ENERGY COOPERATION IN NORTHEAST ASIA:
OPPORTUNITY AND PROJECTS*

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INTRODUCTION

The countries in Northeast Asia, Korea, China, and Japan have experienced a robust dynamic economic growth for last several decades. Also, the region is expected to continue the economic growth in future. Accordingly, the region has a great potential for increase in energy demand in future along with further economic development, particularly in China and Korea. However, due

* This paper is prepared, being based on the author’s two publications: 1) Ryu, Ji-Chul, August 2003. Towards the Establishment of Institutionalized Framework for Multilateral Energy Cooperation in Northeast Asia, and 2) Park, Chang-Won and Ryu, Ji-Chul, March 2005. Energy Cooperation in Northeast Asia: Long-term Visions and Strategy...
to the limited availability of indigenous energy resources in the countries, the incremental energy demand should be met by imports.

The region also has large potentials for the development of untapped energy reserves of oil and natural gas, particularly in remote areas such as the Eastern Siberia and Sakhalin Island in the Russian Federation. Development of such huge energy development projects in Northeast Asia, if accomplished, envisages opportunities for multilateral regional energy cooperation in the region.

Currently, the region is a net importer of energy, so that further increases in demand imply a continuous rise in dependence on imports from outsiders of the region, particularly from the Middle East. So that keeping the intra-regional supply-demand balance at an optimal level, particularly for oil and natural gas, will be one of significant challenging issues in energy cooperation in Northeast Asia.

Regional energy cooperation in Northeast Asia has been impeded historically by some geopolitics factors, including Sino-Japan relations, territorial disputes among the countries in the region, and currently the political and security crisis in the Korean peninsula.

Opportunities for energy cooperation in Northeast Asia include; development of energy resources, particularly oil and gas in Russian Far East, construction of cross-border infrastructure networks, such as pipelines for crude oil and natural gas, and power interconnection systems, and efforts to creation of institutionalized framework for facilitating multilateral regional energy cooperation, and resolution of energy poverty problem in the DPR Korea. This paper will address on the above-mentioned issues and prospect related to the energy cooperation in Northeast Asia from a Korean perspectives.

**OVERVIEW ON ENERGY PROFILE IN NORTHEAST ASIA**

**Energy demand profiles**

Northeast Asia experienced a robust growth in energy demand over the past several years. Economic growth in China, the Republic of Korea, and Japan is the main driver for energy demand growth in the region. Thus, the region becomes a large energy consuming region in the world, accounting for 30.6 per cent in world total energy consumption as of 2008. Four countries in the region, namely, China, Japan, the Russian Federation and Korea are major
energy player in the world, ranking No. 2, 3, 4 and 9 in terms of energy demand size in the world, respectively.

Table 1. Energy Indicator in Northeast Asia by Country (2008)

<table>
<thead>
<tr>
<th></th>
<th>Korea</th>
<th>Japan</th>
<th>China</th>
<th>Russia</th>
<th>DPRK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Primary Energy (MM toe)</td>
<td>240.1</td>
<td>507.5</td>
<td>2,002.3</td>
<td>684.6</td>
<td>18.4</td>
</tr>
<tr>
<td>(Share in world total, %)</td>
<td>(2.1)</td>
<td>(4.5)</td>
<td>(17.7)</td>
<td>(6.1)</td>
<td>(0.2)</td>
</tr>
<tr>
<td>Energy per capita (toe)</td>
<td>4.59</td>
<td>4.02</td>
<td>1.48</td>
<td>4.75</td>
<td>0.77</td>
</tr>
<tr>
<td>Energy import dependency (%)</td>
<td>96.4</td>
<td>96.9</td>
<td>8.3</td>
<td>80.0</td>
<td>-</td>
</tr>
<tr>
<td>Oil dependency ratio (%)</td>
<td>43.0</td>
<td>43.7</td>
<td>18.8</td>
<td>19.9</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Korea Energy Economics Institute, 2009, Yearbook of Energy Statistics

Energy consumption per capita is also varied over the countries in the region, being 1.48 TOE (tons of oil equivalent) in China and 0.77 TOE in the DPR Korea, and more than 4.0 toe in Korea and Japan in 2008. The lower energy consumption per capita in China and the DPR Korea implies that Northeast Asia has a large potential for further increase in energy demand in future.

Northeast Asia is a net importer of energy as a whole although the countries in the region have different levels of energy resource endowment. Russia is only a country in the region currently net energy exporting country, while Korea and Japan have little endowment of energy resources and thus these countries heavily rely on imports. Their overseas dependence rates of energy are more than 96 per cent (with nuclear energy included). Although China possesses abundant energy resources, particularly coal, it is also a net importing country due to its enormous demand for energy during the course of its rapid economic development. China shows the energy import dependency of 8.3 per cent in 2008. Major supply sources for these energy importing countries are outside of the region, mainly the Middle East, Australia and Southeast Asian countries.

Continuous increases in energy demand

Given a large population and further expectant active economic growth in China as well as the industrialized nature of economies of Korea and Japan, energy demand in the region is also expected to increase in future more rapidly compared to any other region in the world.
### Table 2. Energy Demand Outlook in Northeast Asia (Unit: million toe)

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>220.2</td>
<td>251.2</td>
<td>277.0</td>
<td>304.4</td>
</tr>
<tr>
<td>Russia</td>
<td>644.9</td>
<td>711.9</td>
<td>816.6</td>
<td>902.4</td>
</tr>
<tr>
<td>Japan*</td>
<td>523.9</td>
<td>538.5</td>
<td>553.8</td>
<td>569.1</td>
</tr>
<tr>
<td>China</td>
<td>1,425.8</td>
<td>2,046.9</td>
<td>2,439.0</td>
<td>2,874.2</td>
</tr>
</tbody>
</table>


Note *: The outlook figure for Japan is quoted from the APEC Energy Demand and Supply Outlook 2006, the Asia Pacific Energy Research Center (APERC)

Total primary energy demand (TPE) in Northeast Asia is expected to increase to 4,662 million toe in 2020, notably, driven mainly by the country of large economy, namely China. China is expected to double the TPE during the outlook period from 1,426 million toe in 2004 to 2,874 million toe in 2020 and its share in regional TPE in Northeast Asia will increase from 50.6 per cent in 2004 to 61.7 per cent in 2020. However, more developed countries in the region, Korea, the Russian Federation and Japan, are projected to show a moderate increase in energy demand in the period.

**Regional energy development potential**

Russian Far East is blessed with abundant natural resource reserves, including oil and gas, which is yet to be fully tapped. Thus, the countries in the region have shown increasingly interests in developing the huge untapped energy resource reserves in the remote areas and promoting projects for constructing cross-border energy infrastructure networks. This includes, for example, development of energy resources, oil and natural gas and construction of energy network systems for cross-border pipelines and power grids.

Construction of cross-border energy transport infrastructure in Northeast Asia has been actively discussed and implemented at the bilateral and/or multilateral basis. This applies
particularly to natural gas and electricity, and the need for additional cross-border pipelines and power transmission systems between the countries in the region. For example, the development of the natural gas and power generation capacity in the Russian Federation should include projects for construction of cross-border pipeline and transmission networks for a gas and power trades the eastern part of the Russian Federation to China and Korea. Realization of these projects will provide the countries in the region with an opportunity to secure the benefits of diversification of energy sources (from coal and nuclear) and from the improvement of environment-friendly energy systems. The increased interconnection of energy transport systems among the countries in NEA not only can contribute greatly to meeting increased energy demand and diversifying supply options, but also create economic benefits.

**POTENTIAL OF AND CHALLENGES TO ENERGY COOPERATION IN NORTHEAST ASIA**

In the ‘Five-year Strategy to implement the Intergovernmental Collaborative Mechanism on Energy Cooperation in Northeast Asia’, which was published in April 2010, potential of and challenges to energy cooperation in Northeast Asia were identified as follows:†

**Potential**

There is an abundance of energy reserves ready for development in the Northeast Asian region, particularly in the Russian Federation and Mongolia. The Russian Federation's Far East is known for its vast amounts of oil, natural gas, and coal reserves, as well as hydro resources that can be used to generate electric power. Mongolia is prepared to develop a large coal reserve for both domestic use and exports to neighboring countries.

Given the diversity of energy resource endowment and market structure among the countries in the region, Northeast Asia shows tremendous potential for regional energy cooperation. The WG-EPP‡ 2007 Energy Outlook Report identified the following potential areas for regional energy cooperation in Northeast Asia:

It is confirmed that promoting regional energy cooperation can create more opportunity for energy trades among the countries in the region as well as for improvement of energy efficiency;

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† UNESCAP, March 2010, The Five-year Strategy to implement the Intergovernmental Collaborative Mechanism on Energy Cooperation in Northeast Asia
In light of expected steady increases in demand for energy, particularly coal, natural gas, and electricity in the region, energy importing countries in Northeast Asia, namely, China, Japan, and the Republic of Korea, need to promote energy cooperation with Mongolia and the Russian Federation for the energy development; Construction of energy trade infrastructures, in particular, for natural gas pipelines and power transmission networks, is required in Northeast Asia in order to facilitate the intra-regional energy trades among the countries in the region; Energy development projects and infrastructure construction to transport energy need for a massive investment requirement. Therefore, a multilateral cooperative mechanism for creating a more favourable environment for energy investments and financing in the region will be necessary; and Environmental impacts of rapid increase in energy demand will become a more important policy variable in Northeast Asia. All countries in the region need to cooperate to pursue environmentally friendly energy mix and the improvement of energy efficiency.

**Challenges**

Regional energy cooperation among the countries in Northeast Asia presented lags behind other regions of the world. Despite the incredible potential for multilateral cooperation, most of the cooperative energy development projects in Northeast Asia have been planned and/or implemented at the unilateral or bilateral level without considering the regional market characteristics as a whole. Thus, many projects for energy development and trade in Northeast Asia faced uncertainty in investment risk, future market size, and commercial feasibility and viability, causing them to either fail to materialize, or experience delays.

In pursuing efforts to facilitate regional energy cooperation, the following challenges need to be addressed and tackled by the countries in Northeast Asia in future:

Identification and prioritization of cooperation projects for common interests: This includes development of energy resources, oil, natural gas, and coal as well as the construction of energy network systems for cross-border pipelines and power grids for both short and long-term basis and for the multilateral level for common interests among the countries in Northeast Asia; Enhancement of policy cooperation among the government and business sectors: The countries in the region need at least to reach a consensus for promoting regional energy cooperation with common efforts both at the government and private sector levels. This includes the participation of all the countries in the region, including China and Japan in joint efforts for a regional multilateral energy cooperation framework, and also for establishment of an overall
coordinating mechanism for implemented cooperative projects;

Improvement of investment environments: Exploration and development of oil, natural gas, and coal and the construction of infrastructure to transport them from remote area in Northeast Asia to consuming areas need for a massive investment requirement. However, the countries in the region abounding in energy reserve, like the Russian Federation and Mongolia, suffer from a tight capital market for financing the energy project, particularly as an effect of global financial crisis. Therefore, multilateral cooperative approaches to create a more favourable environment for foreign energy investments in the region will be necessary;

Lessening political uncertainty: Political stability should be pursued in a multilateral cooperative framework, as it is an important factor in energy projects, particularly, related to the security of the projects. Uncertainty on political stability eventually involves a high risk for investors over the energy industry. In order to facilitate the energy cooperation in Northeast Asia, the countries in the region need at least to reach a consensus for common goals of lessening political risk of the energy project and de-coupling the energy issue from the politics; and

Enhancement of market compatibility: Countries in Northeast Asia have diversity of market system and structures, capacity of financing investment, human resources, and energy policy/planning, which are shown to be major factors to impede the facilitation of regional energy cooperation in Northeast Asia.

ENERGY COOPERATION PROJECT IN NORTHEAST ASIA

There are many existing bilateral energy cooperation efforts involving Northeast Asian countries, and a number of initiatives or projects are promoting bilateral or multilateral cooperation within Northeast Asia. In recent years, energy producing/export countries (Russian Federation and Mongolia) and energy importing countries (Korea, China, and Japan) have conducted numerous discussion and negotiations at the governmental and industrial levels. These cooperation projects are categorized into the following, Exploration/development of upstream sector for oil, gas, and coal Construction of cross-border energy trade infrastructure,

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8 UNESCAP, March 2010, The Five-year Strategy to implement the Intergovernmental Collaborative Mechanism on Energy Cooperation in Northeast Asia
including pipelines and power interconnection networks Power plant development and cross-border interconnections Expanding energy trade among the countries in NEA

Oil Development
In the Russian Federation, there is significant potential to develop oil in Eastern Siberia, Sakha Republic (Yakutia), and in the shelf of the Sakhalin Island. Construction of new oil production hubs in Eastern Siberia and Sakha Republic (Yakutia) and penetration of the Russian Federation in the energy market in the Asia-Pacific region generate the need to complete the oil pipeline system Angarsk-Nakhodka (with a capacity of about 80 million tons per annum) with a possible branch pipeline to China (Daquin).

1. Projects

The Russian Federation is keen to develop more outlets for its massive crude oil reserves in Eastern and West Siberia, and the 4,700 km ESPO oil pipeline will export crude oil to customers in the Pacific, including China, Japan, and Korea. The pipeline is being constructed and will be operated by Transneft, a Russian company, in two phases and will run from Taishet to Kozmino, via Kazachinskoe, Skovorodino, and Perevoznaya. As part of the original plan, there could also be a branch from Skovorodino to Daqing in China, but this proposal remains uncertain.

The first stage has been carried out and includes the construction of a 2,694-km oil pipeline

Figure 1. East Siberia – Pacific Ocean (ESPO) OilPipeline
with seven petroleum-pumping stations at Taishet-Skovorodino, with production capacity of up to 30 million tons, and a specialized sea bulk-oil port in Kozmino. Construction of the pipeline started from April 2006. The second stage involves constructing a 1,963 km oil pipeline from Skovorodino to the Pacific coast. The pipeline system for the second-stage has a design capacity of 50 million tons of oil per year and could be completed by 2013-2014. The feasibility study for the terminal at Kozmino has been completed. Transneft has started the construction of the ESPO branch from Skovorodino to the border of China.

2. Cooperation

Cooperation in the oil sector of NEA include the (1) development of the Eastern Siberia Pacific Ocean (ESPO) pipeline by the Russian Federation with the possible participation of China, Japan and Korea, (2) development of the Kamchatka shelf between the Russian Federation and Korea, (3) commercial ventures by Rosneft in China and Mongolia, and (4) development in Irkutsk and Sakhalin, Russian Federation, in partnership with Japan.

Natural Gas Development

The Russian Far East (Irkutsk, Yakut, Sakhalin Islands) includes one the largest unexplored hydrocarbon-bearing areas still left on earth. The area is a potential large source of natural gas in Northeast Asia for the market in Korea, China, and Japan. The development plan for natural gas in the region also includes a project for the construction of cross-border pipeline networks as a part of a gas-export line from gas fields in Eastern Siberia to Korea and China. The realization of these projects will provide the countries in the region with diverse energy sources (from coal and nuclear) while possibly improving environmentally friendly energy systems. Eventually, the project will contribute to the creation of an integrated regional energy system in Northeast Asia.

1. Projects

The Russian Federation’s Far Eastern and Siberian regions have four gas centers, which could fulfill domestic gas demand and supply excess production to customers in the Far East: on Sakhalin, in Republic Sakha (Yakutia), in Krasnoyarsk region and Irkutsk Oblast. At full development, they will be integrated into the gas supply system of the Russian Federation.

The first gas exports from the Russian Federation occurred in 2009 when Gazprom, the state-own gas company of the Russian Federation, exported LNG to Japan and Korea from the Sakhalin-2 project. Sakhalin-2 is the world’s largest integrated oil and gas project. A consortium
of Japanese and European companies developed Sakhalin-2.

The Sakhalin-1 project is already supplying gas to the domestic market, and the developers are considering modes for gas export to Pacific customers. Four blocks of the Sakhalin-3 project have been licensed, and Sakhalin-4 and -5 projects are in various preliminary stages of development.

In the long term, gas exports to Pacific customers could begin with the construction of a gas pipeline to Vladivostok and the development of a 1,500 km gas transport system (GTS) from Sakhalin to Khabarovsk and Vladivostok. Near Khabarovsk, the system can be united with GTS Chayandinsky NGKM - Blagoveshchensk – Khabarovsk, which will pass in one corridor with the planned ESPO pipeline system.

2. East-Siberia Gas Pipeline Projects

Based on Gazprom's plan, the pipeline will be constructed and connected systematically from East Siberia and Sakhalin to Vladivostok by 2020, and natural gas will be supplied and exported to the domestic market in the Russian Federation and neighboring countries via its trunk pipeline system by developing new gas fields. Pipeline development includes,

1st stage: (1) Constructing a gas pipeline of Sakhalin-Khabarovsk section, (2) Building trunk line and supplying gas in Irkutsk area;

2nd stage: Development of Chayandinsk gas field (1) constructing a branch line for supplying gas to China at the Blagoveshchensk, (2) Connecting gas trunk line between Irkutsk and Tarshet, and (3) Connecting trunk line between Khabarovsk and Vladivostok and supplying natural gas to the Republic of Korea; 3rd stage: Developing fields in the Krasnoyarsk region and connecting line to Tarshet region; and 4th stage: (1) Connecting gas fields between Irkutsk and Chayandinsk, (2) Connecting gas trunk line in Blagoveshchensk and Khabarovsk section (completion of UGSS).
Cooperation

Korea and the Russian Federation signed an inter-governmental agreement for natural gas cooperation in October 2006 with the Korea Gas Corporation (KOGAS) and Gazprom acting as managing companies of the Agreement. Both companies have had several consultation meetings since then. At the Summit Meeting held in Moscow in September 2008, President Lee Myung-bak of the Republic of Korea and President Dmitry Medvedev of the Russian Federation agreed to jointly undertake a $100-billion project to develop gas routes from Siberia to Korea and to expand a Northeast Asian electricity grid network. The proposal would call for Korea to import 10 billion cubic meters (bcm) of gas per year for 30 years beginning in 2015 from the Russian Federation through a pipeline, which would pass through the DPR Korea. A formal contract for the gas purchase will be signed between KOGAS and Gazprom in 2010. Construction of the envisioned pipeline from Vladivostok to Korea is scheduled to begin in 2011 and be complete by 2014, so that gas delivery can begin in 2015. Along with the gas deal, Korea and the Russian Federation also agreed to set up a joint gas-chemical industrial zone in the Russian Federation's Far East, with KOGAS and Gazprom taking the lead.

1. Russia-China: In September 2009, Gazprom and the China National Petroleum Corporation have signed the Strategic Cooperation Agreement, and a gas sector development cooperation road map was also signed. An important step has been taken within the negotiations on the long-term contract for gas supply to China, including gas supply volumes, directions and start-up dates, price formula, and other terms and conditions. Gas from the Russian Federation
will primarily be supplied to China via the western route due to the available abundant resource base being developed. A contract among the parties is expected to be signed in June 2010, and gas deliveries are expected to begin in 2014-2015. Deliveries are planned to carry out from the Chayandinsky deposit and likely from Kovykta.

2. Japan – Russia: The Russian Federation-Japan cooperation in gas supplies continues to progress steadily. In April 2008, the Japan Oil, Gas, and Metals National Corporation (JOGMEC) and the Irkutsk Oil Company created a JV INK-North to implement projects in the northern part of the Irkutsk region. On 26 November 2009, both companies signed a memorandum of understanding (MOU) to commence a gas-to-liquid (GTL) joint study titled “Collaborative study on the applicability of the Japan-GTL process to Irkutsk Oil Company Natural Gas Resources.”

**Coal Development**

Coal demand in Northeast Asia is expected to increase from 1,214 million toe in 2004 to 2,172 million toe in 2020. Coal will be the most significant fuel to lead the increase in energy demand in Northeast Asia with the contribution rate of 53 per cent.

1. Projects

In the Russian Far East, Elga is an attractive coal deposit that is located in Yakutia. Nested in a strategic location, high quality premium thermal coal allows it to be a competitive export in the Asia pacific marketplace. The Elga area contains over 2.1 billion tons of recoverable reserves: 1.6 billion tons of thermal coal and 0.5 billion coking coal. Up to 50 million tons of annual production is available for Asia Pacific market. Coal products can be exported via train through either the Port of Vostochny or Vanino. Infrastructure for transportation and handling facilities should be put in place for further development of the project.
Cross-border power interconnection

Currently, there are little bilateral cross-border power interconnection systems in Northeast Asia. Most countries in the region operate their own power transmission system independent of neighboring countries. However, a cross-border power interconnection system in the region could produce economic gains/benefits for the countries including cross-border load diversity, lower capacity additions, reduced spinning reserve requirements, more efficient dispatch, and more reliable system operation. Power interconnection is one of the efficient ways to overcome the difficulties electric power industries face, including enormous investment cost and concerns for the environmental pollution.

1. Projects

The feasible project for the cross-border power interconnection in Northeast Asia under discussion includes the construction of transmission lines between the Russian Federation, the DPR Korea, and the Republic of Korea. The Russian Federation is believed to have a significant potential to export hydropower out of Eastern Siberia.

The North-East Asian, Regional Electricity System Tie (NEAREST) project, has been discussed in various forms in an effort to promote energy security in Northeast Asia. The project, however, has not taken off despite its desirability and feasibility mainly due to political reasons in the Korean peninsula. Discussion on economic and technical aspects of the project is the
sustaining activity on an ongoing basis in preparation for actual implementation of projects in the near future. Possible opportunities in implementing this project include power exchange, reliability control, and interconnection scenarios.

Figure 4. Regional Power Interconnection in Northeast Asia

**Joint Strategic Oil Stockpiling**

Joint stockpiling of strategic petroleum reserve (SPR) in Northeast Asia has been proposed as one of the means that increases energy security capability in the region by sharing excess storage and SPR capacities while also jointly expanding the level of SPR in the region. Oil importing countries in NEA will establish a cooperative and operational mechanism for joint oil stockpiling system, and, ultimately, achieve better emergency response mechanism and energy security capability, when there are sudden oil supply disruptions. Excess SPR and stockpiling facilities of Korea and Japan could be utilized to achieve effective and efficient joint stockpiling in the region. In addition, transfer of advanced storage construction and operation technology from the Republic of Korea and Japan can significantly encourage other countries to initiate SPR.

The purpose of the strategic petroleum reserve is to prevent severe social, economic, or political turmoil resulting from sudden and temporary supply disruptions by securing a stable oil supply. It can also discourage oil-producing countries from using oil as a political tool.

In fact, there is a case of joint stockpiling between Korea and China in the commercial sector.
A Chinese oil company leases storage from the Korea National Oil Corporation and reserves its oil. However, it is a purely commercial practice, and there is no example of joint stockpiling for SPR in the region. What is more, few comprehensive economic and geopolitical feasibility studies examine joint stockpiling in Northeast Asia.

Each country in Northeast Asia, especially China, prefers to hold SPR in its own territory, in principle, because it is related to national security and strategic materials for a national emergency. A precondition for the joint stockpiling is a guarantee for accessibility to the oil stored in the territory of other countries during the sudden oil supply disruptions, especially when there are conflicts among countries. Access can be guaranteed when there is very strong trust and/or binding agreement among countries. However, the countries in this region have not yet reached that level of trust. Additionally, the region lacks conflict mediation mechanisms. Consequently, there are some skeptical views on the possibility of practically implementing joint stockpiling in the region.

**Cooperation for Energy Poverty in DPR Korea**

The DPR Korea has suffered from serious shortage of energy supply which in turn jeopardized its economy over the last decade. The downturn of the energy sector in the country is a combined result of

- significant cut of subsidized oil supply from the Former Soviet Union and China since the late 1980's,
- allure to maintain and modernize energy infrastructure,
- the impacts of natural disasters,
- and inefficient energy production.

Given the lack of capitals and technologies to rehabilitate its energy system, North Korea is desperately in need of international cooperation with other countries, in particular, the Republic of Korea (South Korea), Russia, China, Japan, the United States, Australia and the European Union, and with the relevant international organizations as well.

1. Recommendation

Recommendations for North Korea to fundamentally resolve the energy crisis include:

Abandoning its long-pursued economic policy of self-reliance (Juche) and opening the energy

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system to commercial energy supply from overseas.

Establishing market mechanism for energy and creating energy market by introducing energy pricing and tax systems and reforming energy legal structures

Promoting active cooperation with South Korea and other countries for rehabilitation of the existing energy facilities as well as for expansion of energy system by de-coupling the energy issues from the politics and accommodating foreign investments.

Adopting cost-effective energy options in recovering energy system in the short term by particularly increasing role of petroleum in energy mix in parallel of pursuing new and renewable energy and natural gas with the medium-long term goals.

Strengthening energy policy making capability by improving energy statistics and modeling infrastructure and training energy experts and scientists.

2. Prerequisite

For promotion of international energy cooperation, North Korea is required to:

Accept demand from the international community for military and security concerns transparently, and actively participate in international energy cooperation activities in pursuit of the membership of the International Monetary Fund (IMF), other international financing organizations, and multilateral regional energy cooperation bodies in Northeast Asia.

Closely consult with South Korea in reconstructing the energy system, so that the energy systems of both Koreas can be integrated into mutually compatible single system in future. Enhance capacity building for introducing market mechanism in the energy sector by promoting international cooperation in the areas of training and educating energy experts, jointly undertaking energy project feasibility studies, and policy making capability.

3. Agenda for Cooperation

Possible energy cooperation projects for the DPR Korea of the neighboring countries

Humanitarian aids for supply of energy products for civilian use of energy: Anthracite coal, LPG, kerosene, diesel, and heavy fuel oil for power generation, power supply to a limited area (eg, Gaesung, Wonsan).
Renovation/re-construction of existing energy production facilities: coal mines, refineries, power generation, transportation/storage systems  

Technical, financial and experts assistances

Revising legal/market rule structures to create environment of market mechanism

Power interconnection with the Republic of Korea and Russia Far East

Natural gas pipeline project: Sakhalin and Irkutsk projects

Providing with training/education programs for energy planning/ implementation

**Effort to Establish a Multilateral Energy Cooperation Framework**

There have been growing interests among the countries in Northeast Asia in creating a useful institutional scheme to initiate multilateral intra-regional energy cooperation in region, in the pursuit of common objectives of energy policy, such as joint development of supply sources, integration of energy infrastructures, energy conservation, etc. It is also required to create an institutionalized framework to reduce risk of large scaled investment and thus facilitate energy investment and trade in the region.

In November 2005, Northeast Asian senior officials from the Democratic People’s Republic of Korea, Mongolia, the Republic of Korea, and the Russian Federation, created the Intergovernmental Collaborative Mechanism on Energy Cooperation in Northeast Asia, as a voluntary and non-binding instrument for intergovernmental consultations and decision-making on energy in the region in recognition of the needs, mutual benefits, and challenges to promote regional multilateral energy cooperation in Northeast Asia.

The Collaborative Mechanism vision to “By 2020, improved energy security in North-East Asia through energy cooperation in a sustainable manner” aims to achieve following objectives:

To increase the supply of energy in the North-East Asian region, lessening its dependence on energy imports from outside the region;

To optimize the economy and efficiency of supply and use of energy; and

To minimize the environmental impact of energy production and consumption through improved energy mix and greater energy efficiency.

Currently, Mongolia, the Republic of Korea, and the Russian Federation are actively engaged in the implementation of the Collaborative Mechanism as official member states. The Democratic People’s Republic of Korea’s participation is limited: it is not represented in joint
studies and only attended some meetings of the Collaborative Mechanism. China is also involved in most activities of the Mechanism, including joint research, but their government has yet to formally endorse the Mechanism. Meanwhile, Japan is an observer country and has shown some interest recently on the activities of the Mechanism. China and Japan are not keen on joining the Mechanism at present, perhaps to unclear benefits and advantages from their membership.

At present, only two working groups have been established under the Mechanism; the Working Group on Energy Planning and Policy (WG-EPP) and the Working Group on Coal (WG-C). Major activities under the WG-EPP are joint studies, capacity-building workshops, and the conduct of Government-Business Dialogue. The Mechanism has thus far successfully accumulated information on energy policies, demand/supply statistics, forecasts of member states, and established common databases through the activities of the WG-EPP. It provided information to government policymakers, strengthened the collaboration among research institutions, involved energy industry representatives and experts in the policy dialogues, and facilitated the Government-Business Dialogue.

However, activities of the Mechanism are too few to have significant impacts, due in part to limited resources and insufficient participation and contribution from other member countries.

**IMPLICATION OF REGIONAL ENERGY COOPERATION FOR KOREA**

Korea ranks the 9th position in the world in terms of total energy consumption, as of 2008: 6th in oil consumption, 4th in oil imports and second in LGN and coal imports. Despite of high energy import dependence of 97 per cent, Korea's performance for energy security efforts (overseas oil development, renewable energy development, energy conservation and efficiency improvement) is still weak. However, Korea's total energy demand is expected to continuously increase in future and to reach 311.8 million toe in 2020. Demand natural gas will increase more rapidly than any other energy source.

Korea needs to effectively tackle energy related problems of supply security, price stability and environment conservation by strengthening the related measures for these challenges. As the global environment protection efforts are emerged, Korea needs to improve its energy demand-supply structure to more environmentally friendly system.

Energy cooperation with countries in Northeast Asia is expected to be essentially necessary for Korea in tackling its challenges. In particular, oil imports increases in China from the Middle
East can be seen as a significant factor to affect Korea's energy security capability in future.

On the other hand, regional energy cooperation in Northeast Asia will contribute to resolve energy poverty problem in the DPR Korea and thus to improve two Koreas' political and economic relations. By initiating and promoting bilateral energy cooperation, Korea will play a leading role as a facilitator for encouraging China, Japan and the DRP Korea to participate in the regional energy cooperation in Northeast Asia.

With integration of onshore and offshore energy system, Korea has a role of bridge for creating integrated energy system in the region and a center for energy logistic and trade. Korea has a capacity of energy industry for leading energy cooperation. Also, Korea can play a leading and principal role in initiating joint effort for research activities with the countries in the region by supporting and strengthening the related research activity.
REFERENCES


United Nations Economic and Social Commission for Asia and the Pacific, April 2003, ‹Vladivostok Statement of Senior Officials on Energy Cooperation in North-East Asia›, Vladivostok, Russian Federation
