

MONGOLIAN ENERGY STRATEGY: CURRENT STATUS AND PROGRAMS

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1. MONGOLIAN ENERGY STRATEGY: CURRENT STATUS AND PROGRAMS

Mongolia is a landlocked country with a vast territory of 1.6 million square kilometers and a small, scattered population of 2.5 million people sandwiched between the Russian Federation and the People's Republic of China (PRC), and for its economic growth, poverty reduction and overall development, the development of infrastructure, such as roads, energy access and telecommunications, is vital. Due to its landlocked and remote location Mongolia is dependent on cross border trade, and the government of Mongolia has been promoting regional cooperation in the energy sector with its immediate neighbors and countries of the region.

Mongolia has been developing its democratic society and market based economy since 1990, and the government of Mongolia has made tremendous efforts to make the transition from an authoritarian regime to a democratic society, and from a centrally planned economy to a market oriented economy. Many important steps have been taken towards the legal, structural, and institutional changes needed to transform society and the economy.

As of the end of 2006 the Mongolian economy grew at a rate of 8.3% and economic growth during the last three years averaged 8.4%. For the first time in three years the budget had a surplus due to the high commodity prices for copper and gold. Although many structural changes have been undertaken to improve the overall macroeconomic situation and policies to improve the investment environment, the economy remains dependent on mining and agricultural products.

Mongolia recently began oil exploration and has started to export crude oil to China, and for the development of oil industry there is a need for investment in the oil sector and the related infrastructure. At this time all petroleum products are imported from Russia and China.

Liquefied petroleum gas (LPG) use is increasing rapidly, and the government places importance on the development of an LPG network and LPG use as a new and

relatively "clean" fuel mix.

One third of the population of Mongolia follows a nomadic lifestyle, herding 34 million livestock. Because of this nomadic lifestyle, it is a challenge to develop suitable electricity access for herders. The government is encouraging the development of renewable energy, such as small-scale hydro, solar and wind energy projects. There are ongoing projects to develop small hydropower plants (HPP), to promote the use of solar and wind energy.

Mongolia's current total installed electricity capacity is 878.4 MW, and its heat capacity is 1,700 GCal/hour. The electricity network covers most of the nation and power is supplied to 19 aimags (provinces), and 200 soum (district) centers. Mongolia covers its deficit in peak hours by importing electricity from Russia. Due to the rapid economic growth of 10.6% in 2004 (6.4% in 2005), the power demand has increased by 7% (4.6% in 2005), and the increased demand is due to increased mining production.

Mongolia has abundant coal resources of 150 billion tons and needs to invest more in exploration and development. The production and export of coal is increasing.

The government is implementing programs to create a unified grid, and to develop the energy sector in a comprehensive and sustainable manner.

The new Energy Law of 2001 enabled establishment of an independent regulatory authority, which will enable efficient operators to enter the energy market, and the restructuring of the energy sector has been implemented in accordance with the new law. The government of Mongolia has started the privatization of state owned assets in the energy sector.

Mongolia is keen to promote energy cooperation with neighboring countries and the countries of Northeast Asia.

In terms of policy the major priorities for the government are to create the necessary institutional framework for private sector participation (PSP), to improve the efficiency of the energy sector, to facilitate the development of renewable energy, and to promote an

environment which will enable regional energy cooperation and integration.

The Mongolian fuel and development strategy is contained in numerous policy documents, and there is no one document which contains all strategy directions. A legal basis is provided by two laws, the Energy Law of 2001 and the Renewable Energy Law of 2007.

The Mongolian Parliament passed the "Renewable Energy Law" in January of 2007, and this law enables the creation of trust funds for promotion of renewable energy sources and purchase of power generated from renewable energy sources at preferential tariffs.

Mongolia's Energy Strategy has been reflected in several policy documents, such as the "Mongolia Integrated Power System" (MIPS), the "Mongolia Sustainable Energy Sector Development Strategy Plan (2002-2010)", the National Development Strategy, the Regional Development Concept, as well as government programs such as the "National Renewable Energy Program", the "100,000 Solar Ger" program, the "Liquefied Petroleum Gas" program, and the "Coal" national program, etc.

Fuel and Energy in the National Development Strategy (NDS) of Mongolia

In order to get a broader understanding of the fuel and energy sector within the wider context of Mongolia's economic development, it is important to understand the national development policy for the short and medium term.

In the coming years Mongolia's economy will be driven by the rapid development of the mining and mineral resources and agricultural sectors, and related industrial and manufacturing developments.

The government of Mongolia developed the National Development Strategy (NDS) in 2006, which outlined the major policies for the 15 years to 2021. The NDS has been developed in line with the macroeconomic, infrastructure, trade and industry, agricultural and other policies, the Regional Development Concept, ongoing programs such as the Millennium Road and Mongolia Integrated Power System (MIPS) etc., and this is the first attempt at a long-term strategy which goes beyond the government remit and ensures consistency in development strategy.

Mongolia will pursue an economic development strategy to develop export-oriented industries and services. The primary objectives of the economic development policy are to make significant progress in achieving the Millennium Development Goals (MDG), increase economic growth to an average of 14%, increase GDP per capita to not less than \$12,000 by 2021, and develop the knowledge-based economy, etc.

The National Development Strategy will be implemented in two stages, the first running from 2007 to 2015, and the second from 2016 to 2021.

Industrial Sector

During the first phase (2007-2015) the utilization of strategic deposits, the improvement of the structure

of the economic sector, the creation of a knowledge-based economy and the formation of a financial capacity utilizing advanced technology are planned. During this stage the following are envisioned; to create favorable legal and economic conditions to attract domestic and foreign investment, to increase the use of mineral resources which are of great importance for economic growth, centralize the revenues from the utilization of mineral resources to the "Mongolia Development Fund", develop the deposits of Oyu Tolgoi, Tsagaan Suvarga, Tavan Tolgoi, Asgat, Tsav, Tomortei, and Choir-Nyalga in an environmentally-friendly manner, enhance the capacity of the Erdenet plant, increase cathode copper production, produce 400,000 tons of pure copper and 500,000 tons of steel by 2015, launch the processing of coking coal, increase the extraction of oil, upgrade the processing of minerals and develop value-added products, expand geological studies and mineral exploration, focus on increasing the standard of living of the population and reduce poverty via utilization of mineral deposits.

During the second phase (2016-2021) the following are planned; to intensively introduce advanced and ad-hoc techniques and technology in the mining and mineral-resource sectors and increase the production and sale of value-added products. In order to achieve these goals, the strategy outlines such goals as; the introduction of affordable, efficient, environmentally-friendly advanced technology to fully utilize mineral resources, keep mineral resource extraction at an adequate level, upgrade the processing and increase the production of value-added products, produce 900,000 tons of pure copper and 750,000 tons of steel, 400,000 tons of lubricants and mineral fuel materials from coal annually to 2021, build a larger scale crude oil extraction and processing plant, meet the needs of the domestic market and supply the foreign market with petrol and oil products, develop a national mining company of world standard, and develop mining related small and medium-sized enterprises (SMEs), etc.

Manufacturing sector

During the first stage (2007-2015) in the area of manufacturing, the following are envisioned; to introduce advanced technology in the manufacturing sector and increase production of value-added products which are competitive in international markets, develop the wool and cashmere processing industry as a strategic sector and enhance its competitiveness in world markets, encourage and develop production of products that can substitute for imports, establish industrial and technology parks which are closely linked with domestic and foreign resources and opportunities regionally and develop those parks, etc. It is expected that high technology will be introduced in manufacturing, and production and product competitiveness will increase as manufacturing's share of GDP increases four-fold.

During the second phase (2016-2021) the following are planned; to strengthen and increase the share of

intellectually capable and knowledge based production in the industrial sector, develop a highly-developed production industry which meets world standards, increase trade and export capacity, and achieve full processing of raw materials originating from livestock, etc.

Energy sector

The NDS sets the following priorities for the energy sector; establishing an integrated energy system in Mongolia, increasing the efficiency of the energy sector and ensuring reliable and safe operations by specifying a power supply policy for the Gobi region and establishing power supply to the Oyu Tolgoi, Tavan Tolgoi, Tsagaan Suvarga and other mines, building a 220-kV power transmission line from the Central Electricity System to Oyu Tolgoi, constructing a power plant of up to 500 MW at the Tavan Tolgoi coal mine using foreign investment, connecting the power systems of the eastern and western regions to the central energy system, reducing energy dependency, building a combined heat and power (CHP) plant of up to 400 MW in the city of Ulaanbaatar, building hydropower plants on large rivers such as the Eg, promoting regional energy integration, and exploring the potential for utilization of nuclear energy and power plants, etc.

Developing access in rural areas is one of the main objectives of the strategy, and electricity supply to soums, residential areas and herders will be one of the main priorities. It is planned to connect 120 soums and residential areas not connected to the central energy grid by expanding the grid and renewable energy sources, and provide 120,000 families with solar and wind energy sources within the framework of the "100,000 Solar Ger" program.

In the fuel sector the following are envisioned; developing small-scale, gasified coal plants and improving energy supply in rural areas, producing smokeless fuel from coal, developing medium- and large-scale production of liquefied fuel, and developing a coke-chemical-coal-power and pure chemical industrial complex, etc. To achieve these objectives, there are plans to form a legal and regulatory framework that can provide government support to the coal extracting and processing industries and to implement legislation, to start utilizing a coke coal deposit at Tavan Tolgoi, to establish coal-chemical research laboratories, to produce liquid fuel products from coal and to reduce imports.

At a later stage, based on pure coal technology, there is a plan to build a larger scale power station and achieve the production capability needed to produce liquid fuel products from coal by establishing a fuel, energy and coal-chemical complex in the Choir-Nyalga coal basin, producing new types of energy sources such as hydrogen and methanol (methane) from coal, achieving the full capacity of the coke-chemical factory and exporting not less than five million tons of coal per annum.

Mongolia Integrated Power System (MIPS) Program

In 2002 the State Great Hural (parliament) adopted the "Mongolia Integrated Power System" (MIPS) program, and the program will contribute to energy access development and will help to reduce operational expenses, creating favorable socio-economic conditions for regional development, and creating a reliable electricity supply. The ultimate goal of the "Mongolia Integrated Power System" (MIPS) program is to create a unified power grid connecting the Central Energy System (CES) of Mongolia with the western and eastern systems thus creating a network which will improve reliability and cost effectiveness.

The Mongolia Integrated Power System (MIPS) Program was updated in 2007. It is the main policy document outlining the main directions for electrification in Mongolia.

National Renewable Energy Program (2005-2020)

On June 9th 2005 the parliament of Mongolia approved the "National Renewable Energy Program" (2005-2020) to facilitate the use of renewable energy in Mongolia. The main objective of the program is to improve the energy structure in Mongolia by increasing the share of renewable energy in the total national energy supply, to increase economic efficiency and reduce unemployment and poverty, as well as to provide sustainable environmental conditions to support sustainable social growth. The goal envisaged in the program is to increase the share of renewable energy within the total generation to 3-5% by 2010, and 20-25% by 2020, respectively.

"100,000 Solar Ger" Program

This program was launched by the government in 1999 to be implemented in the period 2000-2010. The main purpose of the program is to provide solar home systems to all households in rural areas, develop solar-wind-hydro hybrid power systems combined with diesel generators to meet the demand of rural families, villages, schools, hospitals, tourist camps, cultural and small enterprises, and frontier posts, etc.

The government subsidizes this program by paying an amount for the purchase of the system for low-income families. Most rural families pay half of the cost of the solar power system, and the remaining half can be leased for 2-3 years.

Liquefied Petroleum Gas (LPG) Program

The liquefied petroleum gas (2006-2010) program was adopted by the government in 2006. Mongolia has still not completed thorough geological surveys for oil and gas deposits - consequently coal is the major fuel for energy production.

Mongolia started importing liquefied petroleum gas (LPG) from Russia in 1996, and demand has grown at an average of 40% per year. Now there are eight companies which are involved in the import and distribution of LPG in Mongolia. The government of Mongolia (GOM) gives

exceptional importance to the development of the use of LPG as a new fuel mix, as a relatively "clean" fuel compared to fossil fuel, and the government has taken some measures to exempt taxes for equipment, etc.

The government of Mongolia launched a new program "Liquefied Petroleum Gas" which is aimed at promoting the use of LPG in households and transportation, and at introducing the necessary safety standards and regulations.

In order to promote the use of LPG and ensure safety, compliance and efficient usage in LPG consumption, the government is drafting the "Gas Supply Law".

"Coal" National Program

The "Coal" national program, which has been submitted to the State Great Hural (parliament), has as its main objective the development of coal processing technology, thereby contributing to social stability, economic security and sustainable development.

The program's goals are to develop and produce liquid fuels, flammable gases, and ecologically clean fuels from coal, to develop power production, the coke-chemical and coal-chemical industries, and export products, and to develop the coal-processing sector as a leading sector of the economy.

The government of Mongolia is pursuing policies to create the conditions for producing coal using clean coal technology, for producing liquefied petroleum and briquettes, and for attracting investment in this sector in order to export coal products to the world market, and to create a favorable legal environment and tax and tariff conditions.

The program will be implemented in two stages during the period 2007-2020.

During the first stage (2007-2012) the following are envisioned; to develop the techniques and technology for coal exploration, production, and development of a coal-chemical factory, to identify measures and directions, to establish a coal-producing factory and coal-chemical laboratory, to utilize the Tavan Tolgoi coal mine comprehensively and to define internationally recognized standards for coal and study.

During the second stage (2013-2020) is the following are planned; to take measures to introduce modern technology and methods of coal liquefaction and production of oil from coal, and to establish a coal-chemical factory complex.

Mongolia Sustainable Energy Sector Development Strategy

In 2002 the government of Mongolia approved with Resolution Number 140 the "Mongolia Sustainable Energy Sector Development Strategy Plan (2002-2010)", and this reflects the goals reinforced in the Poverty Reduction Growth Facility (PRGF) program, which has been endorsed by the international and donor community. The main objective of the Energy Sector Strategy of Mongolia is to create a financially sustainable energy sector that will

provide cost-effective energy access, thereby enabling poverty reduction and greater private sector and civil society participation. Mongolia's energy sector will be developed within a regional energy context, while at the same time taking advantage of new technologies and sources of energy that might further promote economic efficiency and environmental sustainability.

2. DEVELOPMENT OF BILATERAL AND MULTILATERAL INTERNATIONAL ENERGY COOPERATION WITHIN THE NORTHEAST ASIA REGION, AND COOPERATION WITH OTHER INTERNATIONAL ORGANIZATIONS

As a remote and landlocked country, Mongolia has to cross at least one international border in order to access sea ports and international trade routes. The closest sea port, Tianjin in China, and the port of Nakhodka in the Russian Federation, being 1,700 km and 6,000 km from Ulaanbaatar respectively, are the closest sea access ports and the high transportation cost makes goods produced in Mongolia less competitive on international markets.

Since the early 1990s when Mongolia started to develop a democratic society and market oriented economy, a great deal of effort has been devoted to promoting policies of active bilateral and multilateral trade and economic cooperation.

Because of its geographical location Mongolia has developed close political and economic ties with its immediate neighbors, China and Russia, as well as other countries. Mongolia is promoting the "third neighbor" concept to develop balanced foreign relations with other countries.

Energy cooperation between Mongolia and Russia was historically close. In recent years, however, cooperation between Mongolia and China has been developing quite rapidly. The former Soviet Union built the whole fuel and energy sector in Mongolia, and everything from coal mines to power plants, electricity and heat distribution networks, etc., were built using Soviet technology, and a structure of vertically-integrated energy utilities has been inherited. Although there were traditionally very strong ties in the energy sector, at this moment bilateral cooperation is limited to electricity import from Russia to Mongolia.

Mongolia and Russia have a power connection in the form of a 220-kV transmission line between the Siberian Energy System in Buryatia and Mongolia, and is an important link for making up the deficit of power during peak hours and ensuring the reliability of the Mongolian Central Energy System by regulating frequency stability. On average, Russian power import constitutes 5% of total demand.

Additionally, besides some small regional power links between border points, there is a 110-kV power connection between Western Mongolia and the Republic of Tuva in Russia. Three aimags in western Mongolia - Bayan-Ulgii, Uvs, and Khovd - are fully dependent on Russian power imports.

Energy cooperation with China has started only recently, but it is increasing rapidly. Chinese companies are constructing two hydropower plants in Western Mongolia; the Durgun 12-MW hydropower plant (HPP) and the Taishir 11-MW HPP.

The Chinese government has provided a grant which was used to acquire solar power systems for the "100,000 Solar Ger" program.

The Chinese government offered US\$300 million in soft loans to the Mongolian government, and in 2006 the Memorandum of Understanding (MOU) was signed between the Ministry of Finance and China's Export-Import Bank to utilize this preferential loan for construction of the Egiin 220-MW HPP, on the river Eg.

There is an ongoing study into developing coal mines in Mongolia, constructing power plants and exporting power from Mongolia to China. The study started after the signing of the Memorandum of Understanding (MOU) between the Central Regional Electricity Transmission Company of Mongolia and the State Grid Corporation of China (SGCC) during the state visit of Mongolian President N. Enkhbayar to the People's Republic of China in 2005. The project will be realized after getting the approval of the governments of Mongolia and China following the carrying out of a detailed feasibility study.

The government of Mongolia is developing mutually beneficial, bilateral energy cooperation with countries in Northeast Asia, such as the Russian Federation, the People's Republic of China, the Republic of Korea (ROK) and Japan.

Cooperation with the ROK has started recently yet it has been making great progress in recent years. During the official visit of President Roh Moo-hyun to Mongolia in 2006 several agreements to facilitate bilateral energy cooperation were signed:

1. A Memorandum of Understanding (MOU) on utilization of Renewable Energy between the Ministry of Fuel and Energy and the Ministry of Commerce, Industry and Energy (MOCIE) of the ROK;
2. An MOU between the Ministry of Fuel and Energy and the Daesung Group to develop a renewable energy park in the Gobi region;
3. An agreement between the Energy Research & Development Center (ERDC) and the Korea Energy Economics Institute on cooperation in areas for joint research studies, training and project implementation;
4. An MOU on cooperation between the ERDC and KEPCO (ROK);
5. An MOU between Khasvuu (Mongolia) and KEPCO (ROK) on providing consulting services;

6. An MOU between Ivanhoe Mines and KEPCO (ROK).

Japan has been the largest donor country since the early 1990s, and the technical assistance, grants and aid provided from government of Japan were vital in coming through the transition period from a centrally planned economy to a market oriented economy.

Japanese soft loans were utilized to rehabilitate the Shivee Ovoo coal mine and Power Plant No.4 in Ulaanbaatar. Also grants and technical assistance were provided to develop a coal sector master plan and a renewable energy master plan, to supply solar power systems for the "100,000 Solar Ger" program, and to rehabilitate the Baganuur coal mine, amongst many other projects. Japanese volunteers worked in Mongolia and provided expertise and technical advice at Power Plant No.4, and policy advice to the former Ministry of Infrastructure, etc.

The government of Mongolia gives exceptional importance to regional energy cooperation. Mongolia is eager to promote energy cooperation with our immediate neighbors, the Russian Federation and the People's Republic of China, and the countries of the Northeast Asian subregion. Mongolia is supportive of initiatives for regional energy cooperation of mutual benefit, and the GOM will welcome trans-Mongolian projects. The GOM has actively participated in all intergovernmental meetings since the Intergovernmental Meeting on Northeast Asian Cooperation in Khabarovsk, Russia, in 2001.

Mongolia is a signatory of the Energy Charter Treaty and Mongolia actively participated in many conferences and meetings organized by the Energy Charter Secretariat (ECS)¹.

Mongolia is an active member of regional energy initiatives, such as Northeast Asia energy cooperation and the Central Asia Regional Economic Cooperation (CAREC), and is taking initiatives to further promote energy cooperation.

The Energy Regulatory Authority (ERA) of Mongolia is a member of the Energy Regulators Regional Association (ERRA)².

The Mongolia Energy Association (MEA) works with the World Energy Council, and has organized several regional meetings and workshops on different aspects of energy.

3. PROSPECTS AND SCENARIOS FOR NORTHEAST ASIAN ENERGY SECURITY IN THE FUTURE

The countries of the Northeast Asian region differ significantly in terms of size, capacity, political and institutional structure, and for successful energy cooperation it is necessary to create an institutional framework to

¹ Source: www.encharter.org

² Source: www.erranet.org

promote regional projects.

The main issue for energy in Northeast Asia is the supply and demand of energy resources and the related energy security. Energy demand growth projections show that by 2020 the energy demand of the Northeast Asian region will reach 3,515 million TOE, which is a 50% increase compared to the level in 2001.

It is estimated that by the year 2030 the world's total energy investment would require about \$16 trillion, and nearly a third of that \$16 trillion will be needed for East Asia.

The other important issue is the environment. Dependency on coal and increasing pollution require more concerted efforts to reduce the impact on the environment.

For a long period this region was a theater of intense geopolitics, and interdependency was a major feature of relations between countries in the region. Since the 1990s the countries of the region have made a lot of effort to promote regional cooperation, integration and mutual understanding.

This region is already developing regional arteries of international transport, telecommunications, tourism and services, and there are still even more opportunities for regional cooperation in developing international pipelines and power links³. This region offers opportunities for regional cooperation, which might grow to the level of existing integrated economic bodies, such as ASEAN, the EU, and NAFTA, etc. This region is moving from interdependent to integrated co-existence.

The strong economic growth of the countries of Northeast Asia necessitates an increasing demand for energy resources, and the region needs to secure more reliable and diverse energy resources for sustainable development.

What are the issues, or driving forces, that will shape energy cooperation in Northeast Asia over the coming decades?

The most basic issue for energy in this region, as in any market, is the supply and demand of energy resources, and the related issue of energy security. Although some countries of the region have had a stagnant demand for growth, overall the countries of the Northeast Asian region are characterized by dynamic economic activity which will require increasing demand for energy resources, such as oil, gas, and other power sources.

Most countries of the region are dependent on the Middle Eastern oil supply, and projections show that that dependence will grow. With the unstable situation in the Middle East there is a need to diversify energy supply.

The failure of the countries of the region to secure energy resources in a sustainable manner by concerted effort will negatively affect economic development and will lead to insecurity in energy supply and high prices, and

decrease the overall competitiveness of the region.

The next most important issue is the financing of regional energy projects and the risks associated with the actual implementation of regional projects. These risks include; differences in the legal and institutional structures of the various countries, complicated political issues, and mutual distrust between nations stemming from historical events, etc. Because of historical tensions and the lack of trust between nations, some countries pay excessive prices for securing energy sources. As we see from recent developments in ongoing and developing projects, there are issues related to the costs of the project, and political issues, which need to be tackled at the government level.

The remaining important issue is the environment. Dependency on coal and increasing pollution require more concerted efforts to reduce the impact on the environment. High economic growth and improving living standards of these countries brings increased pollution and CO₂ emissions. Since the nations of the region occupy the same common place, environmental issues should be considered in a comprehensive manner.

The Northeast Asian region appears to have experienced robust dynamic growth in energy demand for the last fifteen years. In particular, China and Korea have led the energy demand growth in the region due to their rapid economic growth. Primary energy supply in China has rapidly increased from 621.2 million TOE in 1990 to 1,563.2 million TOE in 2005, while that in Korea increased from 93.2 million TOE in 1990 to 228.6 million TOE in 2005. Energy consumption per capita in China increased from 0.63 TOE in 1990 to 1.103 TOE in 2005, while that in Korea increased from 2.17 TOE in 1990 to 4.73 TOE in 2005.

However, energy demand in Russia and Mongolia appears to have experienced a decrease during the period 1990 to 2005. Russia's total energy demand is recorded as 654.5 million TOE in 2005, which is a significant decrease from the level of 888.3 million TOE in 1990.

China is the largest energy consumer in the region, being the second largest consumer in the world following the United States. China's share of world energy consumption has grown significantly from 8.4% in 1990 to 14.7% in 2005.

Economic growth is the main driver of energy demand growth in Northeast Asia. In particular, China's economy continued to grow at a rate of 10.1% per annum during the period 1990-2005, while the annual average growth rate of energy consumption was around 4%. The Korean economy has also experienced rapid growth in recent decades. The gross domestic product (GDP) for Korea has increased by 6.8% per annum during the period 1990 to 2005.

Apart from Russia, the countries in Northeast Asia are net energy importers. Overseas energy dependency in

³ Source: A Grand Design for Stability and Prosperity of Northeast Asia, Mr. Hajime Koizumi, KRI International, Japan

China, Mongolia, and the Republic of Korea, was reported to be 7.7%, 19.5%, and 96.8% in 2005, respectively. Among these countries, Korea is a resource-poor country, having indigenous energy resources of only small deposits of anthracite coal, and some renewable energy and hydropower. Therefore, Korea's import dependence ratio of energy consumption has steadily increased, along with its economic growth, from 73.5% in 1980 to 96.8% in 2005 (with nuclear energy included).

Coal is the predominant energy source in China, accounting for 68.9% of total energy consumption in 2005. China has been a net oil importer since 1993 and a net crude oil importer since 1996. The share of natural gas in China's total energy supply was reported as only 2.9% in 2005.

In Mongolia, coal is also the predominant energy source, accounting for 66.3% of the total energy supply in 2005. Oil accounted for 22.7% of the total energy supply in 2005, which is provided by imports of refined products from Russia. Mongolia also imports electricity from Russia. The volume of power imports from Russia to Mongolia is 130 GWh per annum, providing a 160 MW capacity on a constant basis and accounting for around 7% of the total power supply in Mongolia.

In Korea, oil is the most important fuel, accounting for 44.4% of the total primary energy supply in 2005. Next is coal, which accounts for 24.0%. Most of the coal consumed in Korea is bituminous coal, all of which is imported. As a result of fuel diversification efforts, nuclear energy has been used in Korea since the 1980s as a fuel for base-load power generation, and natural gas is used in the form of liquefied natural gas (LNG) as a fuel for the residential and commercial sector and also for cogeneration and district heating systems. Nuclear energy accounted for 16.1% of the total primary energy supply in Korea in 2005 and natural gas made up 13.3%. Hydroelectricity constituted a very small proportion, at less than 0.6%.

Russia is an energy rich country, having abundant natural energy resources. Russia possesses 45% of the world's natural gas reserves, 12% of its oil, 23% of its coal and 14% of its uranium. In contrast to the other countries in Northeast Asia, natural gas is the predominant energy source in primary energy supply in Russia. In 2005, the share of natural gas in Russia's total primary energy was very high, at 55%, while that of coal was 16.4%, oil 19.0%, and hydro and nuclear power 8.3%. Russia is also the largest exporter of energy resources in the world. In 2005, the share of energy resource exports in the total export trade of Russia exceeded 60%, which was a significant increase

from the 45.4% in 1990⁴.

The situation for oil supply is desperate. This region includes countries which are among the world's top ten oil consumers, such as China, Japan and the Republic of Korea. The countries of the region are vulnerable due to their dependence on one region for their supply, the Middle East, and the projections for supply show that dependency on Middle Eastern oil supply will increase even further by 2020. With the unstable situation in the Middle East and increasing oil prices, the countries need to secure energy sources which are as diverse as possible. Recent developments with ongoing projects in eastern Siberia and the Russian Far East show that there is little evidence that there will be significant oil exploration, development and export to the countries of Northeast Asia comparable to the current supply from the Middle East.

Furthermore, with the increasing demand, and mismatch between demand and production⁵ capacities, the countries of Northeast Asia are concerned with the issue of energy security as never before. By 2030 Northeast Asia will consume 20% of the world's oil, and, in particular, in China the gap between oil demand and production will grow.

Although increasing oil prices would help to justify the economic feasibility of expensive regional projects, there might be political influence in the development of future projects through the use of energy resources as a policy tool.

Recent developments with oil related projects provide evidence that there will be quite stiff competition among the countries to secure energy resources and to get maximal access to resources by bypassing neighbors and using bilateral types of agreements.

Due to historical issues between nations, territorial disputes, and political and structural differences, the countries of the region are still reluctant to cooperate on multilateral projects, and, aside from bilateral projects, the opportunities for successful multilateral cooperation are enormous.

With the increasing demand for energy resources in Northeast Asia, the energy security issues may include supply and demand, dependency on specific supplying region, political risks, and the market power of major suppliers, etc.

The Northeast Asian region is characterized by the high dependency on coal in China, and the high dependency on oil in Japan and Korea. Carbon dioxide emissions will grow at 3.2% in China, and at 2.0% in other Northeast Asian countries, totaling 7,967 million tons by 2020⁶. In

⁴ Source: Draft Country Report for Senior Officials Committee (SOC) on Energy Cooperation in Northeast Asia, reports of the Russian Federation, PRC, ROK and Mongolia, December 2006

⁵ Source: Oil Security and Collaboration in Northeast Asia, Norio Ehara, Head of Non-Member Division, Asia/Pacific and Latin American Countries, International Energy Agency (IEA), Seoul, Korea, 16-17 March, 2004

⁶ Source: Potential Benefits and Barriers in Multilateral Energy Cooperation in Northeast Asia, Dr.Ji-Chul Ryu, International Expert Workshop "Towards Multilateral Energy Cooperation in Northeast Asia", September 5, 2003, Seoul, Korea

China, with its skyrocketing energy demand and improved living standards, the use of coal as a primary energy source will affect the whole region along with other countries and there is a need to diversify and improve the share of other energy sources, such as oil, and hydro and nuclear power.

Although the region has opportunities for regional cooperation, the countries of the region differ significantly in terms of economic capability, size, resources and labor. Every country of the region has its own distinguishing features, and its own comparative advantages and disadvantages in promoting regional cooperation.

Regional energy cooperation in Northeast Asia will be a 'win-win' business proposition, beneficial for all the countries in the region. The Russian Far East, being blessed with abundant natural resource reserves, can obtain economic gain by exporting energy sources, while the large energy consuming markets of Korea, Japan and China can secure stable energy supply sources in the region with the advantages of geographical proximity. Thus, the countries in the Northeast Asian region can pursue mutual benefit by promoting collectively and complementarily regional energy cooperation for the joint development of resources and infrastructure such as natural gas pipelines and power transmission grids.

Regional energy cooperation for development of the indigenous energy resources, i.e. oil and natural gas, located in Northeast Asia, will contribute to improving the self-sufficiency of energy supply in the region as a whole and thus to reducing dependency on imports from outside the region, particularly the Middle East.

By promoting multilateral energy cooperation at the regional level, the degree of economic interdependence between the countries in the region will increase, which in turn will create conditions for the maintenance of political stability which is one of the major challenges facing the region.

Potential for Energy Cooperation in Northeast Asia

Development of natural gas fields in the Russian Far East (Irkutsk, Yakutia and Sakhalin): Eastern Siberia is one of the largest unexplored hydrocarbon-bearing (oil and natural gas) areas still left on earth. The development plan for natural gas in Northeast Asia also includes a project for the construction of cross-border pipeline networks for a gas export route from gas fields in eastern Siberia to Korea and China. Eventually, the project will contribute to the creation of an integrated regional energy system in Northeast Asia.

In terms of electricity, there is limited scope in the cross-border power-connection system in Northeast Asia. Construction of a cross-border power-connection system in the region can produce economic gains and benefits for the countries of the region via such things as the load diversity between the countries, lower capacity additions, reduced spinning reserve requirements, more efficient dispatch, and a more reliable system operation. A possible project for the cross-border power-connection in Northeast Asia under discussion includes construction of transmission lines

between Russia, and the DPRK and the ROK, and between China and Russia.

The trade in electricity between the Amur region and the adjacent areas of China, as well as Korea, may increase effectively after the construction of the Bureya HPP and by 2020 total electricity exports from Russia may reach 75 billion kWh. In the more remote future further integration between the electric power systems of eastern Siberia, the Far East and the countries of Northeast Asia is possible.

The further development of the transportation infrastructure of Russia's oil industry is determined by the following major factors; the need to have its own oil-loading terminals for exporting oil supplies by sea; the expediency of creating new export routes for Russian oil and oil products; the appearance of new oil production hubs in the east of the country (eastern Siberia, the Sakha Republic (Yakutia), and the Sakhalin shelf). The following basic directions for the development of the oil transportation system are planned in Northeast Asia:

- **East Siberian direction:** Construction of new oil production hubs in Eastern Siberia and the Sakha Republic (Yakutia) and penetration by Russia into the energy market in the Asia-Pacific region will generate the need to complete the Angarsk-Nakhodka oil pipeline system (with a capacity of about 80 million tons per annum) with a possible branch pipeline to China (Daqing);
- **Far Eastern direction:** Creation of an optimal transportation infrastructure meeting the requirements of rational subsoil use, including those in the frameworks of the "Sakhalin-1" and "Sakhalin-2" projects taking into account the prospects for further development of oil and gas resources of the Sakhalin shelf.

Policy Cooperation Agenda

The policy cooperation agenda which can be implemented between the countries in Northeast Asia in the short term may include upgrading and enriching the policy dialogue channels between governments in Northeast Asia in order to create a confidence building environment, development of the Senior Officials Committee (SOC) to the Energy Ministerial Meetings (EMM), promotion of dialogues and participation between energy experts and business, promotion of information and data exchange and sharing mechanisms, joint research and study into possible energy projects, and capacity-building projects for developing countries in the region, etc.

In the longer term prospects may include the creation of institutionalized frameworks for multilateral regional energy cooperation, such as treaties, charters, the introduction of policy coordination functions, the development of a joint policy agenda for common goals and task sharing, and an addressing of intra-regional energy financing mechanisms, etc.