gas Pipeline System (Figure 10);
- Explore new oil and gas fields by transferring oil and gas exploration technology;
- Enhance environmental protection by transfer of the technology of pollution control in coal-fired power generation;
- Transfer safe nuclear power technology; and
- Achieve, through technology transfer and infrastructural developments, the optimal distribution of a co-generation power system by developing hydropower and high-voltage power lines.

The development of a Trans-Asia Pipeline System will greatly contribute to intraregional economic development as well as global environmental protection. And it will benefit the national security of each country as well as regional peace in Asia. It will also contribute to the expansion options for energy acquisition from the Russian Far East and Eastern Siberia, bringing wider access to greater natural gas reserves, and reducing excessive energy reliance on the Middle East. Northeast Asian countries should take the initiative and leadership in organizing an Asian Energy Community.
Northeast Asian Pipeline

The master plan for the Northeast Asian Pipeline Network is shown in Figure 11. Major sources of gas are northern Sakhalin, Sakha, Irkutsk (West Baikal), and Turkmenistan. These natural gas fields are about 2,000 to 4,000 km away from China, the Republic of Korea, and Japan, and are thus economic for pipeline transmission. The development of natural gas and corresponding pipeline transmission systems at West Baikal in Irkutsk and northern Sakhalin are in the forefront of the development of international pipeline networks in Northeast Asia as these projects are actually underway.

Northeast Asian pipelines can be classified into three categories at the conceptual level—international transmission pipelines, international open access pipelines, and national trunk pipelines. International transmission pipelines are long-distance gas transportation systems that convey gas from wellheads to consuming areas. The Irkutsk and Sakhalin pipelines are good examples.

International open access pipelines are the trunk pipelines connecting many gas-consuming areas across borders. Their utilization is dependent on the “Open Access Rule,” i.e., whoever owns natural gas can use them to distribute and sell the gas. I propose three “Ring Pipelines” of this type in Asia (Figure 12)—the Sea of Japan Ring Pipeline, the Yellow Sea Ring Pipeline, and the East China Sea Ring Pipeline. National trunk pipelines are domestic trunklines in each country. In Northeast Asia, the Republic of Korea and Taiwan have such national trunklines.

Figure 6
World’s Natural Gas Trades
Figure 7
Europe

Figure 8
North America

Figure 9
Economic Comparison; Pipeline Transmission vs. LNG Tanker

<table>
<thead>
<tr>
<th>Distance (Km)</th>
<th>Cost/Unit of Gas (High Cost Gas Pipeline)</th>
<th>Cost/Unit of Gas (Low Cost Gas Pipeline)</th>
<th>LNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
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<td>10000</td>
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</tr>
</tbody>
</table>

(An Overview of the Natural Gas Industry)
Figure 10
Asian Energy Community Trans-Asia Pipeline Concept

Legend

- Gas Field
- Main Pipeline
- Branch line

Total length: 45,000km
Total construction cost: ¥ 7 trillion
Conclusions

Each country in the region must fully discuss the role of energy supply and demand in its energy future and take action based on a consensus. Each country should understand that natural gas will play an important role in energy policies and that the promotion of an intraregional distribution of natural gas through the development of a pipeline network will contribute to the sustainable development of the region. Each country will need to determine which projects are feasible and essential for the region, and arrange the projects in order of priority. It will be crucial to study and discuss international rules or regulations concerning the system, its technology, and its operation. For such discussions, I propose that the concerned countries establish an intergovernmental forum at the ministerial level, which could evolve into an official intergovernmental organization—the Asian Energy Community.
The Northeast Asian Natural Gas Pipeline would be a basic infrastructure project that spans several countries. The realization of this project will crucially depend on the cooperation of each country, or its government and private sector. In the construction phase, the required funds and pipeline technology must be actively transferred across borders by international or national financial organizations. The establishment of a Northeast Asian Development Bank could play an important role in such financing.

The development of natural gas resources and the proposed pipeline would be mutually beneficial for all countries concerned. For example, in the Irkutsk Project, Russia is offering its natural gas resources and earning money for its regional development. The United States can offer its advanced natural gas exploration and pipeline technologies, and in turn earn money and market access. Japan and South Korea can offer a huge gas market and development funds, and in turn receive Russian natural gas for the enhancement of their energy security. China can offer a huge potential gas market and secure transit of gas for Japan and the Republic of Korea, and in turn receive Russian natural gas as well as transit revenues. The Democratic People’s Republic of Korea and Mongolia can secure transit of gas for China, Japan, and the Republic of Korea, and in turn earn transit revenues as well as increase their potential for development.
Figure 12
Northeast Asia Triple "Ring Pipeline" Plan
ANNEX I

Japan's Main Domestic Gas Main Pipeline Projects

The forecast of the long-term energy balance of Japan, prepared by the Japanese Ministry of Trade and Industry’s Comprehensive Energy Research Board in June 1994 should be revised for two reasons:

1. Overall energy demand is growing more rapidly than the forecast due to insufficient energy conservation; and

2. Nuclear energy production will be substantially delayed due to technical and operational problems at several nuclear power plants in Japan (Figure 1-1). The shortfall in the energy balance can be made up by expanding the natural gas supply.

Fig. 1-1 Forecast of Long-Term Energy Balance in Japan
Japanese importation of crude oil is heavily dependent on Middle East supplies, and will continue to be so. On the other hand, Japan's importation of natural gas in the form of LNG relies mostly on Southeast Asian sources (Indonesia, Malaysia, and Brunei). Although new natural gas fields are being explored in the Middle East, overdependency on Middle East supplies will become a great threat to Japan's national energy security. Therefore, in the interest of national energy security, new international natural gas pipelines should be built between Eastern Siberia, the Russian Far East, and Japan.

To fully and effectively utilize these pipelines from the Northeast Asian gas fields, Japan's main domestic gas pipeline system must be in place. The development of a main domestic pipeline system is necessary to reform the inefficient domestic energy transportation system, and benefit consumers. For this reason, a feasibility study based on the research results of the National Pipeline Research Society of Japan should be started as soon as possible.

Japan has only 2,000 km of pipeline, developed mainly by domestic gas exploration companies due to few domestic gas fields, insufficient inland demand for natural gas, and the high cost of pipeline construction in Japan. Major European and North American countries, as well as Taiwan and South Korea, already own complete natural gas main systems.

The share of a pipeline system used in total domestic cargo flow (tonnage times mileage or ton-km), including oil, in major industrial countries is 11.4% in France (1991), 7.5% in Germany (1992), 8.2% in Italy (1992), 5.6% in the United Kingdom (1992), and 20% in the United States (1991); compared with 0.4% in Japan (1992 estimate).

The proposed domestic gas main pipeline grid could be completed between 2005 and 2020. It would consist of three trunklines—Japan Sea Vertical Import Gas Main, Pacific Coast Marketing/Distribution Gas Main, and Interconnecting Horizontal Gas Quasi-Mains. The construction costs of the former two coastal lines are estimated at ¥1.3 trillion and ¥2.2 trillion, respectively, bringing the total gas main pipeline budget to ¥3.5 trillion (Figure 1-2).
Figure 1-2
Domestic Gas Main Pipeline Project
Annex 2

Natural Gas Transportation by Northeast Asian Pipelines

A rough estimation of the projected gas tariff has been undertaken by the National Pipeline Research Society of Japan. The gas sources are considered here as: (a) around Ashkhabad in Turkmenistan, (b) around Yakutusk in the Sakha Republic in Eastern Siberia, and (c) around Irkutsk including Koviktinskoye gas field in West Baikal. The consumers are considered to be China, Mongolia, North Korea, South Korea, and Japan. The three pipeline routes analyzed are: (A-line) Ashkhabad-Urumqi-Lanzhou-Xian-Lianyungang-Mokpo-Kitakyushu; (B-line) Sakha-Ayan-Sakhalin-Wakkanai; (C-line) Irkutsk-Beijing-Rizhao-Mokpo-Kitakyushu; and (D-line) Irkutsk-Beijing-Shenyang-Pyongyang-Seoul-Pusan-Kitakyushu, as shown in Figure 2-1.

Fig. 2-1 Examples of Pipeline Routes

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1 Quoted from Masaru Hirata. Development of Natural Gas Pipeline Network in Northeast Asia, 2nd International Conference on Northeast Asian Natural Gas Pipeline, Beijing, September 1996.
All lines would use pipes of API 5L X-65 material, 40-56 inches in diameter and 16-24 mm in thickness, transporting 20 billion cubic meters (bcms)/year for the A-line, and 20 bcm/year for the B-line and, in the case of the C- and D-lines, 20 bcm/year delivered for China, 10 bcm/year delivered for North and South Korea, and 10 BCM/year for Japan. The total length of the A-line is estimated at 7,475 km, the B-line at 2,950 km, the C-line at 4,870 km, and the D-line at 4,645 km.

The construction costs are different depending on the type of terrain—desert, flat, rocky mountain, swamp, and marine. The costs are roughly estimated as 0.008 M$/inch-km for the desert, 0.011 M$/inch-km for rock and swamp, and 0.05 M$/inch-km for marine. As an example, for the A-line route, the length in the desert is approximately 4,450 km, over rocky mountains is 1,925 km, and undersea, 1,100 km. The construction period is estimated at five years and the project period is twenty years.

The total construction costs are estimated for a Rate of Return (IRR) at 13%. The grand total of construction costs for the A-line would be US M$22,550, for the B-line US M$9,950, for the C-line US M$14,410 (under the East China Sea), and for the D-line (the Korean Peninsula Line) M$13,280. Thus, if the wellhead price of gas is 0.5$/MMBTU or 0.02 S/m³, the gas tariff would be 4.69 $/MMBTU or 0.19 S/m³ at Kitakyushu for the A-line, and 227 $/MMBTU or 0.09 S/m³ at Wakkanai for the B-line. In the case of the C- and D-lines, the transportation costs from the Koviktinskoye gas fields to Irkutsk (400 km) should be added to the wellhead gas price. If the gas price at Irkutsk is 1.0 $/MMBTU, the gas tariff at Beijing would be 1.80 $/MMBTU or 0.072 S/m³. For the C-line under the East China Sea, the gas tariff at Kitakyushu would be 4.53 $/MMBTU or 0.18 S/m³. For the D-line via the Korean Peninsula, the gas tariff at Seoul would be 2.31 $/MMBTU or 0.092 S/m³ and at Kitakyushu, 3.26 $/MMBTU or 0.13 S/m³. The gas tariff at Kitakyushu is approximately 1.3 $/MMBTU or 0.05 S/m³ lower for the Korean Peninsula route as compared to that under the East China Sea. These tariffs are feasible because the recent C.I.F. price of LNG (liquefied natural gas) in Japan is approximately 3.8–4.0 $/MMBTU or 0.15–0.16 S/m³. When the evaporation cost is added to these values, the final supply cost is around 6–7 $/MMBTU or 0.24–0.28 S/m³ (Figure 2-2).
These estimates do not include transit royalties which are usually paid to third countries. Following European examples, it is assumed that transit royalties would be about 0.03 $/MMBTU per 100 km. Also, withdrawal of gas by the transit country should be considered. The results including these factors are summarized in Figure 2-3.
Fig. 2-3 Rough Estimates of Gas Tariffs from West Baikal (Unit: $/MMBTU)

- **Irkutsk**: 1.00
  - 0.50 + 0.36 (Mongolia)

- **Beijing**: 2.16
  - 20 BCM/year (China, Mongolia)
  - 1.48 + 0.53 (China)
  - 0.80 + 0.66 (China, North Korea)

- **Mokpo**: 4.17
  - 10 BCM/year (Korea, NK)
  - 1.25

- **Seoul**: 3.62
  - 10 BCM/year (Korea, NK)
  - 0.66 + 0.10 (Korea)

- **Kitakyushu**: 5.42
  - 10 BCM/year (Japan)

**Note:** "+" figures indicate "transit royalty" payable to transit countries

**Europe-Maghreb International Pipeline**

The construction cost for the Europe-Maghreb International Pipeline decreased 35% from the initial estimate. If there were a similar decrease in construction cost for the Trans-Asian gas pipeline, the final gas tariff would be reduced by about 20%. This cost would be sufficient to compete with LNG.
Regional Cooperation in Northeast Asia's Energy Sector: Some Possibilities

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The Positive Political Context

We are now witnessing a transformation of the political system in Northeast Asia. As survival has ceased to be the prime concern of states, their quest for relative gains has become less driven and consistent. Most Northeast Asian governments are now more motivated toward maximizing wealth than territory, and their increasing economic interdependence may make outright conflict too costly. Moreover, with the development of political multipolarity and the opening of once-closed economic systems, economic relationships have begun to develop a more "natural" pattern. As a result, the trans-Pacific economic axis—so prominent in the Cold War era—is being gradually modified by more multidirectional intra-Asian relationships. Indeed, economic interaction across ideological and political boundaries is creating a "soft" regionalism in Northeast Asia—one which lacks organizational structure but which is accepted and even encouraged by governments. Some argue that state behavior can now best be understood in the context of international institutions that both constrain states and make their actions more predictable. At the least, this intraregional multidirectional pattern implies a more diversified set of cooperative and conflictual economic relations in much of the North Pacific, creating a need for rules, codes of conduct, and harmonization of domestic practices affecting international transactions—in short, regional regimes and institutions.

Present positive political trends provide an unparalleled opportunity to think boldly and to be innovative about regional regime building in Northeast Asia. Indeed, the world and the Asia-Pacific region in particular are witnessing a renewed interest in multilateralism. Some argue that multilateral norms and institutions can make significant contributions toward stabilizing the peaceful transformation of the international system and that they are likely to become increasingly important in the
management of change at the regional level. Further, regional arrangements can render great service by contributing to a deeper sense of participation, consensus, and democratization in international affairs. Developing states in particular are increasingly attracted to regional arrangements because of their growing political maturity, and because they perceive the potential of regionalism to promote their economic development and to mitigate their disadvantaged position in the international system. Already a thin net of economic, environmental, and, to a lesser degree, political institutions is spreading over the region, but within a broader Asia-Pacific framework.

The success of multilateralism will enhance the possibility of lasting peace and stability in the region. Indeed, the first step toward the peaceful settlement of international conflicts is the creation of a sense of international community. The creation of such a community presupposes at least the mitigation and minimization of conflict so that the interests and common needs shared by different nations outweigh the interests separating them. Common recognition that even a poor regime is better than none compels nations to collaborate to the extent of developing a minimally satisfying solution. The challenge for the region then is to find a variety of multilateral arrangements that will demonstrate that a habit of dialogue and working together can build common security. Tactical learning—in which the behavior of states towards cooperation is changed—must be replaced by complex learning in which values and beliefs about reaching goals through cooperation are changed.

A multilateral functional approach, e.g., in the energy sector, could help the growth of positive and constructive common work and of common habits and interests, decreasing the significance of political boundaries by overlaying them with a natural growth of common activities and administrative agencies. Indeed, it could build confidence, dampen frontier tensions, and improve relations in this region so critical to world peace and prosperity. This paper poses some possibilities for regional cooperation in Northeast Asia's energy sector.
A Northeast Asia Energy Forum?

The uneven distribution of major production factors among the Northeast Asian countries paradoxically indicates that mutual benefits can be derived from energy cooperation among the countries. Russia, China, and perhaps Mongolia have large oil and gas prospects but need capital, advanced technology, and know-how for their exploration and development. Japan, Taiwan, and South Korea have the necessary capital, technology, and know-how and they also need alternative supplies to lessen their heavy dependence on Middle Eastern oil. The mutual benefits would not only be economic. For example, a gas pipeline from Russia through North Korea to South Korea and Japan could only be undertaken through a pan-Northeast Asian agreement on energy which would clearly contribute to better relations.

There are numerous proposals to harness the capital, advanced technology, and know-how of Japan, Taiwan, and South Korea to develop energy resources in developing Northeast Asia and thereby link the region in an “energy community.” Competing and overlapping proposals for multinational gas pipeline links include the Asia-Pacific Energy Community, The Vostok Plan, The Energy Silk Route Project, The Irkutsk Gas Project, and the Trans-Asian Gas Pipeline Network (Figure 1). These proposals all face serious political, economic, technical, and environmental obstacles that must be overcome if any are to be implemented. In this context a Northeast Asia Energy Forum could foster discussions aimed at resolving or overcoming some of these obstacles and contradictions. It could also explore the pros and cons of a Northeast Asia Energy Charter, a Northeast Asia Energy Treaty, multilateral regimes for nuclear energy security and safety, multilateral regimes for marine environmental protection, and general guidelines for joint development of overlapping maritime claim areas.

A Northeast Asia Energy Charter?

A possible model for Northeast Asian energy cooperation already exists—the European Energy Charter. The European Energy Charter Treaty was signed by 41
countries and the European Community in Lisbon on 17 December 1994. The signatories will eventually include almost all the countries of Europe, both East and West, and all the countries of the former USSR region, as well as Japan, Australia, Canada, and three Mediterranean countries.

The Treaty creates an international framework of legal safeguards within which companies can invest, operate, and trade in the energy sector of all Charter countries. This cooperation is expected to improve energy supply; improve the environment by increasing the efficiency of energy use; open the way to new business opportunities; and catalyze economic recovery in eastern Europe. This is the first multilateral treaty of such wide scope for one particular economic sector—a fundamentally new approach.

The European Energy Charter initiative began with the goal of helping the then Soviet Union to establish a cycle of real economic activity by focusing on the energy sector, where there was a natural complementarity between the very large energy resources and energy systems of eastern Europe, and industrial strength, technology, and investment funds available in western Europe. This is of course similar to the current situation in Northeast Asia.

The Charter (which is important to distinguish from the Energy Charter Treaty) is basically a political declaration that the signatories will promote mutual investments, trade, and cooperation in the energy field. It emphasizes the role of industry and the creation of an open international energy market. Northeast Asian countries might consider a similar multilateral approach to cooperation in the energy sector.
Figure 1
The revised Asia-Pacific Energy Community Plan for a natural-gas pipeline grid

Source: Proposal by Professor Masaru Hirata, National Pipeline Research Society of Japan, June 1993; Map 6.2 in Paik, supra, n. 12, p. 184.
A Northeast Asia Energy Treaty?

Since the key to the success of the European Energy Charter will be industry’s willingness to invest and operate in the developing parts of Europe, it was considered essential to go beyond the Charter and create a framework of legal safeguards for companies’ operations—similar but in particular respects more ambitious than the safeguards already in existence in the West. It was therefore recognized in the Charter itself that a legally binding agreement needed to be negotiated. The European Energy Charter Treaty (EECT) is that agreement.

A similar approach might be considered by Northeast Asian countries. An Energy Treaty would not be an aid program, nor would it be an attempt by governments to plan energy developments. Rather, it would be an instrument for determining the behavior of governments toward industry, entered into voluntarily but binding on the governments concerned. The Treaty would be impartial between developing and developed Northeast Asia. For instance, its safeguards could apply to Russian companies investing outside Russia, as well as to foreign companies investing in Russia. As in the EECT, some of the protection provided for foreign energy investors could be based on the OECD Investment Code negotiated between the Western countries which are members of that organization. But those rules could be extended to developing Northeast Asian countries. The investment provisions of the EECT actually go well beyond OECD rules and, what is more, are legally binding, unlike OECD rules.

A new concept introduced in the EECT and which could be considered for a Northeast Asia Energy Treaty is National Treatment. This means that governments must treat foreign energy investments at least as well as the investments made by their own national companies. In other words, once established in a country, a foreign 'Charter' company could not be discriminated against in any way. This would be a very powerful incentive for companies assessing the risk of committing their resources to a particular overseas venture in the energy field. The concept of National Treatment had been under discussion for some years in the OECD between Western countries, without agreement being reached. The successful negotiation of National Treatment in the EECT illustrates
the advantages of concentrating on one particular industrial sector, rather than trying to negotiate common investment rules for the whole economy.

For the EECT, there were also intensive negotiations on the concept of *National Treatment* for the 'pre-investment' phase, or, in other words, for the right to invest—for instance the right to explore for and produce oil. The EECT commits its signatories to negotiate a second Treaty providing *National Treatment* at the pre-investment stage before 1 January 1998. In the meantime, however, the EECT allows any country to commit itself voluntarily to accord *National Treatment* at the pre-investment stage. Such commitments, although voluntary, will be legally binding and irreversible.

The EECT also provides an example of how to address trade issues. In broad terms, such a Treaty can have the effect of treating those signatories which are not members of GATT as if they were GATT members—only, of course, for energy trade. In other words, the probable GATT membership of countries such as Russia at some future time could be anticipated as far as the energy sector is concerned. This means, generally speaking, that the non-GATT countries would, for energy, have all the rights of GATT membership, and also accept the obligations of GATT membership. The results of the recent ‘Uruguay Round’ negotiations could also be taken into account in later negotiations.

Another feature of possible relevance to a Northeast Asia Energy Treaty would be a ‘tariff standstill’, or more strictly speaking, a ban on any signatory country raising its import or export duties on energy products. In the EECT, this limitation is voluntary rather than legally binding, but the signatories committed themselves to begin negotiations this year on legally binding ‘standstill’ rules. There will also be negotiations this year with the aim of including the results of the recent Uruguay Round negotiations in the treaty, and extending the Treaty’s trade rules to cover energy equipment.

Transit is a particularly important question for energy investors in Northeast Asia. It would be futile for a company to have the right to invest in energy production, and the ability to trade that production in the world market, unless it could send its gas, electricity, or oil through third countries to the markets of its choice. An example of this would be a company producing natural gas in Russia and wanting to sell that gas in, say
South Korea, after transmission by pipeline through, for instance, Mongolia and China. Like the EECT, a Northeast Asia Energy Treaty could require governments to allow such transit or, in the event that the necessary transmission capacity is not available, to allow such capacity to be built on its territory—subject, of course, to the usual planning procedures. The Treaty could also forbid countries, in the event of a dispute, e.g., over transport charges, to interrupt an energy transit that is already taking place without first submitting the dispute to conciliation procedures.

A Northeast Asia Energy Treaty could also commit its members to responsible behavior in the energy-environment field. This provision could establish the basis for integrating environmental concerns into future multilateral policy discussions. Protocols could also address cooperation in energy efficiency and nuclear safety.

It is not clear whether Northeast Asia Energy Treaty commitments should be enforceable as in the EECT. Under the EECT’s dispute procedures, a company which believes that it is not being treated in accordance with the Treaty by its host government can take that government to international arbitration. Alternatively it can ask its parent government to do so on its behalf. This obviously is a key point in ensuring investment confidence.

The terms of a Northeast Asia Energy Treaty could be applied provisionally from the time of signature, subject to any limitations in national constitutions or laws. Like the European process, the Charter Conference could become a standing body meeting two or three times a year to review progress. It could be supported by a Charter Secretariat headed by a Secretary General and made up of staff from both suppliers and consumers. The Secretariat could also be required by the Treaty to cooperate with other international organizations in the energy field and to make maximum use of their work.

By encouraging investments and energy trade, a Northeast Asia Energy Treaty would improve energy supply and security in world markets. But it would also yield major environmental benefits by promoting the transfer of technologies and know-how in the energy efficiency and energy-environment fields. Such a Treaty would also create major business opportunities for both Northeast Asian and Western companies. Above all, a Treaty would give substance to the concept and objective of underwriting economic
prosperity in the developing countries of Northeast Asia by catalyzing a cycle of real economic growth.

However, the introduction of such institutional arrangements in Northeast Asia, which has no history of multilateral cooperation, would be a major undertaking, and finance and project-development issues would be magnified.\textsuperscript{12} Although it is difficult and dangerous to transfer experience from one region to another, initially, two fundamental ideas adopted by the European Energy Charter might be considered for Northeast Asia. One would be to promote a consensus in all Northeast Asian countries on the central objectives of energy policy, such as energy saving, diversification of supplies, integration of networks, nuclear safety, and environmental protection. The other would be to create a political, legal, and if necessary, financial instrument to include substantial transfers of capital, management ability, expertise, and technology necessary to rational development of the medium- and long-term supply and consumption of energy in Northeast Asia.

A Northeast Asian Council on Petroleum?

Northeast Asian countries might also draw lessons from the ASEAN Council on Petroleum (ASCOPE).\textsuperscript{13} ASCOPE was formed in 1975 to promote and extend cooperation among state oil companies/agencies in each ASEAN country. The Council consists of the heads of each national company/agency. Its impetus was the 1973 oil shock and thus an emergency petroleum sharing scheme was its first priority. Its major thrust was the priority provision of oil by producers to consumers during times of worldwide shortage, and the priority purchase of oil by consumers from producers during a glut. However, data and technology exchanges and joint training programs soon followed, becoming more comprehensive every year. ASCOPE sponsors an annual Technical Conference which has become the nexus of oil and gas discussions in the region. And ASCOPE laid the groundwork for an ASEAN Committee on Energy comprised of the Ministers of Energy of each country which pursues technical and policy cooperation.
There are oil and gas complementarities in Northeast Asia which are similar to those in ASEAN. Data and technology exchange in petroleum exploration, development and utilization, joint training programs, policy discussions, and a major annual conference could be a big boost to cooperation in this sector and lay the foundation for more difficult areas of cooperation such as joint development of petroleum in areas of overlapping maritime claims, as well as broader cooperation in the entire energy sector.

A Multilateral Regime for Nuclear Energy Security and Safety

The development of nuclear energy is well underway in the region. Indeed, more than half a dozen countries in Asia are determined to develop nuclear power generation as one alternative source of energy. Japan now has 50 reactors in operation, satisfying one-third of its electricity needs. South Korea has nine reactors operating, meeting 40% of its electricity needs, and is expected to have as many as 23 reactors by 2006. China, with three reactors now, is expanding its nuclear power program, and may have 16 to 18 reactors with a total capacity of roughly 16 GW in the first quarter of the 21st century, accounting for more than 10% of its energy mix. And North Korea will acquire two light-water reactors sometime early in the next century if KEDO arrangements proceed as planned.

It can be argued that already the most advanced sector in the Northeast Asian regional cooperation process is the nuclear energy sector, in particular KEDO. Viewed from one perspective, KEDO involves major powers such as Japan and the United States and a middle power, South Korea, in the provision of energy to a recipient country, North Korea. The process of consultation and agreement among high-level policymakers, the creation of a multilateral organization, the raising of capital, and the formation and transnational operation of multilateral technical teams may serve as a precedent and model for geographically and substantively broader regional cooperation in the energy sector.

For example, all these entities have or will have nuclear waste disposal problems. Indeed, Taiwan’s intent to ship its nuclear waste to North Korea has mushroomed into a
major political controversy. And the UN General Assembly agreed to include a special clause in the closing document of the Earth Summit which stipulates opposition to "transboundary" transportation of radioactive waste. While this statement is advisory only, Japan and Russia, which transport and dispose of nuclear waste, would be affected by any such ban.

Also, Asia already has to plan for the worst scenario—an accident involving a vessel carrying high-level nuclear waste. For example, Japan ships plutonium from France to fuel its nuclear power plants. The shipments follow a route around the Cape of Good Hope, across the Indian Ocean, and on to Japan. The movement by sea of this highly radioactive material is clearly of considerable environmental and health concern to countries along the shipping route. Environmental critics worry that containers of plutonium oxide powder are not guaranteed to withstand temperatures of more than 800 degrees centigrade, a temperature sometimes exceeded by fires at sea. Moreover, should the cargo ship sink, the pressure of water in the depths of the ocean might crush the casks and release the plutonium. There is also concern that the Japanese shipments may open the door to worldwide commercial traffic in one of the most toxic substances on earth. For example, South Korea and Taiwan may want to start shipping spent nuclear fuel from their reactors for reprocessing into plutonium and have it returned by sea.

The problem is that, given growing environmental consciousness, governments may eventually perceive they have a responsibility to protect their living resources and the health of their citizens from the possible effects of such activities. Although freedom of navigation in the Exclusive Economic Zone is enshrined in the UN Convention on the Law of the Sea, not all Asian countries have ratified the Convention. The eventual result could be "creeping" jurisdiction which in effect bars vessels from carrying environmentally-risky energy materials like oil and nuclear waste from particularly congested or shallow straits and archipelagic sea-lanes. The main effect would be higher costs for insurance and the diversion of such vessels to longer routes.

Because all Northeast Asian countries are either actual or potential major energy material importers and/or exporters, any restrictions on traffic in energy materials would not be in their interest. To avoid this scenario, the Northeast Asian countries could
establish a cooperative regime and even an institution to address these issues within, and if necessary, outside of Northeast Asia.

In particular, cooperation in nuclear energy security and in nuclear waste disposal is a possibility. A regional system for secure and safe transport and storage of nuclear fuels, both fresh and spent, is needed. Given the region’s projected scale of nuclear power commitment, the questions of operational safety, adequate storage, and proliferation dangers should also be addressed. The prospective broadening of nuclear power usage to remote areas and localization of many aspects of nuclear plants will also pose problems.

Although there is not necessarily a link between broad civilian use of nuclear power and the proliferation of nuclear weapons, there are potential linkages, and they depend very much on the sort of reactors that are built and the form of supervision provided for spent fuel. As stockpiles generated by civilian nuclear programs increase, and mutual suspicions regarding others’ nuclear intentions rise, there is a danger of a nuclear arms race. One possibility is the establishment of a regional framework like Euratom, in this case an Asia-Pacific Atomic Energy Organization “PACATOM” or “Asiatom,” in which countries sharing common concerns and interests can discuss decisions which may affect them.

Regarding safety of navigation and energy sea-lane security, one can envision piracy problems being effectively addressed in regionwide or, much more likely, subregional “safety at sea” agreements which would also address other common civil maritime problems like search-and-rescue, environmental protection, drug trafficking, and illegal refugees. For future consideration is an international coast guard or naval force to ensure safety of navigation, protection of sea-lanes, and the protection of the marine environment.

A Multilateral Regime for Marine Environmental Protection?

Three recent events have underscored the need for cooperation in the prevention and management of marine pollution and the general protection of the marine
environment—an under-appreciated resource. The first was the news that the former Soviet navy had dumped 18 decommissioned nuclear reactors and 13,150 containers of radioactive waste from 1978 to 1995, most of it in the Sea of Japan (East Sea). This created an uproar in the world environmental community. It particularly jolted nuclear-sensitive Japan and South Korea, and drew comments from North Korea as well. This shock may have been the critical spur needed to forge cooperation in marine environmental protection among the coastal countries. The initial report of Russian dumping has prompted cooperation to deal with this specific issue at hastily arranged bilateral Japan/Russia meetings of relevant ministers and experts, proposals for joint South Korea/Japan/Russia surveys at specific dump sites, and a call by Japan for an international cooperative fund to help Russia treat its nuclear waste. North Korea offered to host an international seminar on regimes for marine pollution control.

In March 1994 a joint Japan-South Korea-Russia-International Atomic Energy Agency expedition began a search for signs of radioactive waste contamination in the Sea of Japan (East Sea). The scientists used a Russian vessel and shared the costs of the expedition equally. Adding fuel to the fire, it was subsequently revealed that chemical munitions were also dumped up until the mid-1980s in the Seas of Japan (East Sea) and Okhotsk. Although most scientists agree that the dumped waste provides no immediate threat to the environment or humans, the longer-term effects are unknown, particularly after the containers corrode. Obviously, a long-term cooperative research program is required to monitor the waste and its effects, and to determine the best methods of dealing with it.

The second possibly catalytic event was the January 1997 accident involving the Russian tanker Nakhodka which broke in two in the Sea of Japan (East Sea) and spilled much of its 19,000 tons of fuel oil, which then blanketed the southwestern coast of Honshu causing severe environmental damage estimated preliminarily at 7 billion yen. The third event was the release of 390,000 gallons of crude oil from the Diamond Grace in Tokyo Bay. The oil left a 3.5 mile-long slick and spread fumes that sickened people along the coast. These incidents have created an awareness among both the populace and policymakers that these problems must be urgently addressed.
However, existing marine environmental protection regimes are not sufficient to resolve the problem. They suffer from redundancy, a myopic focus on only national nearshore waters, lack of coordinating mechanisms, and a varying quality of pollution monitoring and clean-up. An ideal marine environmental regime should end the redundancy and coordinate policies and regulations for transnational features and processes, e.g., ocean current systems and ecological zones. Since the causes and consequences of marine pollution in both coastal and open-sea areas are poorly understood, a regime should also provide for baseline studies, monitoring, and pollution prevention and cleanup. It should also educate policymakers and the public as to the distribution, causes, and consequences of marine pollution. Perhaps more important, any arrangement must help upgrade the capacities of North Korea, China, and perhaps Russia to assess, monitor, and combat marine pollution. Indeed, this technical assistance may be the major incentive for them to participate. More scientific knowledge could also help allay developing countries’ fears that more advanced nations are trying to make them pay for developed country pollution or make them less competitive by diverting resources from economic development.

Because the seas are linked both physically and ecologically and because not all Northeast Asian countries border both seas, there should be an overarching consultative mechanism that includes all Northeast Asian entities but consists of two working committees, one covering the Sea of Japan (East Sea) and the other the Yellow Sea/East China Sea. Japan should be included in the latter regime at an early stage because of its fishing, oil development, and shipping interests in the Yellow Sea, the apparent relationship of the waters and ecosystems, and because of its ability to supply money, technology, and knowledge to the regime. Each country would manage its own waters, but a loose consultative mechanism should discuss common policies, cooperative research, education, and training. To decrease sensitivities, areas of overlapping claims around the Kuriles/Northern Territories, Tok Do/Takeshima, and the Senkakus/Diaoyu might be initially excluded from the purview of the consultative mechanism. To avoid inflaming the China/Taiwan issue, Taiwan might be included only as an observer.
This framework could help develop cooperation in environmental monitoring, harmonize the legislation of the parties, transfer pollution control technology, and fight pollution—especially spills from vessels or offshore drilling. One priority might be the synthesizing of information on pollution and dumping in Northeast Asian seas, perhaps resulting in a dynamic computer-based atlas of ecology and pollution in Northeast Asian seas. The parties might work on the regional level in cooperative projects for environmental impact assessment training, marine parks creation, wetlands management, and control of industrial, agricultural, and domestic wastes. The ultimate goal is similar environmental legislation in each country and an umbrella convention on the protection of the marine environment. An organization might follow with a Secretariat comprised of technical and policy representatives from each party, charged with developing recommendations for regional policies, laws, standards, procedures, training, research and environmental assessment, and management.

Such a regime would benefit each participant. Although all participants will lose the ability to treat the sea as a free waste dump, all would clearly benefit from cleaner seas. Japan and South Korea would benefit from the adherence by China, North Korea, and Russia to a predictable regime with common minimum standards of discharge. In return, China, North Korea, and Russia would gain training and technical assistance from Japan and South Korea, evening up the regional level of marine environmental technology and expertise.

* * * *

Cooperation could also extend to environmental protection in reducing the emission of carbon dioxide from energy generation and thus in alleviating Northeast Asia’s contribution to global warming. World emissions of carbon dioxide have nearly doubled over the past twenty-five years. By 2010, world carbon emissions will reach 10,336 million tons a year, 60% higher than the current level. China alone may become the world’s biggest emitter, accounting for a predicted 26% of world carbon emissions in 2020. The connection between carbon emissions and global warming is increasingly recognized and cooperation in the means and cost of its amelioration is logical.
Joint Development of Overlapping Maritime Claim Areas

In Northeast Asia, there are several areas with overlapping claims to seabed with hydrocarbon potential—in the Sea of Japan (East Sea) and the East China Sea (Figure 2). Such areas might be amenable to joint development, i.e., an agreement to put aside the sovereignty issue and jointly explore and exploit any resources in the area in dispute. Joint development is usually bilateral in nature but such agreements are not necessarily restricted to only two nations. Bilateral joint development agreements that have been adopted during the last two-and-a-half decades may provide useful models and ideas that can be used in Northeast Asia. Such arrangements have been established to share the governance and benefits of hydrocarbon resources in ocean space between France and Spain,27 Norway and the United Kingdom in the North Sea,28 Saudi Arabia and Kuwait,29 Saudi Arabia and the Sudan,30 Iceland and Norway,31 Thailand and Malaysia,32 South Korea and Japan,33 Australia and Indonesia,34 Vietnam and Malaysia,35 Colombia and Jamaica,36 Guinea-Bissau and Senegal,37 and Argentina and the United Kingdom around the Falkland (Malvinas) Islands.38

The typical structure of a joint development arrangement includes: (1) a treaty that identifies the shared area and establishes the legal basis for cooperation, (2) the establishment of a bilateral joint commission usually composed of equal members from the two parties to govern the venture, and (3) the granting of exploitation rights to one or more private enterprises by either the contracting states directly or by the joint commission.39 The governing joint commission can be strong as in the Thai-Malaysia, Saudi Arabia-Sudan, and Australia-Indonesia arrangements—with full juridical personality and powers to license, stipulate terms and exemptions and enter into development contracts with foreign operators40—or it can be weak as in the South Korea/Japan, Saudi Arabia-Kuwait, Malaysia-Vietnam, and Colombia-Jamaica agreements, operating solely as a consultative body to coordinate cooperative activities or as a liaison between national oil companies.41 The Japan-Republic of Korea Joint Commission, for instance, has the power only to recommend action to the two contracting
parties.\textsuperscript{42} The process of selecting and then monitoring the licenses or concessionaires is perhaps the most important element of such agreements.

Figure 2
Northeast Asia: Maritime Jurisdiction and Oil and Gas Potential. Source: Mark J. Valencia. 1992. Hydrocarbons in Morgan and Valencia. \textit{supra} Figure 2.
The Timor Gap Treaty between Australia and Indonesia is the most detailed in the administrative structure it creates, perhaps because the two countries have had a history of suspicion toward each other and needed to anticipate difficulties with clear procedural rules. The activities within the joint development zone are governed by a Ministerial Council, composed of an equal number of ministers from each State, which reaches its decisions by consensus. Actual management activities are carried out by the Joint Authority, which can contract with private enterprises and has the legal personality to sue and be sued. It is composed of an equal number of Executive Directors from the two countries and has a Technical Directorate to supervise petroleum operations, a Financial Directorate to handle the money, a Legal Directorate to review the contracts and address disputes, and a Corporate Services Directorate to serve as a type of secretariat for the governing branches.

In contrast, the most recent agreement between Colombia and Jamaica establishes a structure that in turn establishes a joint-development zone, but then simply says that the parties will meet to reach agreements on cooperative developments as conditions and resources warrant. The Saudi Arabia-Sudan arrangement is also vague in spelling out the legal regime that governs the shared area, and the Thai-Malay agreement addresses only some of the issues regarding governance. Thailand and Malaysia retain sovereign rights to the joint development area and concurrently regulate customs, fishing, navigation, marine pollution, and security, hydrographic and oceanographic surveys. Criminal jurisdiction is arbitrarily allocated to each State by employing a dividing line through the joint development area, equidistant from each States' overlapping claim lines.

When resources are actually being explored or exploited, a number of legal issues must be addressed and resolved by the cooperating parties. The parties must determine what law will be applied in the shared zone with regard to the different legal issues that may develop—i.e., the contracts with private concerns, the labor conditions for the workers, tort injuries, criminal jurisdiction, taxation, customs regulations, navigational freedoms, and so on. Financial arrangements are, of course, crucial. The countries must determine whether the exploitation will be financed privately or through some joint public-private arrangement, and must determine how the private enterprises are to be
selected. Another important decision is whether to include unitization provisions for deposits that straddle the boundaries of the joint development area. Conflict resolution procedures and technology transfer requirements may also be included in an agreement.

It is important to emphasize that it is not necessary for the contracting parties to resolve their conflicting maritime boundary disputes in order to enter into a joint development venture. The South Korea-Japan, Australia-Indonesia, and Argentina-United Kingdom joint development arrangements divide their areas into subzones, where different legal regimes govern. Under the agreement between Argentina and the United Kingdom, for instance, the United Kingdom will receive two-thirds of the earnings from hydrocarbons east of the Falklands (Malvinas) with Argentina receiving one-third, but earnings from hydrocarbons west of the islands will be split 50-50.52

How well has joint development worked?53 The Saudi Arabia-Kuwait arrangement is the only agreement which has proceeded from political agreement through the establishment of the necessary legal and institutional organizations to successful exploration and development of resources. The Sudan-Saudi Arabia agreement functioned successfully through a three-month prepilot mining test, but a commercial project has not been implemented due to uncertainty about its commercial viability. The South Korea-Japan joint development scheme was a highly sensitive political issue which strained relations between the coastal states. Although the agreement became effective in June 1978 and much drilling has occurred, the countries have yet to find any petroleum. The Thai-Malaysian scheme encountered a series of political obstacles to implementation, engendering long delays. In contrast, the Indonesia-Australia arrangement seems to be working well so far.

The success of the Kuwait-Saudi Arabia agreement is attributable to: (1) an "unwritten agreement" to keep oil out of political differences; (2) the practical desire of both parties to develop the oil fields quickly; and (3) the small portion of total oil production by these states from the joint development area.54 The two countries reached this agreement relatively easily and because of the good relations and practical attitude of the two countries the agreement works relatively smoothly.
Perhaps pan-Arabism and familiarity with the Islamic concept of *musawa* (equal shares in joint and undivided property) were additional factors in the successful implementation. The agreement of both countries on a single company (an operator who played a constructive and cooperative role in the exploration and development of the resources) was also a definite contribution to its success. Furthermore, the discovery of actual resources in the joint development area certainly cemented the effort.

Among the significant problems that would have to be resolved before a joint development authority could be established would be: (1) the boundaries of the area to be governed by the authority; (2) the status of the claims to this area during the joint development period; (3) who can participate; (4) for the East China Sea, the role that would be played by Taiwan; (5) the power relationships among the claimants, particularly in light of the different areas claimed by them; (6) the resources to be managed, e.g., oil and gas, fisheries, environment, and maritime space; (7) the mechanism of management and its governing structure; (8) the law that would apply in the area governed by the authority; (9) the fiscal and production arrangements; and (10) the length of the agreement.

These are formidable—but not insurmountable—issues. Many of the joint development arrangements now functioning are between countries with substantial suspicion or enmity between them, that decided to depoliticize a disputed maritime area in order to explore for resources and provide benefits for the people of both countries. For example, the dispute between Argentina and Britain over the Falklands (Malvinas) festered for 162 years and culminated in a war before an agreement could be reached in 1995 to establish a joint development zone. Claimants to disputed areas in Northeast Asia can avoid a similar violent conflict and decide to set aside their disputed claims for the time being in order to promote exploration and exploitation for the benefit of all the peoples of the region.
North Korea/South Korea Energy Cooperation?  

Looking into the future, it may make economic sense for the two Koreas to cooperate in offshore oil exploration. Both Koreas need oil or gas to fuel their economies. South Korea has the technology and equipment to explore and exploit offshore oil, as well as surplus refining capacity, but has little or no petroleum resources. North Korea has some offshore oil and gas potential, but has little indigenous capability to explore, exploit, or refine it. The two could make a deal: South Korean expertise to develop North Korean natural resources. This not only makes economic sense, but would be a tangible expression of both sides’ oft-expressed desire for closer ties.

North Korea’s offshore potential is in Korea Bay, where oil reportedly was found in 1989, and on the continental shelf off its east coast. Australia’s Beach Petroleum is currently exploring in Korea Bay. Another possible exploration target is the deeper-water Korea Rise. Although North Korea needs energy resources, its search for offshore oil has been haphazard and dependent on the vagaries of foreign contractors. And even if North Korea discovered oil, it only has two refineries with a capacity of about three million tons a year, and minimal downstream petrochemical facilities.

South Korea has no indigenous hydrocarbon production, and all exploration efforts onshore and offshore have been fruitless, except for some minor gas. Consequently, South Korea has invested in overseas oil exploration and development, diversified its import sources, and reduced its dependency on petroleum energy to 40% in 1990 and a projected 24% in 1996 from the level of the early 1980s.

South Korea has the capability to drill offshore in difficult conditions, which is a factor in petroleum exploration in the Yellow Sea, where there are frequent gales in winter and typhoons in summer. By 1990, 32 exploration wells had been drilled on its continental shelf, ten by the government-owned Korea Petroleum Development Corporation and the rest by joint ventures with foreign companies. South Korea also has a surplus of refining capacity; it has six refineries with an overall capacity of 862,000 barrels of oil per day and an additional 60,000 barrels per day of refinery capacity under construction.
In the past, North Korea and South Korea have tentatively explored direct trade and joint ventures. And the February 1992 nonaggression pact between the two provides for joint development of resources and cooperation in science and technology. Given the right political circumstances, joint oil exploration and development makes sense for both Koreas.

Cooperation in Energy as a Confidence-Building Measure?

Energy security cooperation might become one aspect of Asia Pacific security cooperation, and might serve as a bridge for regional security cooperation. Since the ASEAN Regional Forum (ARF), which includes China, Japan, South Korea, and Russia, may evolve into a regional cooperative security mechanism, a working team for a regional energy security regime might be set up as early as possible within the ARF framework. The working team could focus on cooperative security arrangements in the energy sector, and could discuss and draft proposals for consideration and adoption by ARF. Initially the working team might focus on CBMs in the energy field, and then move on to substantial cooperative measures. Such practical moves would greatly improve the regional energy security environment and facilitate the process of building regional cooperative security. The nongovernmental Conference of Security Cooperation in Asia and the Pacific (CSCAP) might set up a parallel forum and process in the energy sector.

Conclusions

What is needed now is gradual step-by-step confidence-building efforts in the energy sector with achievements sufficient to attract the attention and support of governments. Such confidence-building might initially be primarily bilateral and consist of private level contacts among individuals and institutes. These contacts might be strengthened by data exchange, conferences such as this one, and even joint resource assessment. This web of bilateral government and nongovernment relations could eventually evolve through a loose multilateral network to a more formal multilateral
organization. This evolution could be assisted by the organizing of multilateral nongovernmental conferences on issues of mutual concern, e.g., the realistic supply and demand schedules and patterns for a Northeast Asian gas grid; the most logical complementarity of related industry sites and types; and the implications of such a grid for national development plans. There are obviously a plethora of questions that need to be addressed. A Northeast Asia Energy Forum might be formed in this region to discuss and analyze these questions as well as other cooperative aspects of energy resources development and use, including supply and demand agreements.

Notes


16 Shi-yong Chon, 1997. UN opposes Taiwan's nuclear waste shipment to DPRK: Minister Yoo says following special session. *Korea Herald*, 27 June.


23 Oil-hit prefectures state their case for compensation. *Japan Times*, 18 February 1997.


Treaty between Australia and the Republic of Indonesia on the Zone of Cooperation in an Area between the Indonesian Province of East Timor and Northern Australia, 11 December 1989 [hereafter cited as Timor Gap Treaty].


*Id.* at 24.


Miyoshi, *supra* note 33, at 548.

Timor Gap Treaty, *supra* note 33, pt. III, art. 5, “The Ministerial Council,” para. 2, and art. 6. para. 1(k)-(m), (o), and (r).

*Id.* pt. III, art. 5, para. 5.

*Id.* pt. IV, art. 8(b), “Functions of the Joint Authority.”
Id. pt. IV, art. 9, "Structure of the Joint Authority," para. 1(a).

Id. pt. IV, art. 9, para. 1(b)(i).

Id. pt. IV, art. 9, para. 1(b)(ii).

Id. pt. IV, art. 9, para. 1(b)(iii).


Sims, supra note 38, A6, col. 4.

Valencia, 1986 supra n.51.


The Role of Siberian Interstate Gas-Supply Systems for the Asia-Pacific Region

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Siberian Energy Institute
Irkutsk, Siberia

A New Gas Strategy for Siberia

Siberia possesses huge fuel and energy resources which will determine the future of the energy sector and the economy of Siberia and Russia as well as the scale and efficiency of their exports to international markets. Siberia contains 85% of the known natural gas reserves in Russia (one-third of world reserves), 75% (16%) of its coal, and 65% (4%) of its oil.

Despite the crisis in industry, Siberia now supplies 75% of all energy resources produced in Russia: 69% of the oil, 91% of the gas, 61% of the coal, and 27% of the electricity. Hence, Siberia was and is the main fuel and energy base of Russia and will play a leading role in fuel and energy supply to many regions of Russia, as well as in the export of energy resources.

Disintegration of the USSR and the loss of Baltic and Black Sea ports, political and economic problems in the transportation of fuel and energy resources for export through the countries of the CIS, as well as the growing world significance of the Asia-Pacific region (APR), make Asia strategically important for Russia. This fact gives rise to the following new complex problems in Siberia and the Far East:

- Setting of priorities for their further development;
- Creation of a common market for fuel and electricity;
- Development of new oil and gas resources and construction of oil and gas pipelines to Asia; and
- Restructuring of the coal industry with regard to the possible export of coal and processed coal products to the APR countries.
It is precisely these problems that are addressed by the energy strategy of Siberia, which was elaborated by the Russian government in 1995.

In our opinion, rapid and large-scale development of the gas industry in Russia with a view to the Asian market should be a priority in state and regional policy. Two basic scenarios are possible:

1) Construction of a large trans-Siberian gas main “North of the Tyumen region-Krasnoyarsk-Irkutsk-Chita-China-South Korea” with its further replenishment from gas fields in the Irkutsk region, Krasnoyarsk territory, and Yakutia.

2) Large-scale development of gas resources in Eastern Siberia to meet internal demand and to export gas to the eastern areas of Russia and to Mongolia, China and Korea.

Such a strategy is supported by the following facts.

- The available data indicate there are sufficient gas resources in Western Siberia for export to Asia, taking into account the planned development of gas fields in the Yamal peninsula which will render additional resources for this purpose, if necessary;
- Huge gas resources exist in Eastern Siberian and the Far East (Table 1);
- Siberia and the Far East use one-third to one-fourth the grade of fuel used in the rest of the country; thus the technological level of the whole economy in these areas is creating adverse environmental impacts;
- The demand of China, South Korea, and eventually of Japan for natural gas is estimated to exceed 120-150 billion m$^3$ yearly;
- There are plans in different countries of Asia for the creation of international and global systems of energy supply, in which the participation of Russia is obligatory not only with respect to natural gas but to electricity as well; and
- It is known that in the 1970s and 1980s the USSR constructed up to 10,000 kilometers of gas mains yearly and the 4500 km-long export gas pipeline from Urengoi to Uzhgorod was constructed in only two years. Hence, the trans-Siberian main pipeline could be constructed over several years.
Forecasted Russian Gas Demand in the Eastern Region of Russia and the Asia-Pacific countries

In Eastern Russia, natural gas is used in relatively small amounts—about 10% of Russia’s total consumption is in the Tyumen region, 3.4% in the remaining part of West Siberia, 1.5% in Eastern Siberia, and about 1% in the Far East.

At present there is a deficiency in the supply of fuel and energy to the Far East. Attempts to satisfy the regional demand for fuel, electricity, and heat by increasing the extraction of local coal and constructing hydropower plants are problematic in terms of both time and money. Nonetheless, “reconstruction” of the regional energy sector and its whole economy could be implemented rather quickly and effectively using natural gas on a large scale. Thus, even by conservative estimates, the economy and population of Siberia and the Far East can potentially use natural gas in rapidly growing volumes. The potential gas demand in Eastern Russia can double by the year 2020, amounting to 140 billion m$^3$ including 60 billion m$^3$ yearly only for Eastern Siberia and the Far East.

Thus, to meet the gas demand of Eastern Siberia and the Far East and to export gas to the Asia-Pacific countries, 72-87 million m$^3$ of gas should be produced in 2010, and about 115-145 billion m$^3$ in 2020. This will require the creation of a large interstate gas-transportation system with obligatory coordination of interests and the support of all concerned countries of the Asia-Pacific region, as well as huge investments from diverse sources.

Tentative Estimation of the Efficiency of Possible Gas Exports from Western Siberia to the Asia-Pacific Region

Gas export can be efficient only if its selling price is higher than the self-financing price, which takes into account all the expenses of gas production and transport, taxes, credits and dividends, and the necessary accumulation of investments. According to the estimates of the Siberian Energy Institute, the self financing prices of gas production in the Tyumen region will tentatively be $9-10/1000$ m$^3$ in 2000 and $13-15/1000$ m$^3$ in 2010.
The main expenses are in transport rather than production. The required capital investment for the export of 55 billion m$^3$ of gas will tentatively be: $10$ billion from 1997-2000, $7.3$ billion from 2001-2005, and $4.1$ billion from 2006-2010. Operating costs for gas transport (with depreciation charges) are taken equal to 10% of the pipeline cost.

The self-financing prices of gas exports were calculated based on the following assumptions: prices do not include a value-added tax; profit taxes are 35%; rent (excise tax) is 35%; credits are granted at 7% per year; and the portion of the profit that is invested is not taxed. Under these conditions, the export gas price for producers may average $110-120/1000 \text{m}^3$ for the period 2001-2010.

Comparison of the calculated self-financing prices with prices expected in the energy markets of the Asia-Pacific region ($130-150/1000 \text{m}^3$) indicate that the export efficiency may increase with the reduction of profit and excise taxes. The export cost can also be decreased by making gas pipeline construction and operation cheaper, for example, by using more electric drive at compressor stations instead of gas turbines. Preliminary calculations show that such replacement is advantageous not only in Eastern Siberia, where there is excess hydro-power plant capacity, but in other regions where the trans-Siberian gas pipelines will be laid.
Comments

A Plan to Establish the Northeast Asia International Natural Gas Company

Shogo Kojima, President
Tottori Gas Company, Tottori, Japan

I am Shogo Kojima from Japan. I was born in Dalian, China. I am managing the Tottori Gas Company, a city gas supplier. As an executive of a gas supplying company, I would like to suggest how an international natural gas pipeline can be realized.

A city gas company sells produced gas to the users through a pipeline at a certain price. Investment of a large sum of capital is necessary at the beginning, but it costs less than filling gas cylinders every day and delivering them by vehicles. With a certain continuous sales volume, it will be possible to make a larger profit in five to seven years and the invested capital can be returned in the medium term.

What is the first thing we should do in order to build an international natural gas pipeline from the gas field in Irkutsk, Russia, through Mongolia, China, North Korea and South Korea to Japan? It is necessary to plan for a Northeast Asia Natural Gas Pipeline Company. The following is an example:

Tentative Plan

1. Name: Northeast Asia International Natural Gas Pipeline Co.
2. Capital fund: 2.5 billion dollars
3. Stock holders: six countries (Russia, Mongolia, China, North Korea, South Korea and Japan)
4. Sales volume: 4 billion dollars/year
5. Amount of natural gas to be transported: 65 billion m/year
6. Investment: 10 billion dollars
7. Term for Collecting Investment: 15 years
8. Borrowed Money: 7.5 billion dollars
   Rate of Interest: 5%
Balance: it will be in the black in 5 years, and accumulated loss will be zero in 10 years.

The depreciation of equipment: 13 years, remaining value: 5%

IRR: 13%

Others to be determined:
- Transportation
- Route
- Demand
- Source of gas
- Transportation Cost
- Purchase Amount
- Maintenance
- Technical Details of the Pipeline

Goals of the company:

1. To protect the environment
2. To supply cheap natural gas to Northeast Asia
3. To stimulate development of Northeast Asia
4. To reduce the barriers to co-operation among Northeast Asian countries
5. Peace

I would like to point out two major questions in establishing the company. First, the long-term stability of the political system in the six countries is essential. Is it possible to conclude a security treaty or a peace treaty among the six countries? And will a security pact on the long-term supply and transportation of energy through an international natural gas pipeline be feasible? Secondly, the stability of the economic system for the pipeline is necessary.

A thorough examination of the plan by a Working Group with representatives from each country is needed. After that a new feasibility plan for the company can be developed which will be long term and fundable. When these questions are resolved, the pipeline can be realized.
The Prime Minister of Japan has announced a new policy regarding Russia, that is, the three principles of trust, mutual benefit, and long-term viewpoints. A top-level conference between Japan and Russia will be held this fall and the government authorities will discuss the cooperative development of natural gas in Irkutsk, Russia. Nearly 25 years have passed since diplomatic relations between Japan and China were restored. The Japanese Prime Minister will visit China in September and will discuss energy and environment issues.

The present favorable conditions for the pipeline developed over the past seven years. It is very important that the Northeast Asia Economic Forum take the lead and help formulate the plan for a Northeast Asia Natural Gas Pipeline Company. I hope that such a plan can be completed by the Eighth Northeast Asia Forum. I thank you for your kind attention.
VII

COMPARATIVE APPROACHES TO A COOPERATIVE ELECTRIC POWER SYSTEM FOR NORTHEAST ASIA
VII

COMPARATIVE APPROACHES TO A COOPERATIVE ELECTRIC POWER SYSTEM FOR NORTHEAST ASIA
Regional Approach for Cooperative Development of a Clean, Efficient Electric Power System

Peter Hayes and David F. Von Hippel
Nautilus Institute for Security and Sustainable Development

Introduction

Recent economic growth in the Asia-Pacific region in general, and in Northeast Asia in particular, has been spectacular. Changes in the economic system in Russia—and potential changes in the Democratic People’s Republic of Korea (DPRK) and Mongolia as well—will only add to the general growth in the region. Along with this growth has come a vast expansion in the need for energy services, and an expansion in the demand for the fuels that help to supply these services. Chief among these fuels is electricity. Northeast Asia includes the most populous nation in the world (China), an industrialized nation long known for its accomplishments in technology (Japan), a nation fast approaching the same industrial status (the Republic of Korea, or ROK), and, in the Russian Far East and Mongolia, a treasure trove of natural resources. None of these crude characterizations, of course capture the breadth of natural, human, and economic resources that each of the countries of the region has at its disposal, but they serve to indicate the some of the richness and diversity of Northeast Asia.

Along with regional economic and population growth has come a suite of environmental and other problems, including:

• Heavy emissions of sulfur and nitrogen oxides—the gases that are the major contributors to “acid rain”—particularly as a result of heavy use of coal and increasing transport-sector activity;

• Rapidly increasing emissions of carbon dioxide, methane, and other “greenhouse gases” that contribute to anthropogencially-caused global climate change;

• Local air pollution, again caused in large part by uncontrolled (or minimally-controlled) coal combustion and/or by road vehicle traffic;
• Water-borne wastes emitted to rivers, lakes, and the ocean from industries and municipalities;
• Deforestation, and erosion caused by deforestation and poor soil conservation;
• Increased routine and catastrophic oil spills caused by increases in shipping of oil, oil products, and other commodities as supplies from outside the region are increasingly required;
• Increased competition for resources, including imported oil may strain political relations between neighboring countries of the region;
• Existing and potential cross-border migrations of people;
• Territorial disputes and long-standing ethnic, political, and military conflicts; and
• Issues of energy security and energy independence.

In summary, the countries of the Northeast Asia region collectively possess the need for electricity generation and other fuel supplies to feed economic development, possess the natural resources needed to provide the requisite fuels, and possess the technical know-how and (to a large extent) access to capital required for prudent resource development, even under the substantial environmental constraints that face the region. No country individually, however, has all of these attributes. Substantial regional and international cooperation will be therefore be required to allow Northeast Asia to realize its development goals without jeopardizing the regional and global environment. In this paper we present some of the key areas and opportunities for regional cooperation on energy-sector issues, particularly those issues regarding electricity infrastructure.

Plan of this Paper

In the remainder of this section of this paper we briefly summarize the current and potential future energy situation in the countries of Northeast Asia. In the latter subsections of this section we focus to some extent on the DPRK as both the country that
we have studied most and, to some extent, the key to the success of many regional schemes to share energy resources.

In Section 2, we discuss issues and cooperative strategies having to do with \textit{interconnection of the electricity systems} of the countries of the region.

In Section 3, we focus on strategies for \textit{building the institutions} that can help foster cooperative development of an environmentally "cleaner" regional energy sector.

In Section 4, we discuss \textit{technology transfer} for the clean\textsuperscript{a} use of coal and promote energy-efficiency and renewable energy use as a particular need for cooperation, as well as the need for cooperation on the improvement of \textit{environmental performance in the energy sector}.

In the final section of this paper, Section 5, we provide a brief \textit{summary} of our major findings and recommendations, and submit for discussion our "short list" of those near-term \textit{steps that should be taken} to start cooperation in the region on "clean electricity" issues.

\textbf{Growth in Fossil Fuel Use in Northeast Asia}

Table 1 presents the current pattern of commercial fuel use in the countries of Northeast Asia by type of fuel\textsuperscript{1, 2, 3}. The countries of Northeast Asia consumed slightly under 20\% of the world's supply of commercial fuels in 1995, including about 17.5\% of the petroleum products, 4.5\% of the natural gas, and more than a third—almost 37\%—of the world's coal. The sectoral breakdown of fuels demand in several of the countries of the region (as of 1992) is shown in Figure 1.\textsuperscript{4, 5, 6, 7}. Here the industrial sector fraction of fuels demand is greater in the less developed countries—China and North Korea—than in Japan and South Korea (ROK). Conversely, energy demand in the transportation sector makes up a significantly smaller portion of total energy use in China and North Korea.

\textsuperscript{a} In this paper we use the word "clean" to mean technologies and energy systems that have substantially reduced environmental impacts per unit output relative to "business-as-usual" or typical technologies or systems.

\textsuperscript{b} As noted, figures in this table are for 1995 for all countries except Hong Kong, Mongolia, and North Korea (DPRK). 1995 fuels use in Hong Kong and Mongolia was probably somewhat higher than the 1992 values shown, while energy consumption in North Korea was probably less than the 1990 estimate in the table.
Both North Korea and China consumed approximately 1.2 tonnes of oil equivalent (toe) of end-use fuels per capita in 1990 and 1992 (respectively), while South Korea used 2.2 toe per capita, and Japan used 2.6 toe per capita.

Table 1: Fuels Consumption in Northeast Asia and the World

<table>
<thead>
<tr>
<th>Country</th>
<th>Oil</th>
<th>Natural Gas</th>
<th>Coal</th>
<th>Nuclear Energy</th>
<th>Hydroelectric</th>
<th>Total</th>
<th>Fraction of NE Asia</th>
<th>Fraction of World</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>157.5</td>
<td>15.8</td>
<td>640.3</td>
<td>3.3</td>
<td>16.2</td>
<td>833.1</td>
<td>52.4%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Chinese Taiwan</td>
<td>35.4</td>
<td>3.9</td>
<td>17.0</td>
<td>9.1</td>
<td>0.8</td>
<td>66.1</td>
<td>4.2%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4.2</td>
<td>-</td>
<td>5.5</td>
<td>-</td>
<td>-</td>
<td>9.7</td>
<td>0.6%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Japan</td>
<td>287.3</td>
<td>55.0</td>
<td>85.9</td>
<td>74.3</td>
<td>7.7</td>
<td>490.2</td>
<td>30.9%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Mongolia</td>
<td>0.6</td>
<td>-</td>
<td>1.9</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>0.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>North Korea</td>
<td>3.5</td>
<td>-</td>
<td>32.4</td>
<td>5.7</td>
<td>38.1</td>
<td>49.9</td>
<td>2.4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>South Korea</td>
<td>94.8</td>
<td>9.2</td>
<td>27.3</td>
<td>17.3</td>
<td>0.5</td>
<td>149.0</td>
<td>9.4%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Total Northeast Asia</td>
<td>563.3</td>
<td>83.9</td>
<td>810.3</td>
<td>104.0</td>
<td>30.9</td>
<td>1,588.8</td>
<td>100.0%</td>
<td>19.5%</td>
</tr>
<tr>
<td>NE Asia Fraction of World</td>
<td>17.5%</td>
<td>4.5%</td>
<td>36.7%</td>
<td>17.4%</td>
<td>14.2%</td>
<td>19.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Rest of World</td>
<td>2,663.6</td>
<td>1,799.7</td>
<td>1,400.4</td>
<td>492.4</td>
<td>187.6</td>
<td>6,547.0</td>
<td>80.5%</td>
<td></td>
</tr>
<tr>
<td>TOTAL WORLD</td>
<td>3,226.9</td>
<td>1,883.6</td>
<td>2,210.7</td>
<td>596.4</td>
<td>218.5</td>
<td>8,135.9</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Figure 1: Sectoral Breakdown of Commercial Fuels Consumption in Four Countries of Northeast Asia
The major point here is that energy use in Northeast Asia—particularly in China, Mongolia, and North Korea, would seem to have substantial “room to grow” before it reaches the levels currently maintained by Japan and other developed nations. The consumption of transport services, which Chinese, Mongolian, and North Korean citizens currently use very lightly, is one of the key areas that is bound to grow, with—in all probability—a significant increase in transport energy use.

Figure 2 shows the pattern, as of 1990, of electricity generation by energy source in four countries of Northeast Asia⁶. Japan and China dominated total regional generation. Japan and the ROK used a relatively more diverse energy mix to power electricity generation, while China and the DPRK were heavily dependent on coal (and hydro, in the case of the DPRK) to provide for power needs.

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Data for Figures 2 and 3 compiled from various sources for the Nautilus Institute East Asia Energy Futures Project (D. Von Hippel and P. Hayes, 1997/1998, work in progress). Data for Mongolia and the Russian Far East are expected to be included at a later date.
The pattern, as of 1990, of electricity demand in Northeast Asia is shown in Figure 3. Japan and China again dominate total electricity use, but electricity use in the public/commercial and residential sectors made up much greater proportions of total use in Japan than in China. Residential electricity use also makes up a much larger proportion of total electricity use in the ROK (20%) than in the DPRK (10%).

**Figure 3:**

*Electricity Demand by Sector in Northeast Asia*

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**Scenarios of Future Energy Use in the Region**

Table 2 provides an overview of the results of country-level scenarios of future energy use from several different groups. In each case, the table shows the average annual growth rate of primary commercial energy use from the early 1990s (scenario base years vary among groups) to 2010. In each case the “Base,” “Business as Usual,” or “Reference” scenario prepared by each group is reported.

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\(^d\) Primary energy use includes fuel used in conversion and transformation processes such as coal cleaning, electricity generation, and oil refining.

\(^e\) That is, excluding those fuels that are typically not (at present) formally traded in international markets, such as biomass for domestic cooking.

\(^f\) In many, but not all cases, more than one scenario was prepared by the sources cited. Additional summaries of projections for the region can be found in D. Von Hippel, Global Dimensions of Energy Growth Projections in Northeast Asia, a paper prepared for Nautilus Institute’s U.S.-Japan Foundation-
Table 2: Projections of Primary Commercial Fuel Use in Northeast Asia: Annual Average Growth Rates from the Early 1990s through 2010$^9$

<table>
<thead>
<tr>
<th>Source of Projection</th>
<th>Country</th>
<th>China</th>
<th>Taiwan/ Hong Kong</th>
<th>DPRK</th>
<th>Japan</th>
<th>ROK</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCICED</td>
<td></td>
<td>3.88%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East-West Center</td>
<td></td>
<td>3.63%</td>
<td></td>
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<tr>
<td>Institute of Energy Economics, Japan</td>
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<td>4.64%</td>
<td>3.96%</td>
<td></td>
<td>1.22%</td>
<td>4.68%</td>
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<tr>
<td>Korea Energy Economics Institute</td>
<td></td>
<td></td>
<td></td>
<td>5.33%</td>
<td>1.83%</td>
<td>4.98%</td>
</tr>
<tr>
<td>RAINS-Asia</td>
<td></td>
<td>4.54%</td>
<td>4.18%</td>
<td></td>
<td>1.83%</td>
<td>4.98%</td>
</tr>
<tr>
<td>US DOE EIA International Energy Outlook</td>
<td></td>
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<td></td>
<td></td>
<td>1.91%</td>
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<tr>
<td>World Bank</td>
<td></td>
<td>4.50%</td>
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</tbody>
</table>

Although the results of these scenarios vary somewhat, the overall pattern of strong growth in primary fuels use—in the range of 4% to 5% per year for all countries except Japan—is uniform. At this growth rate, energy use in the countries of the region (with the exception of Japan) will rise by about 120% of today’s level by just the year 2010. As most of this fuel will continue to be fossil-derived, the increase in greenhouse gas (GHG) emissions from the countries are significant enough to merit extreme global concern, in addition to the ramifications for acid rain.

Masked by the growth rates shown in Table 2 is a shift in virtually all of the countries of the region towards greater use of electricity at the expense of other end-use fuels. This shift means that the growth in electricity demand will be higher—in some cases, substantially higher—than the growth in overall fuel use shown in Table 2. Fujime et al.$^{10}$, for example, project nearly 8% average annual growth in electricity demand in China between 1992 and 2010, and KEEI (Korea Energy Economics Institute) and KEPCO (Korea Electric Power Corporation) forecast growth in annual electricity generation in the ROK of 7.8% (1992 to 2010) and 5% (1997 to 2010) respectively.$^{11}$

Another key aspect of the projected growth in fuels use in Northeast Asia is the shift in the patterns of fuel use, imports, and exports in the region. Of particular concern is the projected shift of China over the next two decades from being a small net exporter of oil in 1992 to being a very large net importer, with oil import needs second only to


$^9$ "Taiwan/Hong Kong" is Chinese Taiwan and Hong Kong combined. See endnote for sources used for this table.
Japan in the region, and significantly greater overall oil demand. This shift, as emphasized by Fujime (IEEJ) and Fesharaki et al. (East-West Center) in their respective scenarios\(^\text{12}\), will (together with flat production and growth in domestic consumption in the Asian countries now exporting oil—especially Indonesia) shift the focus of regional imports to the Middle East, increase competition for crude, and increase the pressure on oil transport infrastructure, including sea lanes used by tankers.

**Electricity Supply Situation in China**

Electricity generation in China more than tripled between 1980 and 1994, with gross generation increasing at an average annual growth rate of over 8%. As of 1993, 75% of China’s generation capacity and almost 82% of its generation was in fossil-fueled power plants. Of fossil-fueled generation, the overwhelming majority (93% in 1993) of fuel consumed was coal\(^{13}\).

Recent investment by state enterprises in China reflects the high growth in electricity needs. Between 1985 and 1993, energy industry investment consistently absorbed 20-30% of total state investment, and 55-60% of energy-sector investments were for the electric power sector.

Various projections of electricity needs\(^h\), including those noted above, uniformly indicate a continued rapid expansion of Chinese power needs, and a continued dependence on coal as the major energy source of power generation. Published estimates of the total required additions to Chinese generating capacity by 2020 range from roughly 500 to 700 GW under various scenarios\(^{14}\). In order to meet future needs for power, the Chinese government has increasingly encouraged private-sector financing of power sector development. In addition to expanded coal and hydroelectric power production, China is

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pursuing development of commercial nuclear power (its first full-scale power reactors came on-line in 1993) and some renewable power development, particularly wind power.

The dominant environmental problem facing the power sector in China is acid precipitation derived (in large part) from sulfur oxide emissions from coal-fired devices, including coal-fired utility boiler power generation. Few power plants in China at present are equipped with sulfur-oxide emissions control devices, and pre-combustion processing of coal to remove sulfur is not used for all utility coal. Some of the most intensely-acid precipitation events ever measured have been recorded in China, and there are widespread reports of damage to structures and ecosystems in China due to “acid rain.” Lack of investment capital in general, however, makes it difficult for China to afford the appropriate pollution control equipment for power plants.

The northeast area of China (for example, the Provinces of Heilongjiang, Jilin, Liaoning, and part of Inner Mongolia) is of particular interest in the context of regional cooperation strategies because of its proximity to the other countries of Northeast Asia. Northeast China is endowed with large coal deposits (the area includes two of China’s largest mines), produces much of China’s crude oil, and was responsible for about one-third of national natural gas production as of 1993. The region is only a modest producer of hydroelectric power. The Northeast China power network had an installed capacity of somewhat over 23 GW as of 1991, about 17% of the national total capacity. Of the 23 GW capacity in Northeast China, approximately 19 GW was in thermal power plants. Average wholesale electricity prices in Northeast China were slightly above the national average as of 1993. As of 1993, about 100 million people lived in the three northeast provinces of Liaoning, Jilin, and Heilongjiang. These provinces had per-capita incomes that were at or somewhat above the national average. The industrial sectors in the provinces of Northeast China also, as of 1990, were relatively heavy users of electricity, and residential electricity use in the Northeast was roughly twice the national average on a per-capita basis.
Electricity Supply Situation in Japan

Japan has relatively few natural resources suitable in scale to provide a large portion of its energy needs. Thus, it has been dependent largely on energy imports. In the electric power sector, Japan has pursued a program of diversification of energy supplies. By 1994, about 32% of Japan’s electricity generation was from nuclear plants, 8% from hydroelectric plants, 13% from coal, 26% from liquefied natural gas (LNG), and 21% from oil and oil products.

As a mature industrialized economy, the recent percentage growth in gross domestic product (GDP) and of energy consumption in Japan has been significantly less than that enjoyed by its industrializing neighbors in the region. Nonetheless, projections by the US Department of Energy’s Energy Information Administration (USDOE/EIA) and the Institute of Energy Economics, Japan (IIEJ) indicate growth in electricity consumption from 1993/1994 to 2010 averaging, respectively, 2.6 and 2.2% per year. IIEJ projections call for installed generation capacity in Japan to increase by about 50% between 1994 and 2010, with the addition of nearly 100 GW of capacity. IIEJ’s base-case projections call for the shares of power generation to remain relatively constant from 1994 through 2010 and 2015, with the exception that the share of coal-fired power grows from 13-22% at the expense of oil-fired generation, which shrinks from over 21% to less than 12% by 2015.

Reserves of investment capital in Japan are likely to be adequate to finance the pattern of capacity additions noted above, but recent changes in the country may serve to markedly change the patterns of investment in electricity generation in Japan. Pressures to decrease electricity rates toward international levels, public resistance to expanded development of nuclear power, managerial difficulties leading to poor public perception of some utility companies, and the push to privatize power generation all have the potential to markedly alter the electricity-sector landscape in Japan over the coming decade.

Japan produces and uses highly efficient electricity generating technologies and environmental controls for power plants. The bulk of Japan's emissions of acid gases, for
example, come not from large power plants and industrial facilities, but from smaller facilities and the transport sector. Acid gases with origins in the Koreas and in China made up a significant (but not major) fraction of total acid deposition in Japan as of 1990\(^{17}\). This proportion can be expected to rise as Japan continues to phase in tighter emission controls and the economies of its Northeast Asian neighbors continue to grow.

**Electricity Supply Situation in Mongolia\(^{1}\)**

Coal is the only domestic commercial energy resource extracted in any quantity in Mongolia. Mongolia possesses significant reserves of both lignite and higher-quality coals, but to date only the former has been extracted\(^{2}\). Coal production in the country rose rapidly in the 1980s, but declined precipitously starting in 1990 as a result of lack of spare parts, poor management, and environmental and safety problems. Significant bilateral and multilateral aid programs have and are in progress to revitalize coal production in Mongolia. A significant fraction of Mongolia’s coal is exported to China. Petroleum products are all imported (historically from Russia\(^{k}\)), and are used primarily in the transport sector.

All of Mongolia’s power generation capacity is coal-fired, with the exception of some small isolated generation fueled with oil products (for example, diesel engine-driven generators). Mongolia’s total installed capacity was just under 1 GW as of 1994. Coal-fired power plants in Mongolia reportedly use 1950s Russian technologies. These power plants are very inefficient and in poor repair, and as a result electricity shortages in Mongolia are chronic. The need for spare parts and new equipment for power generation in Mongolia is being addressed (in part) by various aid programs. At present, the Mongolian power grid covers somewhat over one-third of the country and serves about

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\(^1\) Most of the discussion of Mongolia’s energy sector provided here is based on a UN document entitled *RAS/n/OIC Energy, Coal Combustion and Atmospheric Pollution in Northeast Asia Final Report* (United Nations Department for Development Support and Management Services (DDSMS), February 1997).

\(^2\) All but one of Mongolia’s 16 state-owned coal mines are of the open pit variety.

\(^k\) Imports from Russia have been sporadic in recent years due to lack of hard currency to pay for imports, as well as transportation difficulties.
half of the country's population. About 90% of generation is consumed by industry. Per-capita generation of electricity in Mongolia as of 1994 was about 1,200 kWh (including consumption in all sectors), which was slightly higher than per-capita generation in China during the same period. UN statistics\textsuperscript{18} indicate that Mongolia has historically imported electricity. Electricity imports had declined from a significant fraction of supply in the early 1980s to a few percent of total supplies as of the early 1990s.

In addition to its coal reserves, Mongolia holds promising oil deposits, and reportedly has significant untapped hydroelectric resources. In addition, the wind regimes in Mongolia's desert plains are highly favorable for development of wind power, although wind turbines used there must be engineered for operation under harsh conditions. We have no information on future plans for the electricity sector in Mongolia. Although the relatively low per-capita electricity consumption noted above suggests that there is considerable room for growth in electricity use, recent capacity factors for electricity generation (on the order of 35%) suggest that the existing generation capacity could, if properly maintained, serve Mongolian demand for much of the next decade, even assuming annual demand growth in the 5% to 7% range. The key issues are rather reliability of supply (especially in winter in the capital city), local air pollution from thermal power plants, and the tradeoffs involved in household electrification to reduce air pollution from residential space heating and cooking.

Electricity Supply Situation in the Republic of Korea

The Republic of Korea has limited reserves of anthracite coal (domestic coal production comprised about 11% of coal supplies in 1995), but otherwise is dependent on imports for its fossil fuels needs. The ROK imports crude oil—over 70% of which came from the Middle East as of 1995—and is also a net importer of refined petroleum products.

Electricity demand and generation capacity have grown rapidly in the past 15 years. Electricity generation increased nearly five-fold between 1980 and 1995, an average growth rate of 11% per year. Generating capacity increased at an average rate of 8.6% per year over the same period. As of 1980, oil-fired thermal generation dominated
the ROK’s installed capacity base. In the last 15 years, however, the ROK has invested heavily in other types of generation, particularly nuclear power, coal-fired, and LNG-fired facilities. As of 1995, the generating capacity in the ROK was approximately 10% hydroelectric (of which over half was pumped-storage hydro), 27% was nuclear, 25% coal-fired, and the remaining 38 percent was steam-cycle, combined-cycle, and internal combustion plants fueled with LNG\(^1\) and oil products\(^9\).

In order to provide electricity to meet projected growth in demand of 5-8% per year, the ROK has in the “construction pipeline” 8.3 GW of nuclear power plants\(^20\), with another 9 or 10 GW of nuclear capacity possible by 2010. KEEI projections suggest the addition of about 8 GW of coal-fired capacity and 5 GW of LNG-fired plants between 1997 and 2010\(^21\). Total net additions to generating capacity in the ROK between 1995 and 2010 have been projected at about 35 GW.

The ROK’s large industrial base is capable of manufacturing most of the equipment needed for the power sector. Until recently, the national power corporation (KEPCO) has been responsible for the vast bulk of electricity-sector investments. Recently, however, the ROK has started to solicit bids for privately-financed construction of generating facilities. The ROK substantially lacks indigenous natural resources (with the exception of uranium) that can be used to fuel expansion of electricity generation on the scale that will be required over the next 15 years, and as a consequence will have to increase its fuel imports.

**Electricity Supply Situation in the Russian Far East**

The Russian Far East (RFE) is endowed with large deposits of coal, petroleum, and natural gas, and significant hydroelectric resources. At present, however, there is no petroleum production in the region. There are a number of large coal mines in the area, but a host of political, technical, and transport difficulties (among others) have recently limited production. The heating value of the local coal is low, and its ash content is high. The region has in the past been a net exporter of electricity to the rest of Russia, but

\(^1\) Combined-cycle power plants, principally fired with LNG, comprised 19% of total generating capacity by 1995, up from just 3.6% in 1991.
recently, due in part to coal supply problems, has become a net power importer. Another problem has been the difficulty of obtaining and paying for diesel fuel, which is used (presumably) as a start-up fuel in utility, district heat, and other smaller boilers. The sum of these difficulties has been frequent outages of both power and district heat for the people and industries of the region. Most of the RFE’s most urgent energy sector problems seem to stem not from a basic lack or resources or of productive capacity. Rather, they are the result of a combination of mismanagement, energy markets that are not yet functioning properly, and a vicious cycle of poor cash flow.

The RFE is presently undergoing an economic transformation. In addition to the general transition to a market-based economy that is occurring throughout the Former Soviet Union, the RFE has been faced with the need to change over from production of defense-related items to civilian goods. Once this transition gains momentum, demand for energy services in the RFE could increase rapidly, but we would suggest, based on anecdotal evidence, that much of this demand could be satisfied through better operation and maintenance of existing systems—for example, refurbishment and modernization of power plants, fixing and insulating steam lines, and repairing coal mining equipment and transport systems. The RFE therefore has the resources and basic equipment to be self-sufficient in electricity production, and could, with sufficient investment, become a major energy exporter.

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The Energy and Electricity-Sector Situation in the DPRK

Electricity demand and supply in the DPRK, current status

As of 1990, total electricity demand in the DPRK was approximately 38 Terawatt-hours (TWh), net of losses, use of power in power plants, and exports of electricity to China from plants on the DPRK border with the PRC. As of 1996, by our estimate, the total demand for electricity in the DPRK had dropped to 21 TWh. Table 3 shows the breakdown, in 1990 and 1996, of estimated electricity use by sector, generation by plant type, exports, use of electricity in coal production, losses, and in-plant use.

In 1990 the total generating capacity in the DPRK was about 9,500 megawatts (MW), of which about 5,000 MW was hydroelectric capacity, somewhat under 4,300 MW was coal-fired capacity, and somewhat over 200 MW was capacity fired with heavy fuel oil. About three-quarters of the reported hydroelectric capacity is contained in about 20 major plants, and similarly, about two-thirds of the reported thermal (coal- or oil-fired) capacity is accounted for by only seven major facilities. There are reportedly hundreds or thousands of other generating stations, both hydroelectric and thermal, but the vast majority of these stations are not connected to the nationwide electrical grid.

A number of larger hydroelectric and thermal power stations were reportedly under construction as of 1996, but only one or two thermal plants and one hydroelectric plant have, to our knowledge, commenced operation in recent years. We do not know the status of the other plants that are being built.
Table 3: Estimated Electricity Supply and Demand in the DPRK, 1990 and 1996 (TWh)

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>YEAR</th>
<th>1990</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDRO</td>
<td></td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>HFO-FIRED</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>COAL-FIRED</td>
<td></td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>NUCLEAR</td>
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<td>2</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
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<td>32</td>
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<td>(4)</td>
<td>(4)</td>
</tr>
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<td>(2)</td>
<td>(1)</td>
</tr>
<tr>
<td>OWN USE</td>
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<td>(4)</td>
<td>(2)</td>
</tr>
<tr>
<td>LOSSES</td>
<td></td>
<td>(7)</td>
<td>(4)</td>
</tr>
<tr>
<td>TOTAL DEMAND</td>
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<td>21</td>
</tr>
<tr>
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<td></td>
<td>23</td>
<td>11</td>
</tr>
<tr>
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<td>1</td>
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<td>3</td>
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<td>1</td>
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</tbody>
</table>

The electrical generation and transmission and distribution (T&D) systems in the DPRK were reportedly beset, as of 1990 and even more acutely in 1996, by a number of problems, including:

- Lack of maintenance and spare parts at generation facilities;
- Outdated and inefficient substation facilities on the T&D network;
- Poor facilities for monitoring, dispatching and controlling the T&D network (although these are being partially addressed by an ongoing UNDP project);
- Problems with obtaining supplies of coal, mostly (reportedly) related to fuel transport; and
- Lack of air pollutant emissions control in thermal power plants.
Electricity demand and supply in the DPRK, future scenarios

For the years 2000 and 2005, we evaluated two different scenarios of energy sector development:

- A **Recovery** scenario, in which we assume that the agreed framework for transfer from the Korean Peninsula Energy Development Organization (KEDO) of the two pressurized water reactor (PWR) units results in a general opening of the DPRK economy to foreign investment and enterprise. This economic opening in turn results in an increase in DPRK industrial production and energy use back toward 1990 levels by 2000, and beyond 1990 levels in 2005. We explored two variants of the Recovery scenario for 2005. One of these assumed that power from the PWRs (scheduled to begin operation sometime early in the next decade) is mostly exported to the Republic of Korea, and one in which the power is primarily used in-country to substitute for thermal generation.

- A **Decline** scenario in which it is assumed that the economy of the DPRK slowly continues to worsen through 2000, then picks up slightly as proceeds from the sale of electricity from the PWRs start to be used to re-start or repair selected industrial and other infrastructure.

Electricity demand and supply under these two scenarios is shown in Table 4.

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*These inputs to and results of these scenarios are described in much greater detail in a separate report by the authors: David F. Von Hippel and Peter Hayes, *Demand for and Supply of Electricity and Other Fuels in the Democratic People's Republic of Korea (DPRK): Results and Ramifications for 1990 through 2005*. Prepared for the Northeast Asia Economic Forum/East-West Center. This report is in draft form as of July 1997.*
## Technical problems in electricity supply

The major problems regarding electricity supply in the DPRK do not have to do with adequacy of overall electricity generation capacity, but rather, as indicated above, with the state of repair of power plants, the weakness of the transmission and distribution system, and problems with fuel delivery infrastructure. The weakness of the T&D system is manifested in the DPRK by fluctuating power frequencies. The frequency of oscillation of alternating current (AC) power on the DPRK grid, nominally 60 Hertz (Hz, or cycles per second), reportedly falls as low as 57 to 59 Hz with some regularity, and has been reported to fall to as low as 54 to 55 Hz. These fluctuations in power quality can damage components of the electricity supply system, as well as being harmful to end-use equipment.

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### Table 4: Estimated Electricity Supply and Demand in the DPRK, Scenarios for 2000 and 2005 (TWh)

<table>
<thead>
<tr>
<th></th>
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<td>25</td>
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<td>28</td>
<td>18</td>
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<td>1</td>
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<td>3</td>
<td>1</td>
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<td>(4)</td>
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<td>(3)</td>
<td>(2)</td>
<td>(2)</td>
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</tr>
<tr>
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<td>(3)</td>
<td>(1)</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>LOSSES</td>
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<td>(7)</td>
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</tr>
<tr>
<td>TOTAL DEMAND</td>
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<td>0</td>
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<td>2</td>
<td>4</td>
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<td>3</td>
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</tbody>
</table>

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**In this table, “2000-R” stands for Recovery scenario, year 2000. “2000-D” and “2005-D” denote the Decline scenario in years 2000 and 2005. “2005-R-Ex” is the year-2005 variant of the Recovery scenario in which power from the PWRs is largely exported, and “2005-R-D” is the version of the Recovery scenario for 2005 in which the bulk of the power from the PWRs is retained for domestic use within the DPRK.**
Environmental impacts of electricity generation in the DPRK— regional ramifications

Although the coal used in the DPRK is relatively low in sulfur (by international standards), the massive quantities of coal used by the DPRK, and the uncontrolled combustion of coal in thermal power plants and in equipment in virtually all sectors, translates into significant air pollutant emissions. Major emissions include particulate matter, carbon dioxide, sulfur oxides; and nitrogen oxides, and air- and water-borne emissions of heavy metals, including lead and cadmium, may be an environmental hazard as well.

Of these pollutants, emissions of sulfur and nitrogen oxides—the "acid gases"—are of the most immediate environmental significance from a regional point of view. Acid gases combine with water in the atmosphere to form nitric and sulfuric acids, which then fall to the ground with rain, snow, or fog (hence the term "acid rain"). Dry deposition of sulfur and nitrogen oxides also occurs. Both sulfur and nitrogen oxides are readily transported in the atmosphere, thus a portion of the acid gas emissions from the DPRK ultimately falls on (and affects the environment in), Japan (which, because of prevailing wind patterns, tends to receive the largest share of the DPRK's acid gas exports)\(^p\), the ROK, China, Russia, and other nations. As a consequence, the development or re-development of the electricity system in the DPRK is a matter of environmental concern for all of the countries of the region. Table 5 presents our estimates of sulfur oxides (SO\(_x\)), nitrogen oxides (NO\(_x\)), and carbon dioxide (CO\(_2\)) emissions in the DPRK from 1990 through 2005, including both our Recovery and Decline scenarios.

\(^p\) Peter Hayes and Lyuba Zarsky, 1995. Acid Rain in a Regional Context, in Science and Technology Policy Institute and the United Nations University's Joint Seminar on "The Role of Science and Technology in Promoting Environmentally Sustainable Development." Science and Technology Policy Institute and The United Nations University, Seoul, Republic of Korea, June 1995. See also Table 6-2 in this report.
Table 5: Estimated Acid Gas and CO₂ Emissions from the DPRK, 1990 - 2005

<table>
<thead>
<tr>
<th>YEAR/SCENARIO</th>
<th>Sulfur Oxides (thousand tonnes)</th>
<th>Nitrogen Oxides (thousand tonnes)</th>
<th>Carbon Dioxide (million tonnes)</th>
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<tbody>
<tr>
<td>1990</td>
<td>826</td>
<td>552</td>
<td>131</td>
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<tr>
<td>1996</td>
<td>460</td>
<td>313</td>
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<tr>
<td>2000–Recovery</td>
<td>733</td>
<td>501</td>
<td>116</td>
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<td>2000–Decline</td>
<td>443</td>
<td>321</td>
<td>70</td>
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<tr>
<td>2005–Recovery, Domestic Use of PWR Power</td>
<td>780</td>
<td>533</td>
<td>124</td>
</tr>
<tr>
<td>2005–Decline</td>
<td>489</td>
<td>355</td>
<td>77</td>
</tr>
</tbody>
</table>

Interconnection of Regional Electricity Systems

Interconnecting the electricity systems of China, Russia, North and South Korea, and perhaps even (eventually) Japan would have a number of benefits, including:

- Providing a way for resource-rich regions to sell power to areas where demand for electricity is greater than supply;
- Providing a vehicle for power exchanges that allow a better overall match between the timing of power demand and seasonally-varying supply (for example output from hydroelectric plants);
- Providing a method for reducing overall capital investment in generating facilities (as less reserve capacity would have to be built in any one country); and
- Setting the stage for further cooperation, thus acting as a catalyst to spur the development of the entire region.

Establishing such power interconnections on a wide scale in Northeast Asia, however, will require overcoming a daunting array of technical, financial, and most of all political obstacles. Care must also be taken that interconnection does not become a mode of simply transferring environmental problems from one location to another within (or outside of) the region.
Power Interconnections in the Tumen River Area

Providing regional interconnections, including connections between the DPRK and China and Russia in the north, and the DPRK and the ROK in the south, will involve the installation of interconnection equipment. The Chinese and Russian electrical systems use a frequency of 50 Hz, while that in the ROK is 60 Hz. In all three cases, interconnection of power systems with the DPRK will more than likely require installation of AC (alternating current) to DC (direct current) to AC converters. A study for the Tumen River Area Development Programme in 1994 estimated the cost of interconnection hardware at $US460 billion per gigawatt (GW) of capacity, but Siemens indicates that the cost for a set of state-of-the-art solid state converters may be closer to $US125 million per GW. Either way, these devices are expensive. Interchange costs can be offset, however, by reductions in required reserve capacity in one or both of the interconnected systems. That is, the interconnected systems (in aggregate) need not build as many power plants; thus there is significant capital cost savings.

9 For example, to sell power from the Pressurized Water Reactors (PWRs) to be supplied to the DPRK by the Korean Peninsula Energy Development (KEDO) under the terms of the Agreed Framework between the United States and the DPRK.

1 Order-of-magnitude cost estimate obtained in conversation (1997) with G. Jutte of Siemens Power Transmission and Distribution, Limited. There are a number of technical issues that will have to be considered when and if AC-DC-AC converters are to be used in Korea, including the line voltage on the DPRK side, the distance over which the power must be transferred, and many others.

' At present, there are several power plants on or near the border of the DPRK and China that are shared by the two countries. We do not know whether these plants operate at the standard Chinese or standard DPRK generating frequency, or whether there are frequency conversion systems in place to serve both grids. We suspect (but do not know) that the plants operate at a nominal 60 Hz, and are designed to feed power to Chinese cities and industries that are isolated from the Chinese grid.
Interconnecting the Power Grids of the DPRK and ROK

Although the ROK power grid operates at nominally the same frequency as the DPRK grid\(^1\) we suspect that interconnection of the grids, in their present form, will require some power conditioning at the point of interconnection to assure that the power entering the ROK meets ROK standards for frequency and other attributes. The best way to achieve this outcome is probably to add a station near the DPRK/ROK border that converts the AC power from the DPRK to DC power, then back to AC power synchronized with the ROK system for export to the south. This conversion process would be carried out using a series of solid-state devices. Power losses through these types of AC-DC-AC system are minimal, typically much less than 1%. The cost of AC-DC-AC systems of the size that would be required assume a cost of US $125 million per GW of capacity (as indicated above), or about 5% of the costs of the PWRs to be transferred by KEDO.

This information about the types and costs of technologies required for power inter-conversion costs suggests (to us) two interesting questions related to the ordering of ROK assistance (if forthcoming) in revamping the DPRK grid:

- Should the first step in assistance be to interconnect the two grids, so that power can be sold (for example) from the KEDO-provided PWRs to the ROK; or would the ROK (and, ultimately, a unified Korea) be better served by revamping the DPRK system first to make it suitable to synchronize with the ROK grid (effectively creating one Korea-wide system), thus avoiding (at least some) power conditioning costs? Revamping the DPRK electricity grid would likely be primarily a task led by the ROK, but could involve cooperation from the other countries of the region. There is an incentive for other countries in the region to assist in the upgrading of the DPRK grid; power transfers between China or Russia and the ROK would for practical purposes have to go through the DPRK, thus refurbishing the DPRK grid is a

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\(^1\) The fact that the power grids in the Koreas operate at a different frequency than most of the rest of continental Asia (and virtually all of Europe) is probably a legacy of the Japanese. Japan uses both 50- and 60-cycle grids ("Listing of Countries with their Frequency and Voltage", provided on ZZZAP Power World-wide Web site http://azap.com/countries.html).
necessary step toward a truly regional electricity intertie. KEDO may be a suitable institutional vehicle for implementing such a scheme in the medium-to-long run.

- Would it be less expensive and technically less risky (again, assuming that the power from the PWRs is to be substantially sold to the ROK) to simply connect the PWRs to the ROK grid, but not (at least initially) to the DPRK grid? Doing so, of course, could face political difficulties quite apart from its practicality, and might raise additional political questions about the PWR transfer. In this case, it might be necessary to build a new transmission line from the reactor site to the ROK border.

**Regional Planning for Electricity Infrastructure**

The Agreed Framework—in particular to the extent that it results in the DPRK selling power from the KEDO-supplied nuclear reactors to the ROK—and planning for the development of electricity systems for the TREDNA region together provide a precedent for bringing DPRK decisionmakers into the process of planning electricity infrastructure for the Korean Peninsula and Northeast Asia as a whole. Both processes will require the DPRK to provide details of at least portions of the DPRK transmission and distribution grid to engineers and planners from the ROK and elsewhere. If these cooperative projects proceed successfully, it is possible that the DPRK can be enticed into discussions of additional shared infrastructure for Northeast Asia, including gas pipelines, transport facilities, and electricity transmission infrastructure. An inducement for the DPRK might be the opportunity to share in the prosperity of a globally-competitive Northeast Asia. At the same time, DPRK participation will provide an opportunity for all of the parties of the region to meet and discuss infrastructural issues of mutual benefit to the countries of the region. The recent DPRK-ROK agreement with regard to initial aspects of implementation of the PWR transfer is a favorable precedent for future agreements.

Other intra-regional electricity infrastructure projects under discussion include power exports from Russia to China, including transmission via Mongolia. This sort of scheme, like a regional power compact involving the DPRK, will require that the
countries of the region collaborate on making sure that the power grid in Mongolia is robust enough to handle the anticipated power transfers.

**Cooperation to Ensure Compatibility of T&D Dispatching Equipment, Modeling Software, and Protocols in the Countries of the Region**

To the extent that infrastructure to move power between the countries of the region is to be developed, it will be necessary to develop and institute cooperative programs so that the parties involved in electricity transfers effectively "speak the same language." This objective means that, ideally, personnel from (for example) the ROK should either use or be well-versed in the use of the dispatching and system-modeling software in use in the DPRK, and vice versa. Ideally, a regional Center for training of system operators could be set up to train personnel from all of the countries in the region in the protocols and techniques of operating international interconnections.

**Security Issues and Scenarios Associated with Power Interconnections**

The connection of power grids across borders implies a substantial degree of commitment to cooperation. In general, such commitments should enhance mutual trust, and thus enhance security. This should certainly be the case regarding the interconnection of Russia, China, and the DPRK. An interconnection between the DPRK and the ROK should probably also lead to greater mutual trust and cooperation, but suggests more complex security issues. For example, would the DPRK, under some pretense, attempt to extort the ROK in some way by threatening to cut off the flow of power from the PWRs? It seems unlikely that such a move would be effective, given the size of the ROK grid, but such a move remains within the realm of plausibility. It is also possible that the ROK could threaten to withhold payments for power (which the DPRK will likely desperately need) in order to elicit some sort of political or military compromise by the DPRK. The increased cooperation between the Koreas implied by a power interconnection also means an increased flow of people and material between the
countries, which could open up greater opportunities for spying and other clandestine activities.

**Cooperation/Technology Transfer on Fire Prevention and Fire fighting Technologies**

Our understanding is that the DPRK possesses limited capabilities for fighting wildfires or for preventing conditions that lead to wildfires. We suspect that this is also true, to varying degrees, in Mongolia and the Russian Far East. Another possible area of cooperation between the countries of the region might be to provide mutual assistance in acquiring and learning to use modern tools and techniques for fire prevention and fire fighting, including maintaining transmission line corridors to keep them free of combustibles, and for fighting fires (when they do occur) in or near transmission line corridors and other electricity infrastructure. To the extent that the countries of the region connect their electricity grids, maintaining fire control around electricity infrastructure in the DPRK and elsewhere may become a higher priority in Northeast Asia.

**Possible Synergies and Competition with Other Large Infrastructural Projects**

The establishment of regional power interconnections may pave the way for other large regional infrastructure projects, but may also compete with other projects for scarce resources. If cooperation between the countries of the region on power interconnections proves fruitful, then it may help to establish a level of trust necessary to forge other infrastructural links, including high-volume rail connections, expressways, shared harbors, and natural gas pipelines (carrying gas from, for example, fields in the Russian Far East). If the sale of power from the KEDO PWRs to the ROK proceeds smoothly, then the ROK may wish to try and site additional power generation, particularly coal and nuclear units, in North Korea. In addition, if power interconnection is successful, it may enhance the ability of the countries of the region to secure financing for joint infrastructural projects, as a track record will have been established so as to make
investments in the region seem less risky. In addition, the presence of electricity interconnections may help to spur the development of roads, pipelines, harbors, and the like by attracting enterprises that would use the infrastructure of the region.

Conversely, power interconnection projects may compete with other infrastructural projects for capital resources. All of the regional infrastructural projects are likely to be quite expensive (costs for major gas pipeline projects, for example, have been estimated at $US20 billion or more\(^{23}\)), and it is not yet clear where the funds for the investments will come from.

**Strategies for Institution-Building**

If the goal of an environmentally cleaner, more efficient power system in Northeast Asia is to come to fruition, one requirement is that each of the countries of the region have institutions that:

- Have a clear mandate for planning, operation and control of specific elements of their country’s electricity system (or of their country’s portion of international interconnections);

- Are adequately equipped—for example, with both monitoring and testing technologies and trained personnel to use the technologies—to oversee, manage, and assure quality control on power transactions; and

- Can assure that issues of environmental protection (and, indeed, improvement) will be adequately taken into account when arrangements for international energy infrastructure are made.

In addition, one or more international organizations including representatives from the countries of the region (and other countries, if applicable) should be set up with the mandate, power, and wherewithal to (among other tasks):

- Assure consistency in energy planning between the countries of the region;
• Negotiate prices for power transactions, and individual country contributions to the costs of shared power supply infrastructure;

• Monitor, negotiate, and address regional environmental and social issues of concern to the partners in the regional electricity system; and

• Address issues of differing environmental standards between the countries of the region.

**Regional Cooperation on National Long-Range Electricity and Energy Planning**

The countries of Northeast Asia might consider setting up an inclusive sub-regional compact (perhaps organized as a work-group, center, or network of centers of excellence) to adopt compatible, transparent energy planning approaches in each of the countries of the region. The goal of this compact would be to develop energy plans that are consistent across nations, that is, use common assumptions to the extent possible, demonstrate coordinated use of key resources such as fossil fuel reserves, sea lanes and other transport facilities, and environmental resources; and promote sustainable development.

One early task of such a regional energy planning network might be the development of a *regional database* of the existing and planned *electricity infrastructure* in each country. A database of electricity infrastructure might contain, for example:

• The names and locations generating facilities, with their capacity rating, fuel usage, technology type, vintage, past/projected performance history, and seasonal variation of output;

• T&D line routes and specifications;

• Substation characteristics;

• T&D dispatching apparatuses and protocols;
• Resources for electricity generation (fossil fuel deposits and transport facilities, hydraulic resources, wind resources, biomass resources, and geothermal resources);

• Electricity infrastructure investment needs; and

• Other elements pertaining to the electricity systems of the countries of the region.

Another possible cooperation strategy might be for the countries of the region, and others outside the region, to assist in training officials in the countries of the region in the tools and techniques of energy and environmental planning. The energy-sector agencies in the DPRK, Mongolia and (to some extent) China and the RFE are not accustomed to employing the concepts and tools of energy efficiency and energy-environmental analysis in their electric sector planning. Training is needed in these disciplines for those who will need to formulate and implement energy efficiency, renewable energy, and environmental protection policies in Northeast Asia. Personnel at many levels will need to be provided with information and training, from very high-level party officials to boiler operators and energy census-takers. It will also help to provide officials at the planning level (at least) with computer software (and easy-to-use computer hardware) that will help North Korea (in particular) to organize the energy data it has, find and fill data gaps, produce energy supply-demand balances, and prepare alternative energy plans for the future, taking into account environmental and other policy considerations. Ideally, such software could be used in many different ministries. This would allow and provide a vehicle for fruitful and substantive contact between different ministries whose work touches on (due to the multidisciplinary nature of energy issues) the energy sector. Initially, training will likely need to be staffed by experienced organizations outside of the region, but one focus of this initial training should be on developing expertise inside the region and inside each country in the region. One way to build this expertise is to have some regional trainees present at the first training seminars act as assistant trainers in subsequent courses, until they are ready to teach courses on their own. Including as trainees in the first training seminars those whose traditional role in their countries is the dissemination of
information, techniques and technologies (university professors, for example) would also seem prudent.

With training, data, and analysis tools in hand, officials in the region will be ready to formulate and evaluate national or sub-national energy and environmental management plans, and to communicate with counterpart organizations from the countries of the region. In our experience, DPRK officials (for example) are typically fairly well-versed and aware of the international resources (for example, the Global Environment Facility) that may be available to help implement such plans, but there will probably continue to be a role for experts from abroad in assisting North Koreans in obtaining extramural support for and implementing sustainable energy and environmental policies.

**Operation and Control of Interconnections**

The interconnection of electricity systems across borders in Northeast Asia raises a number of institutional issues that will have to be addressed through negotiation and regional cooperation. Among those that occur to us are:

- **Control of electrical dispatching across countries**: Where power is shared across countries, which countries (and which national or international institutions) control the dispatching of power resources? In particular, if power is to be sold from the PWRs in the DPRK to the ROK, will the ROK be able to control the dispatching of the reactors? The same sort of questions might arise, for example, regarding power sales from Mongolia and the RFE to China. Will it be necessary to set up bilateral or multilateral institutions to decide on dispatching, and if so, how will such institutions achieve the rapid responses necessary for such a function?

- **How will accounting and billing systems** be set up for transferred power, and who will be responsible for their operation?

- **How will the prices of electricity transfers** be set, and in what currencies will they be paid? How will changes in power rates be negotiated and implemented? What jurisdictions will adjudicate disagreements between parties on power transactions?
Lessons from other jurisdictions that have already grappled with many of these issues (including Eastern and Western Europe, and Latin America) may be applicable (in part) to conditions in Northeast Asia. Information about these other examples of power interconnection should be reviewed.

**Institutional Issues in Financing of Interconnection Infrastructure and Cleaner Technologies**

If electrical conversion devices capable of carrying on the order of gigawatts of power are to be installed to connect the countries of Northeast Asia, it is clear that those devices will cost hundreds of millions of US dollars. Financing these investments will not be trivial. Issues in arranging financing for interconnections are likely to include:

- To whom will loans be made? Individual countries? Multi-national consortia of national institutions?
- Who will provide the loan? Multinational lenders? Commercial banks?
- What will serve as the collateral (or revenue source) to provide debt service?
- Is there scope for private sector involvement in the financing of interconnections?
- The benefits of interconnection will include reduced need to build generation capacity in one or more of the interconnected countries, but these benefits may not (and probably will not) be equal in each participating country. How will these benefits be calculated, who will calculate them, and how will the results of the benefit calculations affect who pays how much for the interconnection (and the power that flows through it)?

In a discussion of funding mechanisms for sustainable energy development, Razavi\textsuperscript{24} points out the need for a facility to finance risk reduction so as to enable power plant construction agencies to adopt commercially available but new clean coal power plant technologies. Mechanisms are also needed for funding technological adaptation and local manufacturing so as to reduce the cost of environmental control technologies in the
electricity sector. Similarly, mechanisms are needed for financing of energy conservation investments. Razavi makes these points in the following passage:

"Reducing Risk in Using Clean-Coal Technology. The use of clean-coal technology in the region has very large potential benefits. However, these technologies are mostly new and some untested on a large commercial scale. Application of these technologies in the region is now limited due to uncertainties about the cost and operational performance of plants using such technologies. There is a need to devise a financial system which can reduce the risk based on insurance, guarantees, and other methods of risk mitigation. The target countries would be China, Taiwan, South Korea, and, at a later stage, North Korea.

"Providing Financial Incentives for Energy Conservation in China. In China, energy conservation offers significant potential gains in both economic and environmental terms. The government has established, during the last 10 to 15 years, a solid program of physical control systems, financial support, R&D, information dissemination and training. Also, substantial progress has been made through more objective energy pricing induced by the recent market reforms. However, the same market reforms have caused a gradual dismantling of the energy conservation program, mostly because the government is withdrawing its support and leaving it to the market to take care of the matter. The challenge is to redirect the program to the new market environment before it loses its powerful ingredients."

On the topic of natural gas use, Razavi makes the point that a financing mechanism for investments in natural gas supply infrastructure (and in electricity generation facilities that use natural gas) should take into account the positive environmental attributes of gas as a fuel. Assuming that the bulk of infrastructural investments of this type will be funded from the private sector, Razavi suggests that such as financing mechanism "would require a financial system, and correspondingly a
modified bidding process to encourage private bidders to take account of the environmental benefits of gas and to invest in gas import and gas-based power generation."

Involving Local Stakeholders in Energy Infrastructure Decisions, and Incorporation of Ideas/Criteria of Sustainability

If power interconnections go forward, what steps can be taken to assure that the needs of stakeholders in the region, including representatives of communities who will host power lines, power plants, and interties, will be taken into account as interconnections are planned and built? At present, most of the countries of the region have had only limited experience in incorporating the needs of individual communities in decisions on large scale infrastructure, as the interests of the State have usually come first. As the economies of China, the RFE, Mongolia and (under some scenarios) the DPRK open up, those communities that have been up to that point shut out of the decision process may demand a role in decisionmaking. What sort of cooperation structures and institutions can be set up so that regional projects meet not only financial and technical criteria, but incorporate the ideas and criteria of social and environmental sustainability as well?

The beginnings of a recognition of the role of local stakeholders in providing input to energy-sector decisions in the region is included in the Memorandum of Understanding on Environmental Principles Governing the Tumen River Economic Development Area and Northeast Asia**, signed by the governments of the DPRK, Mongolia, China, the ROK, and the Russian Federation. This Memorandum of Understanding (MOU) states in part (Section 2.4) that:

"The Contracting Parties [the five governments signing the MOU] will consult with, give access to information to, and provide opportunities for involvement by affected

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citizens and interested NGOs at appropriate stages of the development and environmental planning processes for the Region."

This agreement led to the first Workshop on Tumen Development, held in early 1997, to which NGOs were invited. Although formulated specifically in the context of the Tumen River Economic Development Area, the MOU described above sets a preliminary standard to which regional electricity projects may be held accountable, not just in the Tumen River area, but in general.

**Tumen River Area Development and Ramifications for Electricity Supply/Demand and Cooperation in the Region**

The area where the Tumen River meets the East Sea of Korea (Sea of Japan), and where the borders of the DPRK, China, and Russia converge, has been the focal point of UNDP-coordinated efforts to establish a regional trade and enterprise zone. These efforts, to some extent, serve as a feasibility study of potential wider infrastructural cooperation in the region in the future.

The focus of this trade and enterprise zone is a roughly triangular region of 800 km² connecting the cities of Hunchun in China, Rajin in the DPRK, and Zarubino in Russia. This area is called the Tumen River Economic Zone (TREZ), and is centered on the ice-free harbors in the area. The broader region in which the Zone is located is called the Tumen River Economic Development Area (TREDA), covering 9,200 km² in an area spanning Yanji in China, Chongjin in North Korea, and Vladivostok in Russia. Should the planned development of infrastructure the TREDA region come to fruition, it could lay the groundwork for further regional cooperation on development of regional electricity connections and other infrastructure.

**Energy and other infrastructure planned for Tumen River area**

A UNDP document provides a discussion of the potential needs of power and other energy services in the TREZ and TREDA through the year 2020. In order to serve a 2020 population in TREDA that is about three times that in 1995, with a year-2020 GNP (in this case, regional economic product) that is more than 20-fold higher than 1995 levels
(and 40-fold higher than current levels in the DPRK portion of TREDNING), forecasts call for an increase in electricity consumption of between 3.5 and 5-fold, with a similar increase in peak load. This increase in load would be met by construction of generating capacity in TREDINA totaling 7,200 MW by 2020, with more than half of that construction occurring between 2010 and 2020. Of the total of 7,200 MW, 2,000 MW of capacity is planned for the DPRK portion of TREDINA. As of 1994, the optimal means of serving the TREDINA area with power from the three countries was still under discussion, with the options being to serve each country's portion of TREDINA separately (without power interconnections), or to interconnect the systems of two of the three countries (thereby allowing savings in required reserve capacity by each of the connected systems). Substantial increases in electricity transmission and distribution capacity will also be required. This increase in T&D infrastructure will include an increase in the number of substations in the DPRK from four as of 1995 to 16 by 2020, and the addition of nearly 1,500 conductor-kilometers of transmission lines (at a total estimated investment cost on the order of $US 600 million).

Plans in TREDINA also call for an expansion in oil refining—most likely a substantial upgrade of the DPRK refinery at Sonbong, which is now the only refinery in TREDINA—and expansion and connection of rail, harbor, and road facilities. The goal of the economic zone, of course, is to attract investment in industrial and commercial enterprises to the TREDINA area. Although little has been done, as of this writing, in the way of groundbreaking for major infrastructural improvements in TREDINA, the Zone continues to attract investor interest. Several million dollars have reportedly been invested in port and container-shipping facilities in Rajin by Chinese and Russian companies. If investment in TREDINA industries and infrastructure begins to gain momentum, it will likely serve as a spur for regional cooperation on electricity and other infrastructure throughout the region.

A UNIDO (United Nations Industrial Development Organization) document lists the proposed expansion at the Sungri refinery in the Rajin Sonbong area as a five-fold increase in capacity (from 2 million tonnes/yr to 10 million tonnes/yr) by 2030, at a total investment cost of 5.8 billion won, including $US 2.3 billion in hard currency. (UNIDO, 1995. Investment Promotion Programme. Industrial Investment Project Profile. Project No. DRK/V/95-12/045. December. UNIDO, Vienna, Austria.)
Industrial development planned for area

A large and diverse set of industrial facilities are planned for the TREDÁ area. A list of potential investment opportunities provided by UNIDO includes:

- Several types of food processing concerns;
- Textile, garment, leather, and footwear manufacturing;
- Wood and paper products;
- Printing houses;
- Chemicals production facilities;
- Drug, pharmaceutical, and cosmetics manufacturing;
- A petrochemical factory;
- Glass and brick manufacturing;
- Iron and steel industries;
- Tools and home implements manufacturing;
- Non-metallic products manufacturing;
- Machinery, appliance, and electronics manufacturing;
- Motor vehicle and bicycle production;

and other industries—in short, virtually the entire suite of industries one would find in a full-fledged economy". Joint venture investments in these types of concerns involving DPRK enterprises and foreign entrepreneurs, if they are successful, should spur investment and development in other areas of the DPRK, including development of energy and energy-efficiency technologies and regional infrastructure. In order for this to occur, however, DPRK organizations and foreign investors must both come to see the joint venture process as a positive, practicable one that benefits both parties.

Strengthening Regulatory Agencies and Educational/Research Institutions in the Region

In most of the countries of the region there is a need to strengthen a variety of government institutions through a combination of provision of information, persuasion of leaders, training of personnel, and supplying of institutions with needed equipment. Many of these tasks are being started by UNDP and other ongoing programs.

One general area in which the institutions of several of the nations of the region (notably the DPRK, Mongolia, the Russian Far East, and China) could be strengthened is in their ability to implement standard and enforce them. DPRK officials, for example, have made general statements about their support for energy efficiency and environmental protection. The next step is to codify these in terms of quantitative standards for the efficiency of new appliances and equipment, as well as effluent standards for new—and perhaps eventually, existing—factories, power plants, residential heating boilers, vehicles, and other major sources of pollution. Once standards are set, it will be necessary to create the capability to enforce them by recruiting and training enforcement personnel and supplying them with the tools necessary to do their job (testing equipment and adequately equipped labs, for example) and the high-level administrative support needed for credible implementation of sanctions.

There is not as yet in the DPRK, for example, a single center of technical excellence that is devoted to the study and promotion of energy efficiency and renewable energy opportunities. We would encourage the formation of such an institution, which could be modeled on existing institutions like the Beijing Energy Conservation Center and a similar Center in Russia. The Center in China was established jointly with the Battelle Pacific Northwest Laboratory and the Lawrence Berkeley National Laboratory (both U.S. government-sponsored organizations with extensive experience in energy demand issues), and the Center in Russia was founded with Battelle. It is possible that the Center for the Rational Use of Energy (CRUE), formed within the existing Institute of Thermal Engineering under a UNDP project, could be strengthened through a combination of North Korean and extramural support into such a center of excellence.
The first step will be to start training current CRUE staff in the fundamentals of energy-efficient technologies and analysis.

**Regional Needs for Technology Transfer**

In Section 1 of this paper we noted that Northeast Asia is an interesting mix of (1) countries with high technological capabilities and significant financial resources, and (2) other countries with extensive natural resources but with crying needs for key technologies and/or the money to pay for them. Particular electricity-sector categories where mechanisms for technology transfer both from within and outside of the region need to be implemented or strengthened include:

- "Clean coal" technologies—including pollution control equipment and technologies for pre-processing of coal to remove sulfur and ash;
- **Energy-efficiency technologies**—to reduce consumption of electricity and fossil fuels and delay the need for new generating facilities; and
- **Renewable energy technologies**, including wind, solar, and other power supply options.

**Potential Regional Collaboration for Transfer of Clean Coal Technologies**

Clean coal technologies include pollution control equipment ("end of pipe" technologies) for coal-fired power plants and other facilities, burner modifications to reduce emissions of acid gases and other pollutants, and fuel pre-treatment technologies. Energy-efficiency technologies for electricity generation (including integrated-gasification combined-cycle combustion) also usually reduce pollutant emissions by reducing the amount of coal needed to generate a kilowatt-hour of electricity. Clean coal technologies and their relative costs are described in a recent Nautilus Institute Report.

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Strategies for implementation of emissions reduction options

There are a number of generic strategies that could be promoted and/or facilitated by the regional international community to help to implement some of the emissions reduction options described in this paper. These strategies—which also apply to energy-efficiency and renewable technologies—could include (but are certainly not limited to):

- **Provide information and general training to government officials.** Getting initiatives such as industrial energy efficiency, and utility boiler emissions control programs, and fuel switching/renewable energy initiatives off the ground in the countries of the region (again, particularly China and North Korea) will be impossible without top officials embracing the concept. Consequently, the advantages and local/international opportunities provided by the measures and technologies covered here must be presented to top officials in a manner that is both forceful and forthright².

- **Provide specific information and training to local actors.** Training of a very specific and practical nature must be provided to personnel at the local level. Examples here are factory energy plant managers, boiler operators in residential and commercial buildings, power plant and heating system operators, and new job classifications such as energy-efficiency and pollution control equipment installers, energy auditors, and environmental officials.


² One of the concepts that should be stressed in the sort of training described here is the concept of "no regrets" development paths. No regrets measures are changes in the way that fuels are produced or used that are environmentally beneficial (reducing, for example, acid gas and/or greenhouse gas emissions), but have minimal, no, or even negative net cost when all of the costs and benefits of the measures are taken into account. These strategies are discussed in the context of climate change and sea level rise in *Climate Change and the Potential Rise in Sea Level with their Socioeconomic Impacts and Response Strategies*, prepared by the authors for the Economic and Social Commission for Asia And The Pacific (ESCAP) Preparatory Meeting for the Ministerial Conference on Environment and Development in Asia and the Pacific 1-4 August 1995, Bangkok, Thailand.
• **Establish programs of grants and concessional loans.** Experience in China has shown that such a program in itself can have a significant positive impact in overall sectoral energy efficiency. The benefits of institutionalizing support for pollution control and energy efficiency, however, would go beyond those obtained through the various individual projects themselves. Creating government agencies or corporations with their own budgets would signal a strong commitment to acid gas emissions reduction on the part of the government, and would create a constituency within official circles for promoting environmental protection. Moreover, by establishing a pool of funds for which government ministries, sectors, and/or individual enterprises could compete, it would stimulate at all levels awareness of the potential, methods, and technologies for reducing acid gas emissions.

• **Modify existing incentives for energy efficiency and pollution prevention.** Depending on the structure of a country’s economy, it may be possible to implement administrative measures (in non- or semi-market economies) or efficiency regulations and inducements (in market economies) that will help to spur the incorporation of appropriate technologies in new and existing infrastructure.

• **Promote Joint Ventures and Licensing Agreements.** The growth in the need for pollution control and energy-efficiency equipment, could be met by domestic production through joint ventures and licensing agreements between governmental or private organizations in China and North Korea and foreign firms (especially, for Northeast Asia, South Korea, Japan, and the United States) with the necessary expertise to produce the needed equipment. For example, a wide variety of efficient industrial equipment and controls— including adjustable speed drives, higher-efficiency electric motors, and improved industrial boilers— have already been introduced to China through commercial channels and are being or will be manufactured there.

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"Bringing together a large number of relatively small-scale demand side projects under the umbrella of a single program, for example, may also go some way towards mitigating the bias towards large-scale projects."
Regional cooperation on acid rain issues

Helping the DPRK, Mongolia, and the Russian Far East with modifications of boilers and burners to improve efficiency (and thus reduce all pollutant emissions) or to add simple “end-of-pipe” emissions reduction equipment to selected plants is an urgently-needed mission that will benefit all of the countries of the region. A UNDP project to introduce Chinese fluidized-bed boiler technology to the DPRK is already underway. This UNDP project could be augmented by assistance from KEDO or others, and might provide a vehicle for interesting and engaging China, Russia (as a recipient of financial assistance and as a supplier of less-expensive equipment), and Mongolia in regional cooperation to reduce acid gas emissions.

The DPRK has some acid rain monitoring sites that could be incorporated into regional Northeast Asia monitoring networks. Providing assistance with this integration process would help to build confidence within the DPRK and between the DPRK and its neighbor countries.

A multinational UNDP effort entitled Air Pollution from the Combustion of Coal, Northeast Asia Subregional Project has included expert missions to each of the countries of Northeast Asia (including DPRK) to assess the status of coal combustion and preparation technologies. An additional component will be a substantial effort to develop regional capabilities for modeling of trans-boundary air pollution in the region, building on the RAINS-ASIA project as well as other bilateral initiatives.

Cooperation on Technology Transfer for Manufacturing of Efficient Electricity-Sector Equipment and Renewable Technologies

Sustained economic recovery in the DPRK, Mongolia, and the RFE will likely require that a large portion of the electricity-sector infrastructure in those countries—including electricity supply and demand equipment—will have to be substantially
refurbished or completely replaced. Refurbishment of electricity infrastructure in China has been proceeding rapidly, but still is still an important need.

On the supply side, equipment that will have to be rebuilt or replaced include boilers, pollution control equipment, generators, T&D equipment, and others devices. Cooperation to assist the developing and re-developing countries of the region in manufacturing these types of devices, for domestic use and potentially for export to other countries, would help to upgrade the region’s overall power system. Cooperation to establish such manufacturing capability would also ultimately reduce pollution within the countries of the Northeast Asia, and would reduce trans-boundary transport of pollution to the rest of the region. Upgrading the electricity-sector infrastructure in the countries of the region would help to make their electricity systems more technically suitable for participation in a regional power grid.

The combination of the technological skills available in the ROK, Japan, Russia, and (to an increasing extent) China together with the renewable resource bases in Mongolia, the RFE, parts of China, and to a more limited degree the DPRK make cooperation on production of renewable energy technologies attractive. Because most renewable technologies emit neither acid gases nor greenhouse gases, technology transfer is also very attractive from an environmental perspective. The environmental benefits of renewable electricity generation technologies may make the funding of cooperative projects easier, particularly as funding mechanisms from the Framework Convention on Climate Change continue to evolve. Renewable energy technologies may be particularly suitable, from both technical and environmental perspectives, for rural electrification in remote areas. Considerations of the role of different technologies and approaches in rural electrification are likely to be particularly important in Mongolia, and possibly to some extent in the Russian Far East.

On the demand side, promotion of domestic production of energy-efficient products is a potential cooperation strategy. This approach could involve ventures such as

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establishment of foreign-owned factories for making appliances, lighting products, and other types of energy-efficiency equipment, as well as joint ventures between foreign companies and concerns in North Korea, China, and other countries in which foreign technology is licensed for production in the region. Examples of foreign-owned factories and licensing of technologies abound in the developing world, including a number of ventures in Eastern Europe and the Former Soviet Union\textsuperscript{31} and in China. It is likely that the earliest examples of such technology transfer to the DPRK (in particular) will come in the context of ventures in the Tumen River Economic Development Area.

In addition to assistance in manufacturing new energy-sector devices, and perhaps of more immediate concern, the DPRK, Mongolia, and the RFE will likely need help in retrofitting key power plants and T&D infrastructure. The oil-fired generation facility in the DPRK at Sonbong, for example, could likely be converted to combined-cycle operation, with a considerable increase in both capacity and generating efficiency. Retrofitting coal-fired plants for pollution control, fuel substitution (such as natural gas and low-sulfur oil), widening the use of fluidized-bed boilers and potentially integrated gasification combined-cycle coal-fired units, boiler refurbishing, the addition of boiler process control equipment, and a host of other upgrades to existing infrastructure will be necessary to assist the DPRK, Mongolia, and the RFE into a Recovery mode. Many countries inside (Japan, the ROK, and Russia) and outside (the United States) Northeast Asia have the expertise needed to help with these infrastructural upgrades.

**Involving the Private Sector in Investments and Technology Transfer**

Much of the money and other assistance necessary to help the countries of the region toward recovery and economic development will have to come from the more flexible and fast-moving private sector. It is likely that inducements and guarantees—possibly supplied by other governments of the region—will be necessary in order to mediate the risk to private firms of dealing with the DPRK, and possibly Mongolia and the RFE as well.
As noted above, one way that the governments of the region, and governments of other countries with an interest in what happens in Northeast Asia (including the United States), can help in this regard is to promote joint ventures and licensing agreements. The governments of the region and other interested parties should promote joint ventures and licensing agreements between DPRK concerns (governmental or otherwise) and foreign firms with energy-efficient technologies to produce. Compact fluorescent light bulb factories are a commonly-cited example of potential energy technology transfers. A wide variety of efficient industrial equipment and controls (including adjustable speed-drive motors and improved industrial and utility boilers), efficient household appliances and components, and efficient building technologies have already been introduced to China through commercial channels, and are being or will be manufactured there. Local manufacturing can be instrumental in reducing the cost of cleaner technologies, including pollution control equipment, renewable electricity generation equipment, and energy-efficiency technologies. Funding is needed to adapt imported “clean” technologies so that they can be manufactured locally and so that they are applicable to local conditions.

Wind turbine generators are another intriguing possibility, given the apparent success of such ventures in former Eastern Block nations and the historical emphasis on machinery manufacture in North Korea, Russia, and China. Foreign firms that have successfully transferred efficient and renewable technologies to China, Russia, and Eastern European nations represent a valuable repository of experience that could be applied to similar efforts in the region. Depending on how fast the Tumen River Economic Development Zone develops (infrastructure in the area is not yet adequate to support major industry), this area could be the location most acceptable to the DPRK for the first such ventures on North Korean soil.

**Cooperation on Nuclear Issues**

As noted in Section 1 of this paper, Japan and South Korea are already major users of nuclear power, China is starting a nuclear program, and North Korea is scheduled

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"Adaptation of technologies would include, for example, making particular devices suitable for the unit sizes and fuel compositions found in the country where they are to be manufactured and applied."
to receive 2 GW of nuclear capacity as a part of the Agreed Framework. As the ROK will play a major role in providing equipment for and constructing the nuclear plants in the DPRK, nuclear cooperation between those countries, at least as far as plant assembly and (probably) operation, is a given. The issue of how to manage the various categories of nuclear waste, however, has not been settled in a satisfactory way in any of the countries of the region. Proposals have been made for an "Asiatom"—a cooperative regional organization designed to coordinate nuclear activities in the countries of the region (and possibly, in the more distant future, found and manage a regional waste repository)\textsuperscript{dd}. Even short of such a formal regional organization, the ROK and Japan have expertise and technology in techniques for handling of nuclear materials that could be made available to assist the nuclear programs of other countries in the region\textsuperscript{ee}.

**Summary and “Next Steps”**

**Summary of the Regional Situation, and Needs for Regional Cooperation on Electricity Sector Issues**

By all accounts, the Northeast Asia region will continue to be a locus for explosive economic growth, and a corresponding increase in the need for energy services. Chief among the fuels needed to provide these services is electricity. Over the next fifteen years, several hundred gigawatts of new electricity generation capacity will be required in the region. Although the bulk of this growth in capacity will be in China, with strong but gradually slowing continued growth in the ROK, needs for electricity are also projected to rise in Japan. The DPRK, Mongolia, and the Russian Far East probably have sufficient generation capacity, if their coal-fired electric plants (and the mines that


\textsuperscript{ee} A forthcoming Nautilus Institute Report (*Two Scenarios of Nuclear Power and Nuclear Waste Production in Northeast Asia*) will describe the authors' analysis of spent fuel projections and technical options for interim storage of nuclear materials for the countries of the region.
feed them) can be suitably maintained, to last into the next decade even if those three economies post strong recoveries.

Several factors place limits on development of the electric power systems of the countries of Northeast Asia, and different countries face different limiting factors. Among the factors limiting electricity development are:

- A **shortage of capital** to invest in building new electricity infrastructure or repairing/upgrading existing plants and equipment (China, the DPRK, Mongolia, and the Russian Far East);

- A **lack of access to appropriate technology** to build cleaner, more efficient power systems (the DPRK, Mongolia, and to a lesser extent, China);

- A **lack of domestic natural resources** that can be used to fuel or power electricity generation (the ROK, Japan);

- A **set of moderate to severe environmental constraints** on “business as usual” development of energy systems, including the regional impacts of global warming, the deleterious impacts of acid rain in the countries of the region, local air pollution, and discharge of solid and liquid wastes.

Viewed as a whole, the countries and regions of Northeast Asia would appear to have all of the different parts—technology, financing, need, and resources—to assemble an effective, cleaner, and more efficient regional power system if long-standing rivalries, animosities, and political differences can be set aside. It is a situation where the whole definitely has the potential to be much more than the sum of the parts, but the “whole” will only come to pass if a concerted effort to foster regional cooperation on a number of fronts gets underway, and soon.

In this paper we have highlighted issues and options for regional cooperation in three areas pertaining to the development of electricity infrastructure in Northeast Asia.

- **Electricity interconnections** to allow substantial sharing of generating resources between countries;
• *Institutional changes* to help foster development of cleaner and more efficient energy systems within each of the countries of the region, and to help manage cooperative inter-country enterprises to develop and share power resources in a way that benefits both the economies of the region and the regional environment; and

• *Technology transfer* to see that the countries that need new technologies, or need help in financing technologies, receive the assistance that they need to make energy use in the region—and particularly the countries’ electricity systems—more efficient and less environmentally disruptive.

**Possible “Next Steps” to Encourage Regional Cooperation in Electricity Systems**

Below we present, as what we hope will be a catalyst for useful discussion, our non-exclusive list of several important steps toward a more environmentally benign, efficient electricity sector in the Northeast Asian region:

1. Assist and participate in confidence-building exercises with the DPRK—particularly, in the short run, those related to successful implementation of the Agreed Framework. The geographic placement of the DPRK is such that most practical schemes to involve the ROK in regional electricity, gas, or transport infrastructure must necessarily cross DPRK territory. As such, the reliable and productive participation of the DPRK is essential for the success of any regional infrastructural integration. In any scenario short of near-immediate reunification of North and South Korea, the DPRK will have to be engaged in numerous smaller international projects before the DPRK and its neighbors will have the confidence to proceed with large regional electric interties or other infrastructural mega-projects.

2. Convene an intra-regional working group, with membership from all of the nations in the region, to study energy sector development and options. The mandate of this sort of group, as suggested in Section 4 of this paper, might encompass taking inventory of the major energy facilities and resources (both natural and technological) in the region, developing country (or sub-country) energy plans for
each part of the region on a consistent and comparable basis, and exploring the economic, technical, social, political, and environmental feasibility of potential regional infrastructure projects. The intent here is that the working group build on the various unofficial and semi-official dialogues that have been taking place between the countries of the region by providing a group of international co-workers with a common work and a common goal around which to build confidence in each other.

3. **Continue and expand regional efforts in environmental monitoring and modeling.** An acid rain monitoring network already exists in Northeast Asia. Building on this network to broaden and deepen spatial coverage of data gathering on the severity and impacts of acid rain would be a logical next step, as would extension of the network to monitoring of marine pollution, the impacts of global climate change, water quality in shared rivers, and other environmental issues affecting shared natural resources. A regional effort for the modeling of trans-boundary air pollution, as an extension to an existing UNDP project in the region, is currently under discussion.

4. **Work together to design consistent and effective incentives for transfer of efficient and environmentally-beneficial technologies.** This process may include review of trade laws and practices in the region[^1], providing incentives for regional investment, joint ventures, and licensing arrangements, changes in electricity rate structures to promote environmental as well as economic goals, and other coordinated actions. The appropriate forum for these functions would have to be decided upon. For example, should a new regional body be created to deal with these issues, or could these technology-transfer functions be added to the mandate of an existing organization?

[^1]: For example, attention should be paid to coordination, within the countries of the region, of environmental regulations relating to resource extraction, so that one or more countries do not become so-called "pollution" or "resource extraction havens" as a result of lax environmental standards. See Mark J. Valencia, 1994. *Involving The DPRK in Northeast Asia Regional Economic and Environmental Cooperation*, prepared for The Northeast Asia Peace and Security Network of Nautilus Institute, January.
5. Cooperate to set up a facility for financing risk reduction with regard to adoption of clean coal power technologies. This could, for example, involve setting up a special bank (or fund within an existing institution) for augmenting existing financing in instances where highly effective air pollution control technologies—or control technologies new to the region—will be used in a coal power project.

Notes


7 Von Hippel and Hayes, supra n.3.


10 Fujime, supra n.9.


12 Fujime, 1996, supra n.9. F. Fesharaki, et. al. supra n.9.

13 Sinton, J., supra n.4.


Korea Energy Economics Institute (KEEI), supra n.5.


Ibid.

UNDP, 1994. supra n.22.


Document in authors' files [R1].


33 Martinot, *supra* n.31.
International Cooperation for Electric Power Development

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Introduction

Electricity is a very high-quality energy form. Its versatility, flexibility, adaptability, and amenability to control are unrivaled. There are many applications where electricity is indispensable, e.g., lighting, communications, and computing. In addition, the cleanliness, convenience, familiarity, and reliability of electricity make it the energy source of choice in many other applications. Since electric power is indispensable for economic growth and modern life, it is necessary to secure a supply corresponding to the expected or potential increase in demand. To do so the following problems must be overcome.

Securing a Stable Balance between Electric Power Supply and Demand

To secure a stable balance between supply and demand, it is necessary to accumulate know-how regarding accurate forecasting of demand as well as investment programs. This knowledge must include energy security, environmental measures, natural resource endowments, and the operational characteristics of each source of electricity generation.

In the future, it will be necessary to develop a vast range of electricity transmission and distribution facilities. But electricity supply technologies are very capital intensive, and there is a shortage of funds in developing countries for such purposes. In particular, it has become necessary to utilize private-sector funds and technology, including foreign investment through BOO and BOOT, especially in fields which are suitable for commercial investment, such as the development of thermal power
generation facilities. Moreover, in the developing countries there are a large number of villages which are not yet electrified, and it is necessary to promote rural electrification, taking into account the possibility of introducing new energy sources. In order for developing countries in the Asian region to raise capital it will be important to accumulate technology and know-how in the fields of design, construction, and work management.

In order to secure a stable balance between supply and demand, it is important not only to construct new infrastructure but also to promote the efficient operation of existing facilities. In this context it is necessary, with respect to power generating facilities, to enhance the efficiency of energy utilization through measures preventing superannuation of existing facilities, improving operation/maintenance technology, and enhancing thermal efficiency. With respect to transmission and distribution facilities, it is necessary to accumulate technology and know-how concerning power system operation and reduction of transmission/distribution losses. It is hoped that the private sector, including foreign enterprises, will contribute to the promotion of such operational technology and know-how as well as actively participate in the operation of such facilities. Apart from these supply side measures, it is also essential to enhance efficiency in energy utilization on the part of the demand side through creating an awareness of the necessity of energy saving and promoting the dissemination of energy-efficient appliances.

**Response to Environmental Issues**

To cope with environmental problems such as global warming, acid rain and pollution, it is necessary to structure the best mix of electric power sources, taking into consideration the effects on the environment, and to adopt measures for efficient energy utilization on both the supply and demand sides. Response to environmental problems tends to be tardy in developing countries in Asia and elsewhere, due to a shortage of technology and funds. It is therefore necessary to promote the utilization of private sector funds and technology including foreign enterprises that possess relevant technology and know-how.
Accumulation of Know-How Relating to Business Management

To ensure stable management of electricity enterprises in developing countries, it is important to accumulate know-how relating to electricity business management, such as ratemaking, financing and investment planning, and to enhance the collection of electricity bills, as well as the quality of services, including customer services.

Increase in the Need for Improving the Quality of Electricity

In Asian developing countries where the economy is growing rapidly, there will be an increased need not only for volume of electricity but also for qualitative improvement of the electricity generated, such as securing stable frequencies and voltage, and reducing blackout time.

Ensuring the Safety of Nuclear Energy

Some countries have promoted nuclear power development from the viewpoint of securing supply capacity, ensuring security, and coping with global environmental problems. But nonproliferation and safety issues also need to be considered and managed.

Necessity for International Cooperation by Electric Utilities

Ensuring a Stable Balance between Energy Supply and Demand

After experiencing two oil supply crises, Japan's dependence on oil for energy has been substantially reduced. In the electric utility industry as well, its oil dependence which exceeded 70% in the 1970s, has now been reduced to 20%. Moreover, the goal of the Electricity Utility Industry Council is to become less dependent on petroleum. However, even during low economic growth, which is expected in the future, Japan's external dependency on fossil fuels will not decrease significantly. Energy demand in developing countries, particularly in Asian nations, is unlikely to decline for some time to
come and even if Japan's energy consumption levels off, concern about depletion of the world's fossil fuel cannot be avoided over the long term.

In the short term, the Japanese electric utility industry has to supply inexpensive and high-quality electricity. Over the longer term, the necessity of securing stable energy sources and the diffusion and transfer to developing countries of technologies for energy-saving and high-efficiency power supply will be of benefit to these countries. It will also contribute to ensuring a stable balance between energy supply and demand for developed countries as well, including Japan.

Changes in Environmental Management

Electricity enterprises in Western countries have entered overseas power markets because of the limits to domestic growth and the need to make good use of their unemployed resources. France's Electricity Corporation (EDF) has made use of its idle resources generated by a slow increase in domestic demand. Britain has utilized those resources generated from a reorganization of its electric utilities.

In Japan, on the other hand, electric power enterprises have been exerting their efforts on the domestic market, developing new electric power sources and striving for a stable supply, with a view to meeting the steadily increasing domestic electricity demand. However, as electric power consumption increases in developing countries, particularly in Asia, and with it the need to develop domestic electricity infrastructure, Japanese enterprises active in electric power infrastructure are increasingly expected to get involved. The efficiency and operational stability of Japan's power stations, as well as the technology used for the efficient interconnection of transmission lines, are of the highest international standards.

Possible Areas for International Cooperation

The management policies of the IPPs which have entered Asian markets seem to have focused on recovery of investment on a short-term basis, and in some countries have resulted in an increase in electricity rates. However, as competition for contracts for IPPs
becomes increasingly intense, power purchase prices may decrease. If this occurs, equipment expenses may be cut to reduce the total investment cost, giving rise to doubts as to the reliability of the facilities as a whole. Under these circumstances, developing countries will re-evaluate development through traditional ODA with a view to securing stable electric power sources on a long-term basis. Then their expectations for assistance from Japanese electricity enterprises are likely to be even greater.

If many developing countries, including Asian countries, depend on foreign capital for their electric power development, and are unable to cope with environmental problems, they will expect sophisticated technology required for the operational protection and maintenance of electricity facilities and for environmental protection, as well as for personnel development. Also, assistance targeted to those who live in areas not yet electrified must not be forgotten.

**Environmental Problems**

The Framework Convention on Climate Change (FCCC) aims to stabilize the concentration of greenhouse gases in the atmosphere and to reduce it to the 1990 level by 2000. The industrialized countries are obligated to set their respective targets, adopt necessary policies and measures, and examine the implementation status (pledge and review). It is possible to jointly implement policies and measures, and a scheme of joint implementation (JI) has also been proposed for countries to jointly achieve reduction of the greenhouse gas load in a cost-effective manner. On the other hand, enforcement measures or concrete obligations are not imposed on the developing countries. Their obligations are only general, such as preparation of a list regarding the state of greenhouse gas emissions.

Later, at the first Conference of the Parties (COP 1), held in Berlin from March to April 1995, the "Berlin Mandate" was adopted, providing for detailed principles for attaining the objective of the Framework Convention on Climate Change. It was decided under this mandate to set quantified greenhouse gas reduction targets for 2000 and after, and to verify the policies and measures for the prevention of global warming. It is expected that concrete approaches will be adopted at the third Conference of the Parties to be held in Kyoto in December 1997. At the first ministerial meeting of APEC held in
Australia in August 1996, the problems of SOx and NOx, together with the question of reducing greenhouse gases were discussed as issues to be tackled by the region as a whole. During the trial period before joint implementation becomes full-scale (2000 is the target year), activities implemented jointly (AIJ) will be conducted in developing countries on a voluntary basis.

**Actions to Meet Basic Human Needs**

Although there is an urgent need to develop electric power infrastructure to supply the rapidly growing demand in developing countries and electric power development is being promoted on a large scale by the private sector, there are still many areas without electricity. While economic development is steadily progressing, the regional inequality between urban and rural districts has tended to widen. These areas are not connected to domestic transmission networks for profitability reasons and tend to be ignored by foreign investors as well.

Although some question the priority of electrifying such areas where life without electricity is taken for granted, the inhabitants' yearning for electricity is quite strong. The availability of electricity will improve minimum living conditions, including education, medical care, and sanitation. In the past, Japan has contributed to rural electrification in developing countries through JICA's grant assistance and in the form of grass-roots grant assistance projects by the Ministry of Foreign Affairs. In countries such as Indonesia and the Philippines, which are comprised of numerous islands, and those like Laos where population density is low and villages are scattered, rural electrification is difficult for economic reasons.

In rural electrification projects, utilization of renewable energy sources such as water and solar power is possible. These electric power sources are desirable because of their ease of maintenance and operation and their low cost. The "electrification project by new energies" in Indonesia, under the AIJ Japan Program, both reduces greenhouse gas emissions and responds to basic human needs.
Personnel Development

One of the basic principles of Japan's ODA is to support self-help efforts by developing countries. In order for the developing countries to achieve their objectives by themselves, development of the personnel who will lead this effort is essential. It is in line with this principle that JICA regards acceptance of trainees from developing countries and dispatch of experts to these countries as the major pillars of its technical assistance program. Just like JICA, Japanese electric enterprises, through specific technical cooperation agreements, are also engaged in training. Such training will contribute to development of critically needed personnel and lead to the structuring of a relationship of mutual trust between Japan and the countries concerned.

Technological advances in power generation, transmission, and transformation indicate an increasing need to train personnel in these advanced technologies. There is also a need for training of personnel in broader social and economic perspectives. For instance, in China, in order to introduce measures to quickly solve environmental problems related to power generation based on coal, harmonization of the industry with the environment and transfer of the related costs to electricity rates are indispensable. Also, the sustainable development of power plants using water power is possible only when adequate consideration is given to the natural and social environment and there exists a local symbiosis. Therefore, efforts in personnel development in software fields, such as development of legal systems and transfer of management know-how, will assume greater importance.

Future International Activities by Electric Utilities

Necessity of Internationalization of Japanese Electric Utilities

Past overseas interaction by Japanese electric enterprises appears to have consisted mainly of cooperation and exchange with developed countries for the purpose of strengthening management capability. In recent years, however, the necessity for, and ideas about, international deployment have come under discussion at enterprises. The
question of participation in the Japan Program on Activities Implemented Jointly is a case in point. Also, some enterprises are promoting the consolidation of office structures with an eye toward overseas deployment, such as establishment of an international affairs department or team. At the same time, taking into account the future environment for the domestic electricity industry, it will also be important to consider the possibility of extending technical and economic assistance to, and entering into the markets of, developing countries in the following ways.

**Personnel Development for International Deployment**

A shortage of personnel is regarded as a major bottleneck in overseas deployment by Japanese electric enterprises. The development of personnel familiar with international cooperation and business and of related know-how is not something to be achieved overnight but rather in a step-by-step manner through activities such as international exchange and technical cooperation. One way would be to participate in various technical assistance projects based on official funds or to promote independent technical exchange/cooperation activities. Also, apart from projects based on official funds, the independent training systems of electric enterprises could be used to foster personnel who are well-versed in international affairs. It would also be possible to acquire know-how through technical collaboration with foreign electric enterprises with records of achievement in the international arena, such as the hiring of foreign citizens, engineers, and financial advisers. Acquisition of international talent, experience, and know-how through such activities and, moreover, creation of personal connections with the relevant countries, will also help promote cooperation with developing Asian countries for the development of their energy infrastructure.

**Participation in Business**

Japanese electric enterprises have engaged mainly in domestic electric power supply. Serious efforts in international deployment began after May 1996 when separate accounting was introduced. However, this initiative has not proceeded much beyond technical cooperation or information exchange. Needless to say, participation of Japanese
electric enterprises in overseas electric power markets is a matter to be decided by the management and corporate strategy of individual enterprises. Much is expected of the Japanese electric power industry regarding overseas involvement.

**Environmental Problems**

In the field of electric power, thermal power generation is closely related to local and global environmental problems, and Japanese electric utilities have long provided technical assistance in desulfurization. At the third Conference of the Parties (COP 3) of the Framework Convention on Climate Change in Kyoto toward the end of this year, measures for the prevention of global warming will be discussed in more detail. Discussions are also expected on specific Activities to be Implemented Jointly, schemes for trading of emission rights and cooperation with developing countries. It is essential for the electric power industry to participate in these discussions and to adopt further active approaches toward global environmental problems. Japanese electric enterprises have advanced technological capability in the following fields and could make wide-ranging contributions:

- High-efficiency thermal power generation using coal: supercritical pressure power generation technology, and coal gasification power generation technology; and
- Environmental load reduction technology: desulfurization technology, denitration technology, and technology for effective utilization of power plant waste.

Also, along with environmental problems, saving energy in power generation and transmission/distribution systems on the supply side has become a major issue in the context of increasing energy consumption in developing countries. In this regard, Japanese electric enterprises have advanced technology in, for example, introduction of high efficiency in transmission networks and Demand Side Management (DSM).

**Responding to Human Needs**

In Japan, empirical testing of a small dispersion-type hydro power generation plant began as part of an information-gathering project on water power development
technology. This project makes use of the framework of the 1995 Implementation Agreement on Waterpower of the International Energy Agency (IEA), and aims to support the development of small hydroelectric power plants in Southeast Asian countries where many unelectrified villages exist.

The present project aims to contribute to overall enhancement of water power development technology in developing countries through support for the construction of dispersion-type hydroelectric power plants utilizing undeveloped water energy in unelectrified villages. It also aims at cost reduction and ease in maintenance. A simple system meeting local conditions is under study.

Developing countries face common problems in the development of water power, such as global environmental problems, maintenance of the compatibility of water power development and global environmental preservation, and the economic efficiency of development sites in remote areas with small populations. A preparatory meeting was held in October 1995 aiming at the conclusion of an implementation agreement for international technical cooperation relevant to these problems. The Implementation Agreement on Water Power was approved by the Council of the International Energy Agency in 1994.

Joint work under this agreement consists of the following five areas, and will be implemented in five years extending from 1995. Japan participates in ANNEX-3 and ANNEX-5.

- ANNEX-1 Water power redevelopment technology;
- ANNEX-2 Small- and medium-scale water power development technology;
- ANNEX-3 Hydroelectric power generation and the environment;
- ANNEX-4 Water power development plan and operation; and
- ANNEX-5 Water power development training program

The participating countries are Japan, Canada, France, Italy, Norway, Spain, Sweden, Finland, United Kingdom, and China. In Japan, the New Energy Foundation (NEF) is the executing organization.
**Personnel Development**

*Development of personnel for operation and management of high-tech thermal power plants*

Recent technological progress in thermal power plants is remarkable. Design conditions are moving from subcritical to supercritical conditions by increasing the steam pressure and temperature. The LNG combined-cycle power plant is also a leading-edge thermal power plant. In developing countries including China, supercritical pressure thermal power plants have recently been introduced and combined-cycle power plants are to be emphasized. However, there is a potential shortage of personnel for operation and maintenance of technically-advanced supercritical pressure thermal power stations. In developing countries, it is possible to construct such sophisticated power plants with the cooperation of plant builders and engineering companies. But this approach usually does not transfer the required technology for operation, maintenance and design of such plants. Thus it is urgent that personnel be trained in such technology.

To train personnel, it is important to use facilities that simulate a real technically-advanced power plant, such as a supercritical pressure plant. However, such facilities in Japan are fully occupied just meeting the needs of the electric enterprises. Therefore, such facilities could be constructed for the purposes of training personnel from developing countries. It would therefore be useful to undertake a feasibility study of the functions which the facilities should fulfill, their desired locations, the project plan, and the funding sources.

*Utilization of personnel having experience in overseas operations*

When Japanese electric enterprises begin to consider overseas deployment as part of technical cooperation or their business operations, the first problem is to find personnel with experience in overseas operations. Business operations abroad are entirely different from domestic operations. They require the conduct of business in a foreign language in different economic and social conditions. Personnel with this experience are indispensable. Compounding the problem is that construction, operation, and maintenance of power plants or transmission and distribution facilities requires persons both well-versed in overseas affairs and possessing highly specialized technical
knowledge. Since Japanese electric enterprises have so far been engaged mainly in domestic operations, such personnel are rare.

On the other hand, Japanese machinery manufacturers and engineering firms have substantial experience in the supply of infrastructure to foreign power plants, and thus have many technical experts with rich overseas experience. These personnel could be used by electricity enterprises when they wish to extend their operations overseas. Therefore, it is important to undertake a manpower study to determine the availability and the ways and means of mobilizing personnel with experience in overseas electricity business operations.
One of the most important problems is the supply of electricity to the FETZ. The Sonbong Thermal Power Station has two 50,000 kw turbine generators and one 100,000 kw turbine generator, and thus a total capacity of 200,000 kw. By connecting a 110,000-volt transmission network with the thermal and hydropower stations in the northern DPRK, this power station can provide reliable, good quality electricity, both inside and outside the FETZ, to facilities in the ports and the electrified railways.

The immediate task is to raise the efficiency of the boilers and turbine generators in the Sonbong station. The initial plan is to increase the generating capacity of the Sonbong Thermal Power Station to 400,000 kw. Eventually it will be increased to 1.4 million kw to meet the expected increased demand in the FETZ. This increased capacity will also require the expansion of the transmission network. Preparations are underway to build networks transmitting 110,000 volts and 220,000 volts by upgrading the present 60,000-volt transmission network. The voltage in the distribution network will also be gradually increased from the present 3 kw to 10 kw. Its frequency is 60 khz. Investment in these projects through contracts and equity joint ventures would be welcome.

It is also urgent that the riparian countries of TREDA co-operate in the electricity sector by connecting power transmission lines in the Rajin-Sonbong FETZ with those of Hunchun, China and Khassan, Russia. To accomplish this, a multinational cooperative organization comprised of the riparian countries should be created to solve the scientific, technical, and practical problems pertaining to sufficient electricity supply in the area.
Comments

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Khabarovsk, Russia

Dr. Valencia reported on the possibilities of cooperation between the energy sectors of the countries of Northeast Asia. I hope that our conference will become the first step to the realization of these possibilities.

The Russian Far East has considerable possibilities for full-fledged participation in international energy cooperation. The Russian firm Vostok Energia, the Unified Energy System of Russia, has been created to coordinate the activities of all energy companies in the Russian Far East. Vostok-Energia deals with policy issues in the energy sector, projected requirements, energy uses, justification for the construction of new energy consumers, and the coordination of finances.

In our opinion, the creation of a mechanism for international cooperation in energy will become an important factor in the stabilization of the economy of the Russian Far East. We welcome proposals regarding the creation of a Northeast Asian Energy Forum, and we hope that the Russian side will be able to participate in all of the forum’s activities. The coordination of efforts in energy is obviously necessary in the following areas: the exploitation and processing of oil and gas; the development of coal mining enterprises; the building and modernization of energy enterprises; the trade in energy resources; the import and export of electric energy; and management.

Organization of the international energy forum will bring difficulties, and a maximum effort is required to realize these goals. In the energy sector of the Russian Far East, the greatest emphasis must be placed on the following:

1) Export of energy resources to Northeast Asian countries;

2) The attraction of foreign investment and modern scientific technology into the production and distribution of energy resources;
3) The creation of stable laws to support these activities;

4) The use of Northeast Asian expertise and technology for energy-saving programs;

5) The creation of effective international units in the different energy sectors; and

6) The coordination of inter-state energy policy to meet ecological standards.

The Russian Far East can participate most effectively in realizing these objectives.

Four large hydroelectric stations with established capacities of 3.33 hecawatts are under construction. With established capacities of 2.4 heca watts, the Burei and lower Burei hydroelectric stations offer the greatest potential for international cooperation. After the completion of hydroelectric construction for the years 2000-2005, the energy balance of the southern part of the Russian Far East will be stabilized and the export of electric energy up to 0.6 hecawatts and up to 2 billion kilowatt hours will be possible.

Potentially, it would be possible to export much more energy from the Russian Far East. In early 1997, a number of leading Russian institutes with the cooperation of the Siberian Energy Institute of the Russian Academy of Sciences investigated the potential creation and uses of electric energy for Sakhalin Island. The primary purpose of this work was the establishment of possibilities for the export of 4-6 hecawatts to Japan through the construction of a direct transmission line across the straits to Hokkaido. Thus the Russian Far East can be an important supplier of energy to Northeast Asia.
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VIII

ENVIRONMENTAL ISSUES IN DEVELOPMENT
Comments on the Environmental Sector

Choi Dae Sun
Researcher
Committee for the Promotion of External Economic Cooperation
Democratic People's Republic of Korea

Environmental protection work is being vigorously carried out in the DPRK based on the environmental protection policy and laws of the government and the requirements and principles of the "Rio Declaration" and "Agenda 21." To implement the biodiversity convention, a national action program has been prepared to investigate and register endangered species. Legal measures to protect the natural environment and endangered species taken by the State include the establishment of six nature preserves, 14 plant preserves, 15 animal reserves, six seabird reserves, and five marine resource reserves. Mt. Paekdu has been declared an international Biosphere Reserve.

The development plans for the FETZ include the objectives of environmentally sound and sustainable development. The main focus is the protection of the water quality of the Tumen River, which is an international water body, and the sea area along the coast of the FETZ.

International cooperation is important because by its very nature, environmental protection is an international issue and success cannot be achieved without the active cooperation of the relevant nations. To enhance such cooperation and ensure that all relevant nations properly fulfill both their national and international responsibilities to protect the environment, the countries' capacities to do so must also be enhanced. I appeal to interested countries to help train human resources and to equip them with modern instruments for monitoring and managing the environment. Otherwise, it will be impossible to accumulate and exchange information on the environment and to formulate a proper scientific strategy to protect the environment. Interchange and international support in this field conforms with international principles and environmental ethics. It is the DPRK's intention to make a substantial contribution to the protection of the environment, to achieving sustainable development in the Asia-Pacific region through
international cooperation, and to the fulfillment of its national and international responsibilities in environmental protection.
Environment and Development

D. Baasandorj
Secretary, Ministry of Environment
Mongolia

I am delighted to have the opportunity to attend this symposium and to share and exchange my thoughts and opinions with the delegates of Northeast Asian countries on environmental issues in development. In the report, I intend to address environmental issues and development, emerging environmental problems associated with development, and ways to solve these problems.

Mongolian Environmental Protection and Natural Resource Management Policies

The traditional Mongolian view toward protecting the environment is based on a philosophy of a progressive correlation between humans, nature, space, and time. Mongolians have respected mother nature as a life-sustaining force and developed a unique nomadic lifestyle and customs which fit their surrounding environment. As a result, Mongolia has been one of the few countries which have kept their environment relatively untouched and pristine.

However, the Manchu dynasty's partitioning of Mongolian territory from the 18th until the early 20th century, the European ideology of socialism, and its derivative, a centrally-planned economy which lasted for 60 years, greatly changed the spatial organization of the Mongolian lifestyle which had developed over many centuries. Because of the centralization of the population and production into a small number of cities and the inefficient exploitation of natural resources, the natural environment has been damaged.

Fifty percent of the country's total farmland has eroded, soil fertility has decreased by 20%, one-third of all pastureland has been overgrazed, one-third of all forest
has vanished, and animal reserves have diminished by one-fifth. Five million hectares of sand in the Gobi region have been eroded by wind; over 300 lakes, rivers, and streams have dried up; and over 100 endangered species of plants and animals are about to become extinct. Because the air, water and soil in urban areas are heavily polluted, thousands of people use water that does not meet the basic health standards. In the cities of Ulaanbaatar and Darkhan, the air pollution in winter is three to five times the legal limit.

The increasing scarceness of natural resources and the decreased quality of the living environment have had a very negative impact on national economic growth; indeed they were a factor in Mongolia's entry into social crisis in the early 1990s. The production of lumber and wood products, agricultural productivity, coal mining, and production of cement, bricks, chalk, and other building materials decreased by large amounts, resulting in the closure of some factories.

This crisis was a result of the exclusion of environmental protection from national economic and social development strategies and the failure to properly evaluate the reserves of natural resources and to maintain an ecological balance. The Mongolian legacy of traditional respect for and worship of nature has faded over the last few decades, as has the ancient Mongolian tradition of maintaining a balance between population, production, and nature through spatial allocation of activities.

In the 1990s, Mongolia began to pursue democracy and chose a new goal of stable growth based on efficient and appropriate use of natural resources and comparative advantage. According to the new Mongolian constitution which was approved in 1992, Mongolian territory and natural resources are subject to public ownership and government protection. The new constitution also legalizes the citizens' right to live in a healthy and secure environment. Maintaining the ecological balance is now an integral part of national security.

A series of laws regarding use and protection of land, minerals, water quality, forests, animals, plants, and the atmosphere have been passed and put into effect over the last few years. They constitute a legal framework for environmental protection. When these laws were written, the guiding principle was to increase the responsibility and the
cooperation of government, citizens, businesses, and organizations in environmental protection. Building this sense of responsibility and cooperation was necessary to implement the strategy of protecting the ecosystem by fully evaluating the amount, capacity, and quality of natural reserves and using the natural resources without harming their long-term productivity. Also, the laws enforce the "user-pays" and the "polluter-pays" principles. A law requiring payment for the use of forest, water, animal reserves, and natural plants has been passed. And the laws requiring payment for the use of land and mineral wealth came into effect on 1 July of this year. Revenues based on this law have yielded to state and local governments, revenues of five billion tugrug or about six million US dollars. We intend to determine the capacity of the natural environment, set related standards and norms, and choose development projects by evaluating their effects on the natural environment.

The basis has been established for the expansion of bilateral and multilateral cooperation with other countries regarding environmental protection. Within the last five years, Mongolia has made six agreements with neighboring countries on cooperation in environmental protection, and we have joined the seven most important international conventions. However, it will require much more time and capital to limit environmental loss, restore the damaged environment, and strengthen the ecological basis of stable growth.

Because of Mongolia’s limited financial resources, unstable economy, and increasing poverty, unemployment, and social disorder, it is very difficult to attract public attention to environmental protection issues and to solve emerging environmental problems. Since we have not taken firm steps to maintain the ecological balance, some ecologically inappropriate and offensive activities are ongoing. These include cross-border transport of forest products, animals, and plants; the mining of gold and building materials with outdated, wasteful technology; and pollution of beautiful scenery through insensitive tourism developments. There is no vision and long-term plan for the protection of our greatest asset — the natural environment. Newly-organized business enterprises and organizations are more interested in making profits and focusing their production and services in the capitol and other large cities, thus increasing the ecological
load in urban areas. As a consequence, many people are moving from the countryside to the city. Such migrations depopulate the remote areas and negatively impact provinces with lower natural capacities.

Considering the above facts, the Mongolian Great Khural has set a goal of developing and implementing a national ecological strategy. We intend to continue and to enrich the Mongolian tradition of development based on consideration of the distribution of the population, natural resources, and production centers. The economic and ecological joint policy has the strategic purpose of implementing social development in harmony with the natural environment as proposed by the United Nation’s “Environment and Development” Conference in 1992. This strategy includes the proposal we made at the Rio Conference to give Mongolian territory a special status. The Mongolian government is clearly planning to develop a relatively independent economy which meets both social and ecological requirements.

The government considers the natural environment to be one of the country’s main assets and intends to increase nature’s productivity without decreasing the quality of natural resources. Thus, we must increase our national capacity to protect the environment. First, we need to create an understanding of the concept of stable growth among the population. To solve existing ecological problems, we are paying special attention to developing a new system of strategic policy and planning which uses legal, economic, technical, and organizational mechanisms. The policy will reflect ecological strategies in production, infrastructure, and in social, scientific, legal, and foreign services, as well as the required governmental support and intersectoral cooperation to implement the strategies.

Effective Regional and Sub-Regional Cooperative Mechanisms

Mechanisms of environmental cooperation exist at the regional and sub-regional levels. Five regional conferences have been held among specialists who discussed current environmental issues and information exchange programs. Further, a Northeast Asian environmental program has been produced. During the third Northeast Asian
Environmental Cooperation Conference organized by our government in September of 1996, for the first time, all Northeast Asian countries (North Korea, South Korea, Japan, Mongolia, China, and Russia) agreed on the general direction of Northeast Asian regional environmental cooperation. And in 1995, participants of the Tumen River Program signed in Beijing an agreement on environmental protection regarding “Tumen River” economic development. Mongolia has also participated in and supported the Eco-Asia Forum organized by the Japanese government.

**Correlation of Environmental Issues with Developmental Issues**

The Mongolian government — following the recommendations of the United Nation’s Environment and Development Conference, the 21st Century Program, and the Rio Declaration — is working towards the goal of steady growth and development. The Mongolian Program for the 21st century began with the purpose of integrating economic, social and environmental issues with national development planning. A National Council on Stable Development was added to the economic, social, and environmental departments in the provinces and cities. It is in charge of reviewing the development of the 21st Century Programs for the provinces. The stable development councils are in fact in charge of these other departments, and work to inform citizens of ongoing environmental issues.

We have carried out several projects on public awareness of the concept of stable development. The National Environmental Trust Fund has been established to support and assist the implementation of stable development decisions together with social and economic policies. We are looking for various kinds of support and assistance from donor countries, international investment and private foundations, and foreign non-governmental organizations to help implement the Mongolian Program for the 21st Century.

Implementation and improvement of present laws and regulations in a market economy will help assure stable development. This will in turn will create a commodious legal and economic environment for the development of economic infrastructure. In this
regard, it is particularly important to decrease the poverty rate through the development process.

The Mongolian government is working hard at reducing the negative impact on society and the economy brought about by natural disasters. Because Mongolia has a relatively large territory, it is very important to implement appropriate policies regarding land exploration, territorial relations, and economic relations. I thank you all for your consideration that the environment is an inseparable part of development.
Comment
Development and Environmental Problems

Kikuo Tsukamoto
Managing Director
Around Japan Sea Economic Exchange Conference
Hokuriku, Japan

I would like to talk about the serious damage we have suffered from oil spilled from the wrecked Russian tanker Nakhodka in the Sea of Japan in January, 1997. At the time of the accident, there was a storm with high waves, and low temperatures. The spilled oil had a high viscosity and the low temperatures caused the heavy oil to sink, become sticky and tough, and transform into a solid state.

The stormy seas prevented cleanup of the oil slick and great amounts washed ashore along the coastline of Hokuriku. When we could, we had to scoop up the floating oil using dippers attached to long poles extending from fishing vessels. Machines to clean up the stranded oil could be used in only a few areas because of geographical restrictions. Thus much of the work was manual, including the removal by hand of oil stuck to rocks. Thus the cleanup operation was completed with great labor and expense by volunteers from all over the country as well as the local residents. These efforts restored the beaches to the state where swimming is possible this coming summer.

The Hokuriku district is one of the best sightseeing spots in Japan, blessed with beautiful scenery and abundant marine life. Owing to the heavy oil washed ashore, its image has been degraded and the number of tourists has greatly decreased. The affect of the oil spill lingers still. Long-term research is required to determine if and how heavy oil which has sunk to the bottom of the sea will affect marine life.

Negotiations over compensation for damages is another problem. Once the sea is contaminated, it takes a great deal of labor and a vast sum of money to restore it. The Sea of Japan is semi-enclosed. In the event of such an accident, other coastal areas facing the Sea of Japan may suffer damages depending on the current and wind direction. Thus we
strongly hope that the countries which share the Sea of Japan will consider such accidents as their own problem and cooperate in the protection of the environment.

Environmental problems in development extend far beyond marine pollution such as that caused by the oil spill from the Nakhodka. Therefore, when we discuss economic development, environmental protection should always be a major consideration. This unfortunate disaster did, however, result in the Northeast Asian Municipalities Summit on Environment which was held in Toyama Prefecture on 22 July 1997. The countries surrounding the Sea of Japan were requested to cooperate in environmental protection. At the same time, the Northeast Asia Environment Cooperation Center was established in Toyama Prefecture and enterprises focusing on environmental conservation were also set up. We have prepared brochures concerning this and we hope you will take the time to review them.

We greatly welcome the movement toward cooperation between the Sea of Japan nations for environmental conservation and strongly hope for its progress.

Thank you very much for your attention.
IX

SPECIAL ECONOMIC ZONES
Comment

Special Economic Zones

Li Wenshan
Deputy Mayor
Hunchun City, China

Hunchun is located at the lower reaches of the Tumen River area where China, the DPRK, and Russia join. The area of Hunchun is 5,120 square kilometers and its population is 250,000. Hunchun meets the Russian Primorski area in the southeast along a 232.7 kilometers-long boundary. It faces Hamgingbukdo in the DPRK to the southwest across the Tumen River along a 139.5 kilometers-long boundary. Contact exists through Hunchun Port, Shatuozi Port, and Quanhe Public Passage by which people and cargo move between Russia and the DPRK. Fangchuan Village in Hunchun is situated at the very point where the three countries join.

Hunchun is 15 kilometers from the Japan Sea. The river is a unique passage from the Chinese interior to the Japan Sea, and Fangchuan also has access to Russia, the east coast of the DPRK, and the west coast of Japan. It is 750 kilometers from Fangchuan to Pusan in the Republic of Korea (ROK), and 850 kilometers to Niigata in Japan. Posiet Port in Russia is only 42 kilometers away, and Rajin port in the DPRK is only 48 kilometers away. Advantages of geography provide Hunchun and the lower reaches of the Tumen River area conditions to become a future cargo hub in Northeast Asia.

Hunchun is also rich in natural resources. There are 25 types of metal and non-metal resources, in which coal and gold are dominant. The coal reserve is 778 million tons, the largest coalfield in Jilin Province. The second largest gold belt is also situated here as are many valuable non-ferrous metals like copper, tungsten, lead, zinc, and tin, as well as non-ferrous metals. Forest covers 76.5% of the area, and the volume of water resources is 2.43 billion cubic meters. There are 24,000 hectares of cultivated land, 16,000 hectares of grassland, and 15,000 hectares of water. There are more than 1,000 species of wild animals and many wild plants available for development. Ginseng and
pilose antler are abundant. Hunchun has a nearly maritime climate, i.e., it is warm in the winter and cool in the summer. With its long history, many historical relics and beautiful scenery, Hunchun has the potential to become a tourist destination.

Hunchun is an important nexus for Northeast Asia. Here advanced technology, equipment, management, capital, rich resources, and labor can complement each other. UNDP regards this area as having a great potential as a global trading and cargo hub for a huge industrial development program, and supports projects in the area. UNDP suggests that US$30 billion in investment is needed over 20 years to transform this area into the Rotterdam of the East, or a second Hong Kong. On 12 December 1995, the five governments of China, the DPRK, Russia, the ROK, and Mongolia joined in an “Agreement Establishing the Tumen River Economic Development Area and the Northeast Asia Development Coordinating Committee,” and a “Memorandum on the Tumen River Economic Development Area and the Northeast Asia Environment.” These documents represent a new milestone in multinational cooperation.

The Chinese government has paid great attention to the development of the lower reaches of the Tumen River Area. Because Hunchun is the frontier representative of China in the development of this area, on 9 March 1992, the State Council approved Hunchun as an open border city. This action established the Hunchun Border Economic Cooperation Zone, and relevant preferential policies. The State has also invested much capital to develop infrastructure here. A leading group involving the State Planning Committee and other ministries has been set up to take charge of the development of China’s portion of the lower reaches of the Tumen River. To show their support, the top leaders of the Chinese government have often visited Hunchun. When General Secretary Jiang Zemin visited Hunchun for the second time in June 1995, he endorsed efforts “to develop Hunchun, develop the Tumen River Area, and make friendly, cooperative relationships with the countries of Northeast Asia.” This statement shows the intention at the highest levels to develop Hunchun and the Tumen River area.

Hunchun has made considerable progress in opening access to the sea. The international railroad connection from Tumen via Hunchun to Mahalino in Russia was completed in October 1996. An international railway transshipment station is under
construction. A container transportation route from Hunchun via Vladivostok and Nakhodka in Russia to Pusan in South Korea has been opened, and a land-water route has been operating from Hunchun via Zarubino in Russia to Japan and Korea, as has the international route from Hunchun to Slavyanka in Russia, and the liner route from Hunchun via Rajin in the DPRK to Pusan in South Korea. Two passenger/cargo liner routes from Hunchun via Zarubino in Russia to Soocho in Korea, Niigata in Japan, and Hunchun via Rajin in the DPRK to Soocho and Niigata are almost completed. To enhance Quanhe Border Public Passage, the Chinese government has early this year approved the passage of people from third countries.

Second, infrastructure has been improving. The total investment for infrastructure in Hunchun since 1991 has been four billion yuan. The Hunchun Mineral Bureau has the ability to produce 2.5 million tons of coal. The Hunchun Power Plant has two sets of 100,000 kw generators, and the plant is undergoing the second stage of construction of a 600,000 kw generator. Large- and medium-sized airplanes can take off and land at Yanji airport, which is 115 km away from Hunchun. Telecommunications and movable telecoms are very convenient. The water supply, electricity, and heating are satisfactory at present and can be expanded. Tourism facilities such as hotels, restaurants, entertainment, and shopping centers are all improving.

Third, the Hunchun Border Economic Cooperation Zone has itself made great progress. The Zone was approved by the State Council as a state-level zone on 14 September 1992. The planned area is 24 square kilometers south of town, and the initial area being developed is five square kilometers. This area has enterprises engaged in manufacturing, financing, trade, warehousing, and tourism. Since the Zone’s establishment, 200 million yuan have been invested in the construction of infrastructure. The Zone owns production facilities, including the infrastructure to supply water, heat, electricity, drainage, telecommunications, and roads, and has other facilities such as a bonded warehouse, standard factory buildings, a trade market, a school, and a hospital. Forty-one projects have been implemented, of which 29 enterprises have begun operation, with 996 million yuan invested from South Korea, Japan, Hong Kong, Macao, and Taiwan.
Fourth, the economic environment is improving. In order to hasten the development of Hunchun, the State and Jilin Province generated many preferential policies on land use, leasing, transferring, taxation, import-export trade, and the approval of projects. Meanwhile, the State allows tax reductions and exemptions for enterprises inside the Zone within fixed time periods. To encourage domestic and foreign investment, the Hunchun government has also formulated preferential policies in 12 categories, and compiled comprehensive development plans and related industrial and professional plans. Recently, Hunchun formulated "The Preferential Policies and Administrative Provisions of the Hunchun Municipal People's Government."

Fifth, there has been progress in encouraging investments. We have been paying much attention to attracting investments for development projects. Currently, 67 industrial enterprises are operating in Hunchun with foreign investment, mainly from the ROK, Japan, Russia, the DPRK, Hong Kong, and Taiwan. The actual investment is US$91.45 million. The enterprises include 40 industrial projects, three farming projects, forestry, and husbandry. The rate of non-productive projects has dropped.

Sixth, border trade with Russia and the DPRK is expanding, and the variety of goods traded is increasing. The total import-export volume of municipality companies in 1996 was US$30.43 million. This year the joint efforts of the Chinese government and the DPRK opened the Quanhe-Wonjon border trade market. The development of the Hunchun Border Economic Cooperation Zone obviously promotes the local economy.

Hunchun will implement the following principles in its development:
(1) Uniting openness, development, and stable cooperation so that the latter promotes the former;
(2) Combining autonomous with cooperative development so that the former promotes the latter;
(3) Combining expanding openness and development construction so that the former promotes the latter; and
(4) Protecting the environment as construction proceeds.

The near-term goal is to increase the Gross National Product to two billion yuan as the population increases to 300,000 by the year 2000, an annual increase of 30%. The
Gross Industrial Output (GIO) is expected to increase annually by 40%, or 2.5 billion yuan. The import-export trade is expected to increase annually by 50%, to US $300 million, and the throughput of ports is expected to reach three million tons.

The long-term goal to 2010 is a population of 800,000 and a GNP of 10 billion yuan, an increase of 18% annually, a GIO increase of 20% annually to 16 billion yuan, and an import-export trade increase of 20% annually to 2 to 2.5 billion. In order to realize these goals, Hunchun will increase the opening of the Tumen River area, improve the Economic Zone, ports and infrastructure, develop tourism, and promote export-oriented agriculture. Thus Hunchun will become a high-quality window through which China participates in Northeast Asian regional economic cooperation.

Under the principles of world peace, cooperation, development, and mutual benefit, let us seize the opportunity for regional economic cooperation in this beautiful, rich, and hopeful land that is Northeast Asia.
Comment

Rajin-Sonbong
Free Economic and Trade Zone (FETZ)

Hwang Hyon Choi
Researcher
Committee for the Promotion of External Economic Cooperation
Democratic People’s Republic of Korea

In the first stage up to the year 2000, the plan is to enable the FETZ to function as an international transit transportation base by reconstructing and modernizing the existing railways, roads, and ports, develop tourism, and create a positive investment climate. The second stage from 2001-2010 will focus on development of a comprehensive and modern international interchange base.

I propose the establishment of a transportation development organization. This enterprise could build a circuit railway by connecting the railways of the three riparian countries which have already been built or are being built, e.g., Rajin-Namyang-Tumen-Hunchun-Kraskino-Khassan-Rajin. It would also be possible to build a transcontinental railway running from Choibalsan, Mongolia through Aershan, China to Changshun-Tumen-Rajin. I also propose that we jointly develop and effectively utilize the energy resources within the region.

Ports

There are four free trade ports inside or in the vicinity of the FETZ-Rajin, Chongjin, Sonbong, and Ungsang. Their present total capacity of cargohandling is 13 million tons/year and this will be increased to 130 million tons/year by 2010. With the opening of the sea route for containers between Rajin and Pusan by the Hyonting Group of China in December 1995, a new frontier has been opened regarding transportation of transit cargoes through Rajin Port. Some 3,000 TEU containers were handled on this route last year. Also, by laying Russian broad tracks right up to the berths, Rajin can now
receive Russian wagons without changing the bogies. Russian transit cargoes such as fertilizer, alumina, and timber are presently being shipped through these ports. Last year, 203,000 tons of Russian transit cargoes were transported through Rajin Port.

Of course, these amounts are still small, but transportation of transit cargoes through Rajin and Chongjin ports is considered competitive by many cargo owners. At the Niigata Forum held at the end of January 1997, a delegate from the Hunchun East First Hosiery Co., Ltd., a China-South Korea joint venture company, said that opening the Rajin route greatly reduced the transport distance and costs. The cost per TEU container had been US$2,100 from Pusan through Vladivostok to Hunchun but it was now only US$1,300 from Pusan through Rajin to Hunchun. He also said that transportation through the Pusan-Rajin route reduced the time by 3-5 days compared to using Dalian.

Railways

A 405 km circuit railway has been built along the Tumen River bordering China and Russia. As laid out in the Master Plan for Land Development, the entire section of the railway has already been electrified and 34 km (8.4%) is double-tracked.

The existing cargo capacity of the railway is 11 million tons/year. The intention is to improve the equipment and facilities at the border railway stations of Namyang and Tumanggang as the demand for transit cargo transportation increases and, eventually, to create a cargo handling capacity of 1.1 million TEU containers annually.

Roads

Like the railway, there is a 385 km loop road along the Tumen River. The road is connected to China by bridges at seven points. Right now, 61 km of road between Rajin and Wonjong, bordering Hunchun, China, is being widened through a joint venture with a Hong Kong company. The roadbed will be completed by the end of this year and paving will be completed by next year. Meanwhile, the roads between Chingjin-Hoiyong, Rajin-Namyang and Chingjin-Rajin will be reconstructed and expanded to meet the increasing demand for transportation.
Airports

In preparation for the construction of an international airport at Sonbong in the FETZ, the plan and design have been prepared and the area has been surveyed. Because of the large cost and considerable time required to construct an airport, a helipad has been constructed in the interim. Eventually, local and international air routes will be opened including that between Rajin and Yanji.

Water

There are several reservoirs with a capacity of over 20 thousand m³/day, but these cannot meet the increasing demand for water. Development of underground water and a supply of industrial water from the Tumen River are planned, and preliminary exploration of water resources has already been carried out.

Service Facilities

The 200 bed Rajin Hotel was completed and inaugurated in the FETZ in September last year on the occasion of the Rajin International Investment and Business Forum. Tourist quarters and facilites have been constructed in several places along 130 km of beautiful coastline. They include five special tourist accommodation sites, including the Pipa tourist quarters which consists of ten buildings with a capacity of 200 beds. The present accommodations can house over 1,000 people.

A ground-breaking ceremony for the first stage of a 200-bed, five-star hotel, with an investment of US$180 million by the Emperor Group of Hong Kong, was held on 1 February this year. The foundation is now completed and the hotel will open in April 1998.

In addition, various service facilities are being constructed, including the Rajin People's Hospital being built by an international Catholic association; ground-breaking was in April 1997.
Comment

Nobuyuki Sekiyama
Managing Director
Institute for Northeast Asian Studies, Japan

I am the Managing Director of the Institute for Northeast Asia Studies (INAS), which was established in Tokyo in May 1996. I shall begin with a brief background of INAS which will provide you with a sense of our progress thus far. The beginning of our institute’s operations is closely related to the development of the Northeast Asia sphere of exchange. First, although our institute’s main representative is Professor Twu Jaw-Yann of Nagoya University, the character of INAS is not limited to that of a typical academic or research think tank. Rather we are striving to create a diverse network that includes politicians, administrators, businesspeople, labor unions, and citizen groups. Our goal is to gather the many results of studies on the Japan Sea (East Sea) rim made to date and to produce a concrete synthesized product.

Second, our institute was established in Tokyo, the political and economic center of Japan. Until now it has been the Japan Sea localities which have taken the initiative to advance Japan Sea rim research. Back in 1990, Dr. Cho started the Northeast Asia Economic Forum. In November of that same year, when I was a Japan Socialist Party (JSP) representative from Niigata, the JSP started the Japan Sea Rim International Forum. Representatives from the Soviet Union, China, the ROK, the DPRK, and Mongolia participated in that meeting. The fact that both the ROK and the DPRK participated left us with a deep impression that the Cold War was finally over. The Forum has continued annually, later taking place in Otaru, Kanazawa, Fukuoka, and Akita. In particular, I remember the third Forum in Kanazawa, in which Dr. Cho delivered a speech on the development of the Tumen River area.

I wish to stress that in Japan the drive to promote progress in the Japan Sea rim started and continues at the local level. However, as we can see from the development of the Tumen River area, the aspirations we have for the Japan Sea rim area will not be realized without the involvement of the central governments, and it has become clear that
adjustments in the interests and efforts of the localities are needed. Thus it is clear that it was important and necessary to establish INAS in Tokyo. For example, the Japanese government was invited to become an official member of the Consultative Commission for the Tumen River Development Area. I want to assert in this conference that INAS is actively working to see that the government moves from its present status as observer to official member as soon as possible.

Third, the distinctive characteristics of this post-Cold War period are said to be globalism, regionalism, and localism. INAS research is not limited to economic issues, but is comprehensive, incorporating politics, security, history, and culture. Moreover, we aim to put the research into practice. We are a "think and do" institute.

Now I would like to make some comments on the valuable discussions of these last three days.

First, the Tumen River area, which is a symbol of Northeast Asian development, provides the region with two multilateral councils, the Coordinating Committee and the Consultative Commission. However, national interests are still given priority. Mutual confidence and mutual benefits, the basis for cooperation, are not yet well established.

Second, from the point of view of economic cooperation as well as preventive diplomacy, the countries concerned should actively try to remove the remaining vestiges of the Cold War. To do so, we must deepen mutual confidence.

Third, I want to point out that each Northeast Asian country has a different approach to international cooperation. The formation of a Northeast Asia economic sphere is closely connected with international organizations such as the WTO, IMF, APEC, ADB, and the World Bank. Some countries of Northeast Asia are members of these organizations while others are not, and this may affect the conditions for fair trade and investment in the region. On the foreign policy and security front, there are mechanisms such as the ASEAN Post-Ministerial Conference, the ASEAN Regional Forum, and ASEM. Again, while some Northeast Asian countries participate, others do not. This points to a need to establish a common forum for dialogue on Northeast Asia at which all the region's countries can sit and be comfortable.
Over the last three days, there have been extensive discussions on Northeast Asian economic cooperation. Regarding the Forum’s plans for dialogue on the region, an opinion was expressed that in addition to the large general discussions during which we present an overview of the issues in Northeast Asia, there should be “subsets” of this dialogue in smaller groups like the Working Group Meetings on Cooperation in Telecommunications and on Electricity Generation and Distribution. Overall, I support this suggestion.

In this post-Cold War period, there is a growing need to turn to multilateral fora to build mutual confidence. The world is becoming “borderless” in Northeast Asia, and there is an urgent need to set up a multilateral mechanism for the relevant countries to deal with issues of politics, economics, peace and security, environment, and culture. This should not be limited to the governmental level. Depending on the nature of the issue, discussions should involve a variety of individuals and groups: national government, local governments, the private sector, academia, parliamentary representatives, and just plain “citizens.”

Every year the East-West Center brings the Northeast Asia Economic Forum to a different Northeast Asian country. To arrive at a successful Forum outcome or product, we should create small working groups with representatives from each country to discuss specific issues. After consolidating the findings of the working groups, these can be presented to all at the next Forum. We may then wish to communicate our recommendations to international organizations and each government. Below is a brief list of issues that I believe require our immediate attention and for which we can create working groups.

First, regarding the Tumen River area, we need to make greater efforts to improve the important functions of the Committee and the Commission. To do this and to complement the efforts of the countries involved in these institutions, I suggest that we set up within the Northeast Asia Economic Forum a small working group—a “Tumen River Area Development Subcommittee.” A main task would be to persuade Japan to become an official member of the Consultative Commission.
Second, we have recently heard the good news that the Korean Peninsula Energy Development Organization (KEDO) held the ground-breaking ceremony for the construction of the light-water nuclear reactors. There are already many nuclear power plants in countries and areas surrounding the Japan Sea. Therefore, it is important that nuclear power be used safely and thus we should start at once to examine multilateral measures to prevent accidents.

Third, energy and energy infrastructure are crucial issues for Northeast Asian economic cooperation. Through a governmental commission research report, INAS has proposed the “Japan Sea Rim Area Pipeline Ring Plan.” The plan aims to extend the benefits of Sakhalin oil and gas development to the Northeast Asian region as a whole, linking Sakhalin, Hokkaido, the western coast of Japan, Kyushu, the Korean peninsula, Northeast China, and the Russian Far East. Some of the reports yesterday made similar proposals. I suggest that we synthesize these plans with road, rail, and relevant international public infrastructure networks to create the best combination of sources and distribution.

Fourth, the environmental protection of the Japan Sea is also an important issue. At the Kanazawa Forum we adopted the proclamation “Fundamental Principles for the Japan Sea Environment.” The Tumen River Area Development Program has also a signed agreement on environmental issues attempting to harmonize them with development. The protection of the Japan Sea is relevant not only to environmental quality, but it is also inextricably linked to social well-being and to industrial and economic policy. The issue of sustainable development should not be overlooked by the Northeast Asia Economic Forum in Northeast Asia cooperation.
Comment

Japan’s Policy Toward Economic Exchanges in Northeast Asia, and Suggestions

Masaaki Komagata, Deputy Director
External Relations Division
Economic Research Institute for Northeast Asia
Niigata, Japan

Economic exchanges with other Northeast Asian countries have been promoted mainly by local governments located on the western coast of Japan. This is because these local governments want to develop the Japan Sea side to catch up with the more advanced Pacific side. The phrase “the Japan Sea National Axis” has now appeared in the National Comprehensive Development Plan which provides a blueprint for Japan in the 21st century. The Japan Sea National Axis is a concept which involves improvement of infrastructure for transportation, industry, and urban living. This concept also includes the establishment of a center for international exchange in economics, culture, and environment for the area surrounding the Sea of Japan, that is, the Korean Peninsula, the Northeastern provinces of China, and the Russian Far East.

Linkages

Northeast Asia or the Japan Sea Rim drew the attention of Niigata Prefecture very early on. Regular air routes between Niigata and the Russian Far East opened 23 years ago, and Niigata Prefecture has cooperated in the development of the Sanjiang plan in Heilongjiang, China.

Cooperation in the improvement of highways and railroads is growing among neighboring local governments and economic organizations in Japan. For example, Niigata Prefecture has recently strengthened its linkages with the Greater Kanto Area by improving the highway systems. The total length of highway in Niigata is 360 km, the longest among all prefectures in Japan. The Kanetsu highway connects to Tokyo, and the
Hokuriku highway connects with Kansai along the Japan Sea. Moreover, the Banetsu highway, which runs across Japan, will be completed in October of this year. Through this highway, the linkage with the Pacific side of North Kanto will be strengthened. Niigata City is in the center of these highway networks and it also has an international airport and international port facilities. Moreover, the bullet train connects Niigata with Tokyo in about two hours.

Niigata Prefecture now has representative offices in Seoul, South Korea and Dalian, China to promote active economic exchange with these countries. Sakata City, Yamagata Prefecture, located 170 km north of Niigata, has established an office in Harbin, Heilongjiang province in China. And Akita Prefecture has set up a public relations office in Seoul to advertise its ports.

The Hokuriku area including Ishikawa, Toyama, and Fukui has a population of 3.13 million. The Hokuriku Economic Association and local governments promote economic exchange in Northeast Asia. Thus the improvement of the highway running across Japan will strengthen the linkages with Kansai and the economic area surrounding Nagoya.

Recently, Tottori Prefecture, which actively promotes exchanges with Northeast Asia, was connected by highway with Kochi Prefecture, Shikoku on the Pacific coast. The completed connection between the Japan Sea and the Pacific includes the Sanin area. Linkages with the Kansai area and the Chugoku area, such as Hiroshima and Okayama, will also be strengthened.

**Foreign Access Zones (FAZ) and Free Trade Zones (FTZ)**

The Import and Internal Investment Law was created to achieve a good trade balance, and 22 FAZs were designated all over Japan, including six on the Japan Sea side, (1) Niigata Port, (2) Komatsu Airport, Ishikawa, (3) Maizuru Port, Kyoto, (4) Sakai Port, Tottori, (5) Shimonoseki Port, Yamaguchi, and (6) Kitakyushu Port, Fukuoka.

Okinawa Prefecture has lagged behind in Japan's economic development because of its geographical remoteness and the presence of U.S. military bases. The Japanese government declared that radical reforms would be instituted in the form of "one country,
two systems” to stimulate Okinawa’s economic development. One such reform was the creation of an FTZ in 1988. However, it was not successful because an independent customs system was not permitted and laws and regulations were insufficient. Now Okinawa is striving to be an economic and cultural exchange center for East Asia by implementing an independent customs and corporate tax system.

In the “Soft” Research Park in Fukuoka, Kyushu, Daewo Electronics built a research center and conducts joint research with Kyushu Technical University. Samsung Electronics and Best Electronics also produce and sell large refrigerators. Enterprises from South Korea, Taiwan, China, and elsewhere including the Tianjin External Trade General Company, a subsidiary of China International Trust Investment Company (CITIC), and various research organizations, are interested in the Asia-Pacific Import Mart (AIM) in Kitakyushu’s FAZ.

A growing problem however is a shortage of labor. Japan, and the Japan Sea side in particular, will soon have a serious problem in securing labor because of the decreasing population and the rapidly aging society. There are already some small- and medium-sized enterprises which must depend on interns from China for their operation. However, this labor shortage could be remedied by joint ventures between, e.g., South Korean enterprises and high-tech Japanese enterprises which could be attracted by promoting favorable treatment for foreign enterprises in the Japan Sea side FAZs.

The potential for economic exchanges among small and medium-sized enterprises is growing as network expansion, FAZs and FTZs progress. There are many small- and medium-sized enterprises which wish to invest and trade in Northeast Asia. However, it is difficult for them to select a location and a partner, collect information about local laws and regulations, and to conduct research on business prospects. To enhance economic exchange, it is necessary to establish a mechanism to promote such exchanges, not only by large-scale enterprises, but also by leading small- and medium-sized enterprises which support Japan’s economic development with their high technology.
New Air Routes

It is not convenient to travel by air across the Japan Sea. However, new air routes between Niigata and China will be opened as a result of the Japan-China air negotiations held in August 1997. However, other routes are difficult to realize because of cost and difficulties in securing enough passengers, even though Tottori, Shimane, Akita, and Yamagata wish to be connected by such regular routes.

Perhaps there should be an air route circling and linking Northeast Asia. Local governments surrounding the Japan Sea could jointly buy a small aircraft, for instance a 100 passenger craft, and lease it for a long period. It would be operated either by a Japanese or a foreign air company. Two flights a week might be adequate for local airports in Japan due to the small number of passengers. The local governments and organizations involved could discuss the route and change it on a regular basis. In fact, Japan Air Commuter (JAC), Kyushu, Japan, is planning to start an international flight between Pusan and Kagoshima or Izumo with a commuter plane carrying 36 passengers.

The Attitude of the Japanese Government

The Japanese government has previously shown little interest in cooperation with Northeast Asia. But recently this attitude has exhibited a slight change. First of all, there have been some changes in Japanese policy towards Russia. Prime Minister Hashimoto spoke of a new “Euroasia Policy” in his speech at the Japanese economic organization conference on 24 July 1997. He emphasized “confidence,” “mutual benefits,” and “long-term views,” and said that the principle of strongly linking politics and economics no longer applied. He also referred to energy development in Siberia and the Russian Far East. Thus possibilities for Japan’s economic cooperation in the Russian Far East have increased.

Prime Minister Hashimoto will visit China in September on the occasion of the 25th anniversary of the reestablishment of diplomatic relations between Japan and China. His schedule includes visits to Shenyang and Dalian, Liaoning. These visits will be the first by a Japanese Prime Minister since the end of World War II. Moreover, multilateral talks on the Korean peninsula are in progress.
**Work in Progress**

The Tumen River Development Committee established by UNDP is an official organization for diplomatic economic discussions in Northeast Asia. At present, Japan is not a member of this Committee. However, local governments and thinktanks in Japan recognize the need for economic cooperation in Northeast Asia through various mechanisms, such as the Northeast Asia Local Government Association and the Northeast Asian Economic Forum.

Therefore, the External Relations Division of the Economic Research Division of the Economic Research Institute for Northeast Asia (ERINA) will strengthen networks and cooperation with other organizations in the region by establishing a liaison office for economic exchanges in Northeast Asia. Within the framework of this liaison office we will establish a practical system for the exchange of information and request the Japanese government to address positively and practically economic exchanges in Northeast Asia. Networks with other organizations in the region will also be strengthened.
Comment

Northeast Asia and the Development of the Mongolian Economic and Trade Free Zone

D. Bayasgalan
Chief, Restructuring and Property Division
Ministry of Finance
and
Batsukh Dash
General Director, Division for Infrastructure Policy
The Administration of the Altanbulag
Free Economic and Trade Zone
Mongolia

A recent statement by Mongolia’s Foreign Ministry reads in part, “To join North East Asian transportation, information, and telecommunications systems.... To participate in the Tumen River program in strict accordance with international relations development and the political situation in the world and the region and, also, to take a flexible approach in setting our strategy and goals.... To join the regional integration movement by expanding the cooperation between participating countries or stakeholders in the region.” Following this policy, the relevant state organizations have actively participated for the last few years in the program to develop the Tumen River basin.

By participating in the Tumen River program, Mongolia has developed more intensive cooperation with member countries, gained access to the sea, and enhanced the development of the Dornod region as one of the centers of the Tumen River program. The goal is to connect Mongolia with the Tumen River economic development region through information, telecommunications, and various transportation systems.

Because the Tumen River basin is located on the coast, it lies astride the shortest route between Asia and Europe. Combining labor from China and North Korea, natural resources from Russia and Mongolia, and advanced technologies from Japan and South Korea will create an innovative infrastructure in the region and provide opportunities to
develop economic and trade cooperation among the countries of Northeast Asia. In 1997, we plan to implement more than 10 projects in the Dornod region within the scope of the Tumen River program.

Anxious to gain access to the sea, Mongolia has joined the International Maritime Organization and the International Sea Transportation Convention. Recently, a conference among Northeast Asian countries was held in Ulaanbaatar to address the transit issues for landlocked developing countries. The conference produced the Ulaanbaatar Memorandum which defines cooperative development strategies for, and agreements on, transit in Northeast Asia. The Ulaanbaatar Memorandum notes that the main transit routes between Asia and Europe do not cross Mongolian territory, and includes a recommendation to research the possibility of building the shortest transportation route between Asia and Europe across Mongolian territory. The results of this Conference will be reviewed and confirmed during the Third Economic Symposium among landlocked developing countries, the International Economic Organization, and donor groups in New York in June of this year. Moreover, the results of the Mongolian Conference will receive complimentary recognition from a United Nations resolution on landlocked developing countries' affairs to be passed during its 52nd session.

**Preliminary Conditions for Establishing a Free Economic and Trade Zone**

The purpose of establishing such a Zone is to improve productivity by attracting foreign investors and advanced technologies. This can be accomplished through efficient allocation and use of the environment, population, natural resources, geography, and transportation.

The strategic policy statement establishing the Free Economic and Trade Zone, defines its rationale and goals.

- Economic free zones are a current trend in free-market economies; and
- A Free Economic and Trade Zone will attract foreign investors to help develop its regions in keeping with its interests.
Unique Aspects of the Establishment of a Free Economic and Trade Zone in Mongolia

Although the establishment of a Free Economic and Trade Zone in Mongolia follows the same principles as in other countries, there are some unique differences due to the current economic situation, social demand and need, and Mongolia's geographic location:

- The Mongolian market is somewhat dependent on its neighbors, Russia and China;
- Mongolia is geographically remote from foreign investors;
- The Zone provides more opportunities to operate with countries in Asia and the Pacific Rim;
- There is an increasing demand for investments based on natural resources located in different regions of the country; and
- Mongolia’s main imports are cars, technical equipment, parts, and consumer goods and its main exports are animal products and raw materials.

Even though Mongolia is rich in land and natural resources, and surrounded by countries with potentially large markets, it is landlocked, distant from world market centers, has a harsh climate and low population, and lacks well-developed production and social infrastructure. These are the factors that must be considered when establishing a Free Economic and Trade Zone.

Strategies to Accomplish the Goal of Establishing a Free Economic and Trade Zone

The process of establishing a Free Zone is divided into three stages: the preparation stage, the middle stage, and the third or developed stage.

In the preparation stage, the following must be accomplished:

- Establish a legal framework;
- Identify prospective domestic and foreign individuals and businesses that are willing to invest in the Zone, make contact with them, and give them permission to start their business operations;
- Appoint an administrative body for the Zone, and arrange for the various relevant departments, e.g., customs, security, employment, investment, and technology to operate in the Zone; and arrange for the management of the work force which will work in the Zone;
- Accurately define the Zone’s territorial borderline, design the Zone’s land management and architecture, and provide the technical/economic basis for the Zone’s development; and
- Discuss with investors the first projects to be implemented in the Zone, locate financial sources, and decide how to raise capital.

The purposes of the middle or the second stage are to create the Zone’s economic framework in which business operations will take place. The purpose of the third stage is to strengthen the export-based production, services, and trade and to expand the influence of the Zone on the development of the region and the country.

By using the Free Economic and Trade Zone to increase international trade and services, we will help satisfy the following needs:
1. The need to attract Mongolian and foreign investors to increase the country’s export growth and foreign exchange reserves, and to develop the region;
2. The need to acquire advanced technology and techniques that will accelerate production rates and enable the products to compete in domestic and international markets;
3. The need to deepen the traditional cross-border economic relationships between Mongolia, Russia, China, and Kazakhstan; enhance trade at the border; and eliminate difficulties for people traveling across the borders;
4. The need to decrease the unemployment rate in the region;
5. The need to introduce developed countries’ ethics in conducting businesses and services, as well as their management and marketing practices; and
6. The need to handle foreign trade in a well-organized and efficient manner.
The Altanbulag Free Economic and Trade Zone

Following the Mongolian government's open market strategies, efforts have been made to establish a Free Economic and Trade Zone. We have formed a temporary administrative body whose responsibility is to prepare for the establishment of such a Zone in Altanbulag township in Selenge province. A draft of a new law which establishes the legal framework for the Altanbulag Free Economic and Trade Zone has been submitted to the Great Khural and is awaiting its final hearing.

The operational strategy of the temporary administrative body is:

- To work on the legal basis for establishing the Free Economic Zone;
- To develop the economic background for the Zone;
- To choose the Zone's geographic location, and to define the size of the Zone;
- To find the necessary capital to launch the free Zone, by contacting domestic and foreign investors;
- To evaluate alternatives for the creation of production and social infrastructure in the Zone;
- To construct the buildings in which prospective investors will work and live; and
- To construct a defensive fence along the Zone's borders.

In accordance with the Strategic Policy to establish a Free Economic and Trade Zone in Mongolia, the temporary administrative body has had to meet some unique preliminary conditions. The Great Khural's 66th Resolution designates the borders of the Altanbulag Free Economic and Trade Zone and designates the area as 500 hectares. Also the Great Khural's recent decision to make a 100% cut in tariffs on imported goods has produced a very favorable environment for the Free Zone to expand cross-border trade and services. The development of the Altanbulag Free Economic and Trade Zone will create opportunities to increase exports, to communicate with businesses in central Mongolia, and to cooperate with and join the ongoing integration of Northeast Asian countries through re-export and other communications. Thus we believe that the establishment and development of a Free Economic and Trade Zone in
Mongolia will benefit not only Mongolia, but also the overall economic integration of Northeast Asian countries.
Comment

Concerning the Economic Development of Mongolia

Mr. Hasebe
President
Hasebe Corporation
Tokyo, Japan

Tourism

It is possible to make a profit in the tourism industry because the necessary capital investment is small. The total number of those who have lodged at our hotel is about 5000.

Increased Exports

It is difficult to increase production in the present state of Mongolia’s economy. This is because the service sector and the distribution system were retarded due to the past 50 years of Communism. Improvement in the distribution system is absolutely necessary including the products at production sites, their transportation, their storage at consumption centers, and their distribution to consumers.

Promotion

Although the population of Mongolia is only about three million, there is sufficient efficient labor. The climate is not suitable for field work, but rather for shopwork, which has good value-added potential and, on a small scale, is possible.

Development of Mineral Resources

Abundant resources are available but foreign investment is necessary due to the poor machinery and facilities.
Modernization of Agriculture

Mongolia consists mostly of flatlands and thus attracts investments in agriculture. Wheat is currently cultivated in Mongolia, and with some improvements the production and cultivation of carrots and potatoes would be possible.

These are the five points essential to the economic development of Mongolia, the most important being investment promotion. This is however difficult to accomplish and some measures, such as preferential taxation, must be implemented to stimulate investment.

As to the future prospects for Mongolia, it is essential to improve both infrastructure and administration/organization. Infrastructure also includes hotels. But also needed are improvements in education. The nomads in Mongolia, as well as the people in the farming or mountain villages of Vietnam, Myanmar, Laos, and Cambodia, have strong desires to be educated, but it is very difficult for them to achieve it. However, the literacy rate of Mongolia is 97%. 
THE ULAANBAATAR RESOLUTION
The Ulaanbaatar Resolution

The Meeting recognizes the momentum created by the Northeast Asia Economic Forum's efforts which began in Niigata in 1988, and which have progressed chronologically through Changchun, Pyongyang, Vladivostok, Yongpyeong, Niigata, Honolulu, and now Ulaanbaatar.

The Meeting also recognizes that the Forum is engaged in a functional approach toward closer regional economic cooperation which will form the foundation for regional institution building. Recognizing the progress and potential of the Forum, the meeting considers it essential that its momentum and continuity be maintained.

Recognizing that mobilization of capital is one of the most important tasks facing the region, the Meeting strongly recommends the formation of a Consultative Working Group on the Northeast Asian Development Bank, to examine ways and means of realizing this concept. In this process there should be wide consultations with the financial community and relevant policymakers.

Also recognizing the critical roles of telecommunications, electric power, and environmental management in regional development, the Meeting strongly recommends that the Forum establish Consultative Working Groups on Cooperation in Telecommunications Systems, Electric Power Systems, and Environment.

These Consultative Working Groups will report the results of their deliberations and activities to the next Annual Meeting of the Forum. The members of the Forum are encouraged to support the Forum's efforts to generate the resources necessary to organize and implement these Consultative Working Groups.

The Meeting welcomes with appreciation the offer of the Tottori Prefecture government to host the Forum's 1998 Annual Meeting in July.
AGENDA

The Seventh Meeting Of The
NORTHEAST ASIA ECONOMIC FORUM
Ulaanbaatar, Mongolia
17-21 August 1997

FIELD TRIP (SOUTH GOBI): 17-18 August
CONFERENCE: 19-21 August

Monday, 18 August
7:00 PM Welcoming Reception Hosted by the Government of Mongolia
Banquet Room, Chinggis Khaan Hotel

Tuesday, 19 August
9:00 AM I. Opening Ceremonies

Chair: Lee-Jay Cho, Chairman Northeast Asia Economic Forum

9:10 Address: The Honorable Mendsaikhany Enkhsaikhan
Prime Minister of Mongolia

9:20 Statement from the Honorable Yuji Nishio
Governor of Tottori Prefecture, Japan

9:25 Statements by Leaders of Delegations

Zou Ping, Director
State Council, China

Li Ju Yon, Vice-Chairman
Committee for the Promotion of External Economic Cooperation, Democratic People's Republic of Korea

Nam Duck Woo, Chairman
Sanhak Foundation, Republic of Korea
Svetlana Vikhoreva, Vice-Chairman, Administrative Committee
Nakhodka Free Economic Zone, Russia

9:55 Opening -- Lee-Jay Cho, Chairman
Northeast Asia Economic Forum

10:10 Logistical Announcements

10:15 COFFEE BREAK

10:30 AM II. Scenarios For Regional Development

Chair: Balganjav Khuldorj, Advisor to the Minister of Infrastructure Development, Mongolia

10:35 A. Development and Issues in the Northeast Asia Economic Zone
Hisao Kanamori, Chairman, Japan Center for Economic Research; President, Economic Research Institute for Northeast Asia

10:55 B. Envisioning Regional Development in Northeast Asia
Ye Shunzan, Professor
Institute of Geography, Chinese Academy of Science

11:55 C. Commentators:
Tsuneo Akaha, Professor
Monterey Institute of International Studies

D. Bayasgalan, Chief, Restructuring and Property Division
Ministry of Finance, Mongolia

Georgi Tolaraya, Minister-Counselor, Deputy Chief of Mission
Russian Embassy, Republic of Korea

Steven Cowper, Executive Director
Northern Forum

12:00 D. Open Discussion

12:15 LUNCH
2:00 PM  III. National Infrastructure Development Plans And Their Relationship To Regional Cooperation

Chair: Steven Cowper, Executive Director Northern Forum

2:05       A. Ts.Sukhbaatar, Director, Department of Economic Cooperation Ministry of Infrastructure Development, Mongolia

2:20       B. Liu Hong, Chief of Section State Planning Commission, China

2:35       C. Andrey Admidin, Chief of Division Institute of Economic Research, Far East Section Russian Academy of Sciences

2:50       D. Chita: Anatoly Zapolsky, Chief, Foreign Economic Relations Chita Government

3:05       COFFEE BREAK

3:30       E. Li Gi Man, Senior Researcher Committee for the Promotion of External Economic Cooperation, DPRK

3:45       F. ROK

4:00       G. Heikichi Hasebe, President Hasebe Group

4:15       H. Steven Cowper, Executive Director Northern Forum

4:30       I. Open Discussion

5:00       CLOSE

6:00 PM    Reception Hosted by the Northeast Asia Economic Forum Banquet Room, Chinggis Khan Hotel
**Wednesday, 20 August**

9:00 AM  IV. **Financial Institutions And Mobilization Of Capital**

**Chair:** Nam Duck Woo, Chairman  
Sanhak Foundation, Republic of Korea

9:05  
A. **Financing Northeast Asia's Infrastructure Requirements: Is a New Development Bank Needed?** --  
Stanley Katz, Visiting Fellow  
Program on Regional Economics and Politics  
East-West Center

B. **Commentators:**  
Bruce Murray, Programs Manager, China and Mongolia  
The Asian Development Bank

Tomoo Hayakawa, President  
Asian Finance and Investment Corporation, Ltd.

Keith Chiddy, General Manager  
ING, North East Asia Bank

Chung Moon Mo, Executive Director  
Export-Import Bank of Korea

10:15  
C. **Open Discussion**

10:30  
**COFFEE BREAK**

10:30 AM  V. **Cooperative Development Strategies For Northeast Asia's Telecommunications Infrastructure**

**Chair:** Yu Jingyuan, Professor, Asia-Pacific Institute

10:55  
A. **The Current Scenario For Northeast Asia's Telecommunications Collaboration** --  
Dan Wedemeyer, Professor, Communications Department,  
University of Hawaii; Board of Trustees, Pacific  
Telecommunications Council

11:15  
B. **Commentators:**  
Zou Ping, Director, State Council, China

Ho Dong Guk, Deputy Director-General  
Ministry of Communications, DPRK
G.Bassanjav, Director, Department of Telecommunications
Ministry of Infrastructure Development, Mongolia

Shim Young Jin, Managing Director, Planning and Coordination
Office, Korea Telecom, ROK

11:45 C. Open Discussion

12:00 LUNCH

1:45 PM VI. Cooperation In Energy Infrastructure

Co-Chairs: Isao Takeuchi, Director-General, Planning Department
Tottori Prefecture Government
Ts.Sukhbaatar, Director, Department of Economic
Cooperation, Ministry of Infrastructure Development, Mongolia

2:10 B. Commentators:
G. Yondongombo, Director, Department of Energy
Ministry of Infrastructure Development, Mongolia

Alexander Ognev, Chief, Long-Term Planning
Vostok-Energo, Khabarovsk

2:30 C. Northeast Asian Pipeline Grids: Options and Issues --
Ken Asakura, Secretary General
National Pipeline Research Society of Japan

2:50 D. Commentators:
Yuri Kononov, Professor
Siberian Energy Institute

Liu Hong, Chief of Section
State Planning Commission, China

D.Bat-Tsend, Deputy Director, Department of Energy
Ministry of Infrastructure Development
Shogo Kojima, President
Tottori Gas Company
3:30 COFFEE BREAK

Chair: Fereidun Fesharaki, Director
Program on Resources, East-West Center

3:50 E. Regional Cooperation in Northeast Asia's Energy Sector:
Possibilities --
Mark J. Valencia, Senior Fellow
Program on Regional Economics and Politics
East-West Center

4:10 F. Commentators:
Liu Hong, Chief of Section
State Planning Commission, China

T. Avarzed, Senior Officer, Department of Energy
Ministry of Infrastructure Development, Mongolia

Alexander Ognev, Chief, Long-Term Planning
Vostok-Energo, Khabarovsk

Kim Yoon Hyung, Senior Fellow
Program on Regional Economics and Politics,
East-West Center

4:45 G. Open Discussion

5:00 CLOSE

8:30 PM Consultative Group Meeting on Cooperative Development of
Telecommunications Infrastructure

Thursday, 21 August

9:00 AM VII. Comparative Approaches To A Cooperative Electric Power
System For Northeast Asia

9:05 A. Regional Potential for Cooperative Development of a Clean,
Efficient Electric Power System --
Peter Hayes, Executive Director
Nautilus Institute for Security and Sustainable Development

9:25 B. Japan's Perspective -
Mitsuho Uchida, Associate Vice-President,
Central Research Institute of the Electric Power Industry, Japan
9:45 C. Commentators:
Wang Leiping, Senior Power Economist
Beijing Economic Research Institute of Water Resources and Electric Power, China

Sh.Batrinchchin, Senior Officer, Department of Economic Cooperation, Ministry of Infrastructure Development

Kim Byong Jun, Head of Department
Pyongyang Electricity Design Institute, DPRK

Alexander Ognev, Chief, Long-Term Planning
Vostok-Energo, Khabarovsk, Russia

Kim Young-Chang, Deputy General Manager
Korea Electric Power Corporation, ROK

10:10 D. Open Discussion

10:25 COFFEE BREAK

10:45 AM VIII. Environmental Issues In Development

Chair: Bruce Murray, Programs Manager, China and Mongolia
The Asian Development Bank

10:50 A. Commentators:
Yu Jingyuan, China

Choi Dae Sun, Researcher, Committee for the Promotion of External Economic Cooperation, DPRK

D.Baasandorj, State Secretary
Ministry of Environment, Ministry

V.Gulgonov, Chairman
State Committee on Environment and Use of Natural Resources, Buriatia, Russia
Kikuo Tsukamoto, Managing Director
Around Japan Exchange Conference, Hokuriku, Japan

11:40    B. Open Discussion

12:00    LUNCH

1:45 PM   IX. Special Economic Zones

Chair: Stanley Katz, Visiting Fellow
East-West Center, Honolulu

1:50    A. Hunchun -- Li Wenshan, Deputy Mayor
        Hunchun City, China

2:05    B. Nakhodka -- Svetlana Vikhoreva, Vice Chairperson
        Administrative Committee, Nakhodka Free Economic Zone

2:20    C. Rajin-Sonbong -- Hwang Hyon Choi, Researcher
        Committee for the Promotion of External Economic
        Cooperation, DPRK

2:35    D. Western Japan -- Nobuyuki Sekiyama, Managing Director
        Institute for Northeast Asian Studies, Japan

2:50    E. Niigata -- Masaaki Komagata, Deputy General Manager
        Economic Research Institute for Northeast Asia, Niigata, Japan

3:05    F. Mongolia -- D. Bayasgalan, Chief, Restructuring and Property Division
        Ministry of Finance
        and
        Batsukh Dash, General Director, Division for Infrastructure
        Policy, The Administration of the Altanbulag Free Economic
        and Trade Zone, Mongolia

Regional Cooperation

3:20    Tumen River Area Development Programme --
        Ian Davies, UNDP/Tumen Secretariat

3:35    Open Discussion

3:50    COFFEE BREAK
Chair: Lee-Jay Cho, Chairman, Northeast Asia Economic Forum
4:15  X. Conclusions and Closing

4:45  XI. The Ulaanbaatar Resolution

5:00  CLOSE
THE SEVENTH MEETING
of the
NORTHEAST ASIA ECONOMIC FORUM
Ulaan Baatar, Mongolia
17-21 August 1997

Participants

CHINA
Zou Ping, Director, State Council; Head of Delegation
Wu Ying, Chief of Section, State Science and Technology Commission;
   Deputy Head of Delegation
He Zhongxiu, Professor, Tianjin Municipality Government
Li Wenshan, Deputy Mayor, Hunchun City
Liu Hong, Chief of Section, State Planning Commission
Sun Guang, Official, Tianjin Municipality Government
Shen Jinsheng, Professor, Northern Communication and Transportation
   University, Beijing
Wang Leiping, Deputy Director, Senior Power Economist, Beijing Economic
   Research Institute of Water Resources and Electric Power
Ye Shunzan, Professor, Institute of Geography, Chinese Academy of Science
Yu Jingyuan, Professor, Asia-Pacific Institute

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
Li Ju Yon, Vice-Chairman, Committee for Promotion of External Economic
   Cooperation (CPEEC), Head of Delegation
Ho Dong Guk, Deputy Director-General, Ministry of Communications
Kim Gyong Jun, Head of Department, Pyongyang Electricity Designing
   Institute
Li Gi Man, Senior Researcher, CPEEC
Li Gyong Nam, Senior Researcher, CPEEC
Choi Dae Sun, Researcher, CPEEC
Hwang Hyon Choi, Researcher, CPEEC

JAPAN
The Honorable Yuji Nishio, Governor, Tottori Prefecture Government
Kazuhiko Akashi, Northwest Asia Division, International Trade Policy Division
   Ministry of International Trade and Industry
Ken Asakura, Secretary General, National Pipeline Research Society of Japan
Dagvadorj Batbayar, Coordinator for International Relations, Tottori Prefecture Government
Nobuo Fukataki, President, Fukataki Accounting Office
Kiyotsune Fukumasa, General Manager, Tottori City Branch, Tottori Bank
Teruo Hachimura, President, Tottori Bank
Heikichi Hasebe, President, Hasebe Group
Makoto Hokkyo, Director of Secretariat Division, Tottori Prefecture Government
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Hisao Kanamori, Chairman, Japan Center for Economic Research
Kim Ki Dae, Professor, Niigata University of International Information Studies
Kiminao Kobayashi, General Manager, Administration Department, Global Infrastructure Fund Research Foundation Japan
Shogo Kojima, President, Tottori Gas Company
Masaaki Komagata, Deputy General Manager, External Relations Division, Economic Research Institute for Northeast Asia, Niigata
Hirosi Kotani, President, Kikkouya, Ltd.
Satoshi Matoba, Secretary, Embassy of Japan in Mongolia
Shun Matsumoto, Reporter, News Department, Nihonkai Telecasting Co., Ltd.
Tsuyoshi Matsumoto, Chief Director of TV News Division, Broadcasting System of San-In
Atsushi Matsuo, Secretary General, The Asian Economic Experts Conference
Koishi Matsuoka, Professor, Shimane International College
Kiyoto Mita, Researcher, Tottori Research Center
Yuko Miyauuchi, Senior Manager, Planning Department, Tottori Prefecture Government
Toru Muyazawa, President, Magenta, Inc.
Haruhito Nakamura, Associate Professor, Nagaoka Junior College
Toshihiko Nakamura, Secretary General, Niigata 21 Club
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Tamotsu Nakano, Senior Researcher, Tottori Research Center
Teruya Nakayama, President, Kittaku Ltd.
Masaru Nishikori, Deputy Director General, Division of Commerce Industry and Labor, Shimane Prefecture Government
Yukiaki Nishimoto, Around Japan Sea Economic Exchange Conference in Hokuriku
Osamu Niwa, Director for International Policy, International Affairs Bureau, Hyogo Prefecture Government
Noriaki Nomada, Assistant Director, International Division, Tottori Prefecture Government
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Atsushi Terada, Tour Conductor, Japan Travel Bureau
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Toshihiko Uchiyama, President, Century, Ltd.
Zenkichi Wada, President, Century, Ltd.
Ichiro Yamazaki, Deputy Chairman, Economic Research Institute for Northeast Asia
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The Honorable Mendsaikhany Enkhsaikhan, Prime Minister of Mongolia, Government of Mongolia
Surengiin Badral, Foreign Policy Adviser to the Prime Minister, Cabinet Secretariat, Government of Mongolia
T. Avarzed, Senior Officer, Department of Energy, Ministry of Infrastructure Development
N. Tuya, Director-General, Policy Planning & Coordination Department, Ministry of External Relations
Ganbold Baasanjav, Counsellor, Asia and America Department, Ministry of External Relations, Mongolia
D. Baasandorj, State Secretary, Ministry of Environment
G. Baasanjav, Director Department of Telecommunications, Ministry of Infrastructure Development
D. Bat-Tsend, Deputy Director, Department of Energy, Ministry of Infrastructure Development
D. Bayasgalan, Chief, Restructuring and Property Division, Ministry of Finance
L. Nyamtseren, Senior Officer, Ministry of Finance
Ts. Sukhbaatar, Director, Department of Economic Cooperation, Ministry of Infrastructure Development
G. Yondongombo, Director, Department of Energy, Ministry of Infrastructure Development

**REPUBLIC OF KOREA**

Nam Duck Woo, Chairman, Korea Sanhak Foundation; Head of Delegation
Chang Keun Sang, Section Chief, Ministry of Finance and Economy
Chang Ki Paik, President, Tae Yang Steel Pipe Co.
Choi Keun Nam, Land Reform Group, Institute for National Development Policy
Cho Mal-Soo, Standing Advisor, POSTRADE
Choo Bong Kyu, Director, Land Reform Group, Institute for National Development Policy
Chung Moon Mo, Executive Director, The Export-Import Bank of Korea
Kim Eun Jong, Project Manager, Korea Land Corporation
Kim Hakun, Professor, Economics Department, Yonsei University
Kim Ik Soo, Executive Director, Samsung Economic Research Institute
Kim In-Young, Professor, Political Science Department, Hallym University
REPUBLIC OF KOREA (continued)

Kim Jae Suck, Director, Land Reform Group, Institute for National Development Policy
Kim Yong Hak, Director General, Korea Land Corporation
Kim Young-Chang, Deputy General Manager, Korea Electric Power Corporation
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Kim Yung Hwan, Land Reform Group, Institute for National Development Policy
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Lee Jae Hyung, Director, Land Reform Group, Institute for National Development Policy
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Alexander Ognev, Chief, Long-Term Planning, VOSTOK-ENERGO,
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Svetlana Vkhoreva, Vice-Chairman, Administrative Committee, Nakhodka
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Anatoly Zapolsky, Chief, Foreign Economic Relations, Chita

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Tsuneo Akaha, Director, Center for East Asian Studies, Monterey Institute of
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INTERNATIONAL
Keith Chiddy, General Manager, ING, North East Asia Bank
Ian Davies, Tumen Secretariat, United Nations Development Programme
Tomoo Hayakawa, President, Asian Finance and Investment
Corporation, Ltd.
John Mi-Soon Lee, Managing Director (Corporate) and ExCom Member
Asian Finance and Investment Corporation, Ltd.
John McAlister, Managing Partner, China Urban Development Partners, Ltd.
Hans Meijer, Powerplants, Warsila NSD Corporation
Bruce Murray, Programs Manager, China and Mongolia, Asian Development
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EAST-WEST CENTER/NORTHEAST ASIA ECONOMIC FORUM
Kennon Breazeale, Projects Coordinator, East-West Center
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