

Energy Security in Northeast Asia: The Role for Japan and Russia

Susumu Abe

Advisor to Toshiba Corporation

I would like to share with the participants of this workshop my thoughts on the world energy situation in the 21st Century. Some of my comments are based on impressions from the 17th World Energy Congress (1998, Houston), which I attended. First of all, I will focus on the idea of a natural gas pipeline network for the Northeast Asian region. However, prior to that, I would like to remind you that as of today one third of the world's population, that has recently passed the 6 billion marks, have no access to commercial energy. Most of these people live in low-income developing countries. These countries contribute about 90% of the world population growth. It is expected that by the year 2020 there will be two billion people more in the world, most of them living in developing countries. This was one of the reasons for the World Energy Council to project a 50% increase in the world energy consumption between now and 2020.

Fossil fuels and natural gas

Current fossil fuel reserves are sufficient to sustain global economic growth well into the next century, and will be used in increasing amounts. Among fossil fuels, natural gas has the fastest growth rate, nearly double that of coal and oil. Electricity generation provides the leading market for natural gas, with annual growth of around 5.5% anticipated up to 2010. However, despite strong worldwide growth in demand for natural gas, the level of reserves continues to rise, thanks to improved gas exploration technologies. As of January 1, 1999, proven world gas reserves, as reported by the *Oil & Gas Journal*, were estimated at 5,145 trillion cubic feet (Tcf) (146 Tcm) - 58 Tcf more than the 1998 estimate.

While it is clear that demands on finite fossil fuel resources will ultimately become unsustainable, it is now widely recognized that energy supplies will not simply run out, but become more expensive thus promoting substitution. That means that even though the next century will see a worldwide role for nuclear power generation and new energy sources, fossil fuels will continue to play the leading role, accounting for some 60-70% of all power generated.

About 66% of the world's oil reserves are located in the countries of the Middle East. For natural gas, about 40% of the world's reserves are in the former Soviet Union and about 30% in the Middle East. Therefore, near the Northeast Asian region there are considerable resources of natural gas.

Asia's energy problems

While the link between climatic change and the discharge of greenhouse gases into the atmosphere has yet to be fully demonstrated, we are acting to keep potential danger to a minimum by adopting a "minimizing impact" approach.

Energy consumption in Asia will increase rapidly in

the future. China's rising energy consumption, in particular, has led East Asia to increased rates of extra-regional imports of energy resources. China's energy demand by 2010 could double compared with 1997. Estimates show that Asian energy consumption as a share of total world energy consumption will rise from 22% in 1990 to 37% in 2020, and there could be even higher rates of growth.

Already 30% of all energy consumed in the Asian countries come from outside the region. The rate at which the Asian countries, including Japan, increase imports of energy resources from the Middle East continues to rise. The result is that the whole of Asia can be seen as sailing an increasingly shaky ship, a fact that raises anxieties about a future energy crisis in Asia. Rising demand for oil will be accompanied by a rising energy dependency of East Asia on extra-regional sources of supply from 55% in 1992 to about 70% in 2010.

Asia's environmental problems

Sharply increased energy demand in Asia will be associated with a major impact on air pollution. Currently, 80% of energy is consumed by the developed countries, which account for only 20% of the world population. However, the main source of energy in the developing countries is coal, and measures to curtail CO₂ discharges remain a major problem. As a result, attention worldwide has been drawn to the expanded uses of natural gas, which generates relatively little in the way of CO₂. In those countries, technical innovation has raised energy efficiency and the focus has been on energy saving. Technical developments have brought about electricity generation equipment that uses natural gas, in the form of the combined-cycle gas turbine (CCGT). To this, micro-gas-turbine generation technology could also be added, as well as the fuel cell technology, which supports locally distributed generation and could provide power for electric vehicles.

Coal and oil continue to be the main fuels, though an increase in natural gas consumption is also anticipated. China will continue to rely on coal, being second only to the United States in terms of CO₂ emissions -- estimated at between 1,300 Mt in 2010 (standard base scenario) and 1,100 Mt (environmentally friendly case). Naturally, high levels of coal consumption bring other problems, including the need to combat smoke, dust, SO_x and NO_x in the air. China has high levels of air pollution as a result of its dependency on coal.

The energy and environment equation

The basis for cooperation in the field of energy is for each country to assume the role appropriate to its own situation and interests. If this is to be promoted and achieved, it is, therefore, necessary to clarify the role for each nation or market. This will help to identify specific

areas of activities, measures to be taken, potential for emergencies, opportunities for diversification of supply, the role of infrastructure, improvements in efficient use of energy, and environmental issues.

The following is the KAYA equation: **CO₂ Emission = Actual GDP x (CO₂ Emission/Energy Amount) x (Energy Consumption/Actual GDP)**. It is used to investigate the possibility of simultaneous management of the problems of carbon dioxide discharge, economic growth, and energy security.

According to this KAYA equation, CO₂ increases in proportion to GNP, if the second and third variables on the right side of the equation remain unchanged when the first variable increases (energy consumption increases with economic growth, and CO₂ increases). Therefore, it is necessary to minimize the second and third variables.

In minimizing the second variable, the demand for energy resources that produce limited CO₂ emissions, or the sources of "cleaner energy" in other words, will be heightened. This variable is seen as a problem on the suppliers' side. In order to achieve a stable supply and environmental protection, the priority will be given, in descending order, to hydropower, nuclear power, new energy sources, natural gas, oil, and coal.

Minimizing the third variable requires efficient energy use, or so-called "energy saving." This is a problem on the demand side, and it is not easy to achieve changes in this direction. The economic principle of pricing influences the selection of energy. In addition, changes in the supply structure and system will incur costs and take time. There are also numerous problems on the demand side, such as technology and economic profitability.

Therefore, the Asian countries should regard the recent economic crisis as an incentive to structural reform. The developing countries need self-help efforts to respond to each country's specific situation, not just expect economic support from the developed countries. In this regard, it is important to start with cooperative recognition of the need to aim for simultaneous attainment of the 3E (Energy security, Economic growth, and Environmental conservation) in Northeast Asia as the long-term policy direction.

Energy prospects for Japan

In December 1997, the Third Session of the Conference of the Parties (COP 3) was held in Kyoto. As a result, the Kyoto Protocol of targets for greenhouse gas emissions by the developed countries during the period 2008 to 2012 was adopted. The 1990 level of emissions was adopted as the base year and the reductions proposed were that each participating country will return to that level. Target figures were calculated for six different greenhouse gases, including carbon dioxide, methane, and other gases. As a result, Japan must reduce emissions by 6%, the U.S.A. by 7%, the EU by 8%, and Russia by 0% thus securing the present level of greenhouse gases emissions.

The Japanese government formulated its policy on global warming prevention and its long-term energy demand on the basis of an interim report prepared by the

MITI committee. The first recommendation of the report is to promote nuclear power generation and decrease dependence on the fossil fuels that release CO₂ into the atmosphere. Nuclear power generation should provide 45% of electricity generated in Japan in 2010, up from the current 35% level. Achieving this capacity requires construction of 20 new nuclear power stations. The second proposal was to reduce energy consumption. The report, however, revealed that even with more nuclear power plants commissioned, Japan's emission reduction targets could be difficult to attain without holding energy consumption at the 1996 level. To maintain this level without any specific measures would require a reduction in energy consumption by more than 12%.

Japan's energy strategy is aimed at the simultaneous achievement of 3E: energy security, economic growth, and environmental conservation. Three targets must be attained if we are to secure these goals: maintain energy consumption at a stable rate until 2010; reduce oil consumption by 56 million kl of oil equivalent (Figure 4); and construct more nuclear power stations. In 1996, energy consumption was 393 million kl of oil equivalent. In 2010 it is expected to reach 400 million kl of oil equivalent. This means that no increase in the energy supply is allowed in the coming decade. Moreover, the average economic growth rate that is expected at 2% a year after 2000 would be problematic to achieve without expansion in the energy supply.

There are many difficulties in handling energy and environmental issues at the same time, including how best to commit to the COP 3 targets. The notion of energy security in Northeast Asia must include awareness of the following three problems: (1) a weakened energy supplies in Asia, (2) concerns for economic growth, including its sustainability, and (3) reductions in the costs of energy.

Russian gas for Northeast Asia

The Asian Pipeline Research Society of Japan (APRSJ) was established in October 1997 to support "the development and expanded use of natural gas in Asia." Towards realization of this goal the society is undertaking a study related to a natural gas pipeline. It also is serving as the secretariat of the Northeast Asian Gas & Pipeline Forum (NAGPF), which comprises interested parties from Japan, Russia, China, the Koreas, and Mongolia.

Five international conferences on the Northeast Asian Natural Gas Pipeline were organized by NAGPF. These have been great opportunities to present papers on such themes as planning, technology, economics, and information exchange -- all for promoting construction of international pipelines in Northeast Asia. The 1st Conference took place in March 1995 in Tokyo with 60 participants from 4 countries. The 2nd Conference that took place in Beijing in September 1996 was much larger -- 170 participants from 13 countries. At the 3rd Conference in November 1997 in Seoul the NAGPF was established. The 4th Conference took place in Mongolia in August 1998 and the 5th Conference was organized in July 1999 in Yakutsk, Russia. The APRSJ suggested the adoption of "A Long-term Vision of Natural Gas Trunk Line in Northeast Asia" as an international joint research

project. This would be a comprehensive compilation of the NAGPF's knowledge.

Russia has the world's largest resources of natural gas. It accounts for 32.4% of the world's reserves and for 26% of total production. In 1998, the country's known reserves were estimated as 47.5Tcm. In addition, there are also unexplored and undeveloped resources of natural gas in East Siberia and the Far East. There are four natural gas provinces that can export natural gas to Northeast Asia, including Western Siberia, Irkutsk, Yakutia and Sakhalin. All are in inland locations, with the exception of Sakhalin. As a result, pipeline transportation is desirable, in terms of transportation costs and environmental preservation.

Turkmenistan's two gas fields have proven reserves of 6 Tcm of natural gas and could supply China with 30 Bcm of natural gas a year (the fields are 7,000 km away from Shanghai). The Western Siberia gas field has about 3 Tcm and could export 28 Bcm a year to China (the distance to Shanghai is 6,700 km). The Irkutsk and Yakutsk gas fields could together export 40-50 Bcm a year. The two routes have been considered for a pipeline supporting these exports: via Mongolia to Shanghai and via Eastern Siberia and the northeastern part of China, bypassing Mongolia. Transportation options from Sakhalin to Japan, Korea and China were also explored. A proposed route to Japan runs from northern Sakhalin to Korsakov overland and to Hokkaido and Honshu under the Soya Strait. A route to Korea and China was investigated in cooperation with Yakutsk to carry gas from Shenyang to Korea and from Beijing to Shanghai.

Russian experts have proposed a 3-stage plan for the construction of the East Russia pipeline network. The first stage from 2000 to 2010 includes a pipeline between Eastern Siberia (Irkutsk), Mongolia, and China. The resources used for this first stage are in Irkutsk, Krasnoyarsk, and Western Yakutia gas fields.

The second stage begins from 2010 to 2015. The resources from both Western and Eastern Siberia gas fields will support a pipeline from Western Siberia to Eastern Siberia and to Northeast Asia.

The third stage should begin from 2015 to 2020 with building pipelines in the Far East and North East Asia. The resources of Central Yakutia and gas fields on the Sakhalin continental shelf will then be connected with the regional gas pipeline network.

Demand for natural gas in China

China potentially represents a huge market for natural gas in the 21st century, with total annual demand of approximately 120 Bcm in 2010. In the same year, electricity generation will account for 42% of natural gas consumption, with 16% consumed by chemical industry, 22% used as fuel, and 20% distributed through the city gas networks. The demand for electricity generation and city gas will increase, and the demand for the use of natural gas as a fuel and in the chemical industry is likely to decrease.

China's domestic recoverable reserves of natural gas resources are estimated at 10 Tcm and its proved gas reserves reached 27 Tcm. To cope with increasing demand, domestic production of natural gas of 35 Bcm to

70 Bcm a year is foreseen for the decade from 2000 to 2010, along with 10 Bcm of LNG production and imports via pipelines of 40 Bcm.

Currently, there are several operational pipelines in Northern China, in the Western areas, Northeastern China, and Schezuan, but these do not form a network. A two-tier project has been announced that will, first of all, link existing and planned pipelines in regional networks and then develop a national pipeline network, with an East-West axis connected with pipelines carrying imported natural gas from Russia.

Energy cooperation in Northeast Asia

The prospects for realization of the natural gas pipeline network plan depend on the direction of the energy policies of the countries of the area and their respective visions of energy security. It is desirable that the long-term strategic aims of the regional states are not dominated by temporary international situations, but should give full consideration to all geopolitical realities. Restated, there is a need to attempt a geopolitical approach to the problem of energy security as it concerns each Asian country, including Japan. Asia is commonly viewed as a difficult region to unify economically or in which to create an economic sphere, due to its diversity. However a cooperative system based on the cooperation of Asian countries is needed.

The Asian countries are also considered to be at the stage of aiming for a stable, regional economic sphere from a general, long-term point of view. Carrying out preparation for a regional economic framework from a perspective of 30-50 years and forming a common economic infrastructure are necessary. Japan is expected to play a role in promoting this. The U.S. has also shown an interest in the Northeast Asia natural gas pipeline network and its participation will support positive developments from the standpoint of regional peace and stability.

On the other hand, participation of the international and regional organizations could be important and valuable for the region. The Asia Development Bank, for example, has cited the following necessary elements for securing international pipeline financing for Asia:

Sufficient gas deposits and market demand

A stable political situation and international cooperation

Technical adequacy

Economic transparency

Fund management ability

Sufficient experience in construction and operation

Sufficient purchasing power

The determining key to fund pipeline projects is transparency in the price of gas and level of import tax and legislation. Moreover, it is necessary to note that liberalization of gas industry regulations, the role of the state-owned firms, the rights and obligations of the pipeline, and the legal and standards regulations in each country are going to be involved in the decision making process. Also, basic organizational structures that ensure openness to new participants would also influence

prospects for financing the regional pipeline infrastructure.

The role for Japan

The falling price of energy is the key factor to Japan's domestic energy supply. On the other hand, the supply of natural gas (LNG), 70% of which is consumed by combined cycle generators, is already settled for nearly 20 years through the mechanism called "take or pay." Fuel procurement is essentially an administrative issue for the concerned parties—the electric power companies and the gas suppliers. However, the problem Japan must overcome with its energy policy in the next 20-30 years cannot be left to the "invisible hand."

In fuel procurement, market theory could work in countries like the U.S. There, the pricing mechanism, and the fact that more than half of the required supply could be procured from the country's own crude oil and natural gas sources, assure that supply and demand are dealt with flexibly and within a domestic framework. For Japan, however, this is not an option because it depends completely on imports of oil. The question is how to live with global reality. Diversifying the energy sources to the maximum should be the basic energy policy, as this allows bargaining room in a market economy.

At the same time, Japan must also consider its position in Asia, the scale of its economic influence, and the role it should play. Japan achieved economic success as the first Asian country that adopted Western technology. As such, it is expected to play a role in supporting Asian development by providing countries with its accumulated technologies and knowledge. It is positioned as an intermediary between the Western developed countries and the developing Asian countries in a world heading toward a global market economy.

Japan's leadership in Asia was questioned by the outbreak of the Asian economic crisis. Japan has to provide a new model for the Asian economy by reviving its own economy. In today's fast-changing international society, Japan should first stabilize its economy, while forming a new international order and leading the East Asian region. Japan has the power to promote plans and activities that will provide a lead to international society in respect of finding counter measures to meet future Asian energy needs and to overcome global warming.

Russia's position and role

Russia's fuel and energy resource is the mainstay of the Russian economy. The role of these resources has become even more important with economic reform. The fuel and energy sector accounted for 24% of gross industrial production in 1990, and grew to 30% in 1997. The energy sector generates 60-65% of all taxes and 45% of Russia's export earnings.

The development of the abundant resources of East Siberia and the Far Eastern region has been a key element in Russia's energy policy. These two regions account for 43% of Russian coal, 29% of its natural gas, and an estimated 18% of its oil reserves. These vast energy resources and the possibility of their export could complement energy demand in Northeast Asia and

contribute to Russia's regional economic role. On the other hand, for Northeast Asian countries energy cooperation could be the central element in economic relations with Russia, contributing to development of Eastern Siberia and the Far East. What is missing is an infrastructure that connects the energy resources and consumers.

Currently, there are projects to develop oil and gas deposits on Sakhalin's continental shelf and in Irkutsk. In order to assure these projects meet both the needs of Russia's eastern regions, as well as economies and countries that neighboring Russia, the partners need to take the long-term view of acting in the spirit of mutual benefit. Moreover, this long-term cooperation in the field of energy requires that the countries involved adjust their energy policies and the long-term energy planning, and coordinate them with economic and technological factors, investment and environmental needs.

In that sense, and not to mention this workshop, Russia's participation in APEC exchanges, including those among Japanese and Russian experts, and the forums such as the Japan-Russia Energy Committee, and information exchanges related to energy data have all proved to be highly significant.

Basics of the Northeast Asian Pipeline Network

The energy equation in Northeast Asia positions Russia's resources on the supply side and the markets of China, Korea and Japan on the demand side. The key relationship here is the one between China and Russia. The close energy links between the two is natural in a geopolitical sense.

It was announced that Russia would supply resources from Siberia and the Far East to the East Asian markets. The Russian company Gasprom is the world's largest state-owned natural gas company. In China, China National Petroleum Corporation is Gasprom's chief counterpart. With these two organizations in control, both countries are well positioned for close contacts and cooperation, and although the development of the Sakhalin resources is already under way, continental Northeast Asia is likely to be the main stage of energy cooperation in the region.

In China, a switch to natural gas in power generation is inevitable and demand for natural gas will grow. The concept of a pipeline network differs from simply securing resources for a nation. The idea is to construct a public asset in Northeast Asia and to promote adjustments in energy policies within the Northeast Asian subregion. To achieve this requires security on the supply side as well as stability on the demand side. Pipelines should be seen simply as a transportation facility, but these can only be built from the point of coordinated interests. On the other hand, the importing countries are likely to balance a limited range of fuel sources within the Northeast Asian region. In this sense, these energy-importing countries must consider how to supplement natural gas delivered by a pipeline with the LNG supplies.

Northeast Asia and the World

The state of Asian economy is no longer a regional issue, but an important part of the world economy. Future

developments in Asia have to coexist with the general and desirable trend of sustainable development of the world economy. A rapid rise in energy demand is foreseen for Asia, East Asia in particular, as the region recovers from the recent economic crisis and restores economic growth. As an outcome of this, we should anticipate that the increase in energy production will not meet with new demand, and the region will increasingly be dependent on imported energy, especially imports from the Middle East. In this regard, the question how to achieve energy security is crucial for both regional and global energy equations, as well as environmental protection in Asia and beyond. This is the major challenge that we have no choice but to face at the beginning of the 21st century. The following key points deserve to be mentioned again:

1. China holds the key to the increase in the level of energy consumption and the volume of CO₂ emissions in the Northeast Asian region.
2. Russia aims to use natural gas exports to support its own economic reconstruction and economic development, especially of the Eastern Siberian and the Far Eastern provinces.
3. To expand the choice of fossil fuel procurement from a very long-term perspective, and acting as the Northeast Asian country, Japan is expected to offer positive support and cooperation for the development of the Northeast Asian countries.
4. The various countries that form Northeast Asia, including Japan, Russia and China, are in a position where they should cooperate and aim for a mutual win-win situation as cooperative players.

All these measures, policies, and efforts, if assembled and promoted in a cooperative and constructive manner would lead the entire Northeast Asia and its member countries to:

- energy security
- natural environment preservation
- economic growth
- interdependence through a regional gas pipeline network

Furthermore, this process would promote the formation of a Northeast Asian economic subregion, bringing order and enhanced stability to the region.

The attainment of the 3Es (energy security, economic growth, and environmental protection) must be shared by all the countries of Northeast Asia. Such common recognition will contribute to Northeast Asia's continued development in the 21st Century. The advanced countries are expected to assist and facilitate such cooperation, whenever it is possible, and share technologies that improve energy efficiency, reduce costs, and protect the environment. The developing countries, on the other hand, are expected to carry out the 3E policies through self-help efforts linked to specific development projects.

From a geopolitical standpoint, Japan's immediate

neighbors are only to be found across the Sea of Japan. Cooperation with neighboring countries is inevitable and appropriate policy should be carried out to create an economic and intellectual sub-system in Northeast Asia. This sub-system could be called "the Japan Sea Sphere or Northeast Asian Economic Subregion" that will contribute to the stability of the world economy and security of the countries and economies that belong to Northeast Asia.

In the future, the Japan Sea Sphere or Northeast Asian Economic Subregion could be an important element in the world economic system, on a par with the European Union and the Americas. All these three regions need to be economically and intellectually united to function efficiently. Japan's geography could help to unite this area, linking it with North America. Russia's geography also is the key to the future of Northeast Asia, providing a link between Northeast Asia and the European Union.

Conclusion

The concept of the Northeast Asian pipeline network is designed to boost cooperation in the field of energy in Northeast Asia. From this perspective it has a potential to stimulate what I would call an "intellectual collaboration" on a number of issues, including safety in the nuclear power sector, environmental technologies, coal gasification, the use of natural gas, and energy efficiency.

On the other hand, globalization heightens the interconnection between each and every field of economic activity -- trade, finance, investment, and technology. As a result, the energy issue can no longer be solved simply in terms of energy sector development alone. A proposed regional pipeline network could become a fundable project only if it follows finance and investment rules and is based on full respect of the rules of trade. Furthermore, if developing countries, like Mongolia or China, are to be involved, a support framework should also be considered. At the same time it is important to analyze regional energy issues by promoting a wide-range exchange of opinion with specialists in other fields, including finance, trade, investment, development, and technology.

It is also expected that economic interdependence, mutual benefit, and cooperative dialogues based on trust would establish new links in a Northeast Asia. Economic conditions and the energy demand/supply situation for each country differ significantly, providing plenty of room for relations based on a complementarity of interests. This could help the countries with different values, ideologies, and beliefs to coexist.

In conclusion, economic globalization presents a new challenge that requires a new look at energy security. This must be assessed from a wider perspective, including geography and all other related fields. From the viewpoint of energy being "the catalyst, not a restricting element to human development," it is needed to set up energy systems based upon "the creation of wisdom and inclination" that overcomes both technological and social limitations. I believe that we have the wisdom to meet these challenges.

The various problems we face today in the fields of energy and the environment do not have the great and immediate impacts of past oil shocks. However, we are

exposed to “ a crisis that is stealing up. ” Compared to the 20th Century’s “ development and growth, ” the 21st Century will be an era of development that aims for “ continuity and harmony. ” The problems of energy and environmental protection are issues common to mankind and should be grasped globally. Concerted actions must be taken in each region of the world, establishing a mechanism that promotes a “ Think globally, act regionally ” approach.

Finally, I would consider it of great significance that we hold this workshop in Niigata Prefecture, which is truly representative of Japan’s energy surplus regions. It is the home of Japan’s gas and oil industry. Blessed with the waters of the Shinano River and as a home to Kashiwazaki Kariwa -- the world’s largest nuclear power station -- Niigata also represents the Sea of Japan/Northeast Asian Economic Sphere. I sincerely hope that my hometown of Niigata will continue to play an important role in Northeast Asian energy cooperation. Through what little I can do myself, I will also continue to make efforts devoted to this goal.

References

1. World Energy Council 17th Congress, September 1998, Houston.
2. Northeast Asian Gas and Pipeline Forum, 4th Conference, August 1998, Ulanbaatar, Mongolia and 5th Conference, July 1999, Yakutsk.
3. Elena Telegina, “ Investment Aspects of Effective Use of Russian Energy Resources to Meet Fuel Market Demand in Southeast Asia in the 21st Century, ” Paper presented at the Russia-Japan Roundtable, June 1998, Moscow.
4. Yoichi Nakamura, “ Japan’s Balance Sheet in 2025: Beyond the Aged Society, ” Nikkei, August 1998.
5. The Energy Security Group of the Council on Foreign Relations, Washington, D.C., September 22, 1998.
6. Susumu Abe, “ Asian Energy Security and the Role of the United States and Japan. ”