

ENERGY SECURITY AND SUSTAINABLE DEVELOPMENT
IN NORTHEAST ASIA:
PROSPECTS FOR COOPERATIVE POLICIES

International Workshop at Tainai Park Hotel, Niigata, June 26-28, 2001
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Report by

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with

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This report summarizes the results of an international workshop convened in Niigata by the Economic Research Institute for Northeast Asia (ERINA) on June 26-28, 2001. The Workshop was supported by a grant from the Japan Foundation Center for Global Partnership. This event was the first phase of a broader project on energy issues in Northeast Asia and prospects for subregional cooperation in the fields of energy and sustainable development.

The report provides an overview of the papers prepared by Workshop participants and the discussions that took place during the meeting – both the papers and Workshop discussions are collective undertakings strongly dependent on the contributions of several individuals. We wish to thank:

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ABOUT THE PROJECT

In the high seas of complex issues related to fossil fuel production, transportation and use and associated environmental trends already comprehensively covered by well established organizations, finding a new direction for meaningful dialogue is a challenge. The project undertaken by ERINA aims at policies, highlighting both the urgent need for and the benefits of cooperation in the energy-environment realm. The ultimate goal is to lift the “strategic sights” of governments and the public above the limits of national policies and prepare a path for them through the complexities of specific cross-border projects. What is needed is a ‘vision’ for a cooperative framework and policy coordination that encompasses the energy-development-environment ‘triad.’ The hope is that ultimately the participating institutions and experts will propose a shared vision of and approaches to an optimum mix of “gives and takes” on the energy-environment front, where the economies of the subregion today operate independently.

Northeast Asia is part of the larger Asia-Pacific region. However, this subregion is not a political, economic or security community. The name of the subregion serves mostly as a geographical referent and, as was mentioned at the Tainai workshop, in the United States, for example, this term is not well known except in the defense community. On the other hand, the Asia Pacific Economic Cooperation (APEC) forum now encompasses 21 economies, including those that constitute the subregion: China, Taiwan (Chinese Taipei), Hong Kong, Japan, Republic of Korea (South Korea), and Russia. Reportedly, in November 2000, at the informal summit of APEC leaders in Brunei, the idea of encouraging the Democratic People’s Republic of Korea (North Korea) to participate in APEC working groups was discussed.

The main conceptual pillar of the project is the expectation that the vital interests of the economies of the subregion overlap, driven by aspirations towards greater energy security, development and prosperity, political stability and environmental safety, and the belief that this could constitute a framework for cooperative engagement, as well as cross-border and multilateral solutions in the energy sector. Indeed, certain areas within Northeast Asia possess vast energy resources, which until very recently were largely disconnected from huge regional markets. Russia, the third world’s largest consumer of energy, possesses in its eastern regions abundant coal, oil, gas and hydro resources. In theory, Russia could contend for significant shares of the energy markets of Japan, South Korea and China.

Economies such as Japan, South Korea and recently China are investing in energy projects in distant corners of the planet. In addition, the technologies, engineering skills and managerial experience critical to the success of advanced energy ventures are also available, but have rarely been applied in this area in a multilateral format. The exceptions are limited to the Sakhalin oil and gas projects and the Korean Peninsula Energy Development Organization (KEDO), which highlight the symbiosis of energy needs and security concerns.

On the other hand, this subregion is also unique to the world of energy because it has a low gas penetration rate, and transportation and distribution infrastructure is limited or yet to be assembled. It is assumed that imports via a pipeline would promote diversification in modes of transportation, allowing gas-to-gas competition and eventually an expansion in the use of gas. Various options for cross-border gas pipelines are under discussion. The problem is that the price tag of these projects is very high, improvements in the investment climate are still inadequate, and markets are neither easily accessible nor sufficiently secure to justify huge investments. Moreover, many of these cross-border projects require multilateral financing and concerted implementation efforts. The worst, however, is the lack of long-term, comprehensive strategies that could enable partnership in negotiations and implementation of the projects.

All these make the economies of the Northeast Asian subregion a unique case study for observing both the domestic economic and political hurdles, and external factors impeding cross-border cooperation in the energy sector. Obstacles and sources of uncertainty are wide-ranging and yet to be fully accounted for and analyzed. On the other hand, the difficulties amplify the necessity of working together to obtain the economic and political benefits of cooperation.

In summary, the project's main focus is on "policies" linked to energy security, economic needs, environmental protection, and cooperative solutions—available and possible—to current and future challenges. The near-term goal is to catalog the areas and principles for consensus building on how to appraise and share the benefits of cooperation in the energy sector, how to advocate cross-border energy projects as efficient tools of economic development, factors of stable and cost-effective energy supply and cohesive confidence-building devices, and how to reconcile energy use and environmental protection in the area. Yet another objective is to assess prospects for cooperative approaches to energy security and institutional frameworks designed to enhance it.

SPECIAL ADDRESS BY DR. TARO NAKAYAMA

As we all follow recent developments in Northeast Asia, I have been wondering what role this subregion can assume in world affairs in the 21st century. In 1990, I was serving as foreign minister when Iraq invaded Kuwait. Only several months later, after the “Desert Storm” operation ended, we witnessed the demise of the Soviet Union, unfolding against the background of a worldwide trend towards liberalization and democratization. In those days, I tried to imagine what kind of a “New World” was likely to emerge from those tectonic shifts coupled with the impacts of globalization. The most important issue in this context was whether immediate and distant neighbors would tolerate and respect— resolutely and consciously—other peoples’ culture, history and traditions.

Indeed, although Christianity currently serves as the common religious background for most Europeans, Christian communities have split as the religion has spread throughout the continent, causing tensions and animosities. Throughout European history, many wars and hostilities rooted in religious differences took place. Catholics, Protestants, and Orthodox Christians—to name only a few major groups within the same religion—were involved in conflicts over many centuries. The Pope is now traveling to European and other countries, trying to reunite communities from different traditions of Christianity.

More broadly, a solution to issues arising from religious differences is yet to be found. As we have witnessed conflict in Bosnia-Herzegovina, the Palestine problem, and tensions in Tibet, we realize that it is indeed difficult to harmonize the differences between particular ethnic groups. But the key question is whether religious differences among states can be respected unanimously.

The 21st Century heralds a new era in which a trend towards globalization, on one hand, and the development of market and mixed economies around the world, on the other, is progressing. It is important for each and every country both to retain its historic roots, cultural values, and religious traditions and also be part of the worldwide economic, cultural and security community. The interplay of these forces poses the most important question: how to construct an international order that ensures stability, security and prosperity.

Since the early 1950s, the top priority in the policies of the United States and the countries of Western Europe has been the establishment and consolidation of regional frameworks. Currently, of the fifteen European Union countries, twelve have abolished their national currencies in favor of a single currency. It is anticipated that an additional eleven countries will join the EU in the future.

Participating as a member of the Japanese Parliament in annual meetings with members of the European Parliament, I ask myself, “How has the European Union managed to be so successful?” It seems that at the root of this success is the fact that European politicians learned lessons from the First and Second World Wars. Among other issues, these two wars were rooted in a struggle over natural and economic resources.

Post-war leaders such as Konrad Adenauer and Charles de Gaulle decided to protect Western Europe from another conflict, with all its ensuing devastation and human suffering. They demonstrated political wisdom when Germany and France established the Common Market for steel and coal, paving the way for the emergence of the European Economic Community and the establishment of the European Union. Today, citizens of the fifteen EU member countries visit other member states without visas, while industries enjoy a tax-free regime for goods and services within the customs union.

At another corner of the Eurasian landmass, a decade after the demise of the Soviet Union, President Vladimir Putin has placed Russia on the path towards spiritual revival and economic modernization. He appears to be in a position to control governors, while commanding broad support among the mainstream forces within the State Duma and orchestrating the strengthening of links between Russia and other entities that formerly belonged to the USSR.

In around 1959, I traveled from Niigata to Russia. At the time, I was an independent member of the Osaka Prefectural Assembly, and had an interest in socialism. So I went to Russia with the intention of finding out what a Communist society was like. I sailed from Niigata to Nakhodka on the Russian ship “Yakutia”, traveled from Nakhodka to the Baikal Lake on the Trans-Siberian Railway, and then took a plane from Irkutsk to Moscow. I felt the Russians to be a very warm, genuine people. I visited various cities and areas, such as the Ukraine, and over a period of one month, I saw a lot of Russia. That was a very unusual experience for Japanese at that time.

The revival of Christianity in Russia was among the eye-catching developments that occurred even before the end of the Soviet Union. At that time, noticing the growing appeal of the Russian Orthodox Church to the Russian citizenry, I asked Mr. Kyoji Komachi, who later became the head of the European Affairs Bureau of the Foreign Ministry, to visit the headquarters of the Russian Orthodox Church in order to follow these changes more closely. Whenever on a visit to Moscow, one could see new churches being erected. When U.S. President George Bush visited Moscow, he paid a visit to a Russian church.

During my discussions with Russians they convinced me that their country would never return to the Soviet model. In the 21st Century, they would like to see Russia become a powerful country and, considering the powerful trend towards globalization, the key question is how to position this new Russia in the world, both in Europe and Asia.

In the context of the European Union's ongoing expansion, Moscow demonstrated its determination to develop closer ties with Asia. Japanese diplomacy facilitated this process, especially with respect to Russia's membership of the Asia-Pacific Economic Cooperation Forum (APEC). Discussions are now taking place with regard to tunnel or bridge projects, connecting Sakhalin with the mainland, while some Japanese companies are undertaking research and feasibility studies on the possibilities of transporting gas from Sakhalin to Japan, via a pipeline built along the Pacific coast of Honshu Island, or using an alternative route along the Sea of Japan coast.

In this context, the most important issue is the establishment of an Asian Energy Community. I have participated in foreign affairs for a long time, but I have a particular interest in matters relating to energy and regional development. Three years ago, at a meeting of the Liberal Democratic Party's Foreign Affairs Subcommittee, the party decided that the creation of an Asian Energy Community would be party policy. The development of this region depends on increasing energy consumption and there is a correlation between energy consumption and economic development.

The subregion of Northeast Asia comprises Japan, the three Northeastern provinces of China, the provinces of Far Eastern Russia, the Republic of Korea (South Korea), the Democratic People's Republic of Korea (North Korea), Mongolia, and—some people would suggest—Alaska. The combined population of these areas exceeds 300 million, including 126 million people living in Japan, 46 million and 21 million in South Korea and North Korea respectively, around 100 million in Northeastern China, 31 million in the whole of Eastern Russia (including 7 million in the Far Eastern region), and 2.4 million people residing in Mongolia.

Standards of living in different parts of Northeast Asia differ in many ways, including rates of ownership of private cars, refrigerators, washing machines and TV sets. These standards also differ in terms of access to advanced communication systems, and per capita electricity consumption.

The use of energy in Northeast Asia is uneven both in absolute and relative terms. According to the International Energy Agency (IEA), Far Eastern Russia, with its population of 7 million, represents 2% of the primary energy supply in this entire region, North Korea, with its much larger population, accounts for only 3% and Mongolia for just 0.2% of the combined primary energy

supply. On the other hand, China's share in the primary energy supply is above 57%, while Japan and South Korea account for 28% and 9% respectively.

Quite naturally, the economies of Northeast Asia demonstrate different rates of growth in energy consumption. From 1971-1991, the energy demand of Asia-Pacific OECD countries was growing quickly, but China now leads both in absolute demand for energy and its rate of growth. According to the International Energy Agency, China's position in terms of energy demand in Northeast Asia will be a dominant factor, increasing rapidly from 52% in 1999 to 68% in 2020. On the other hand, in the next two decades Japan's share is expected to decrease from 37% to 21%, while South Korea's share remains at about the 11%-12% level. During these two decades, 80% of incremental demand growth will be attributable to China.

In terms of the share of primary energy derived from different sources, coal is the leading source for China, followed by petroleum, biomass fuel and hydropower. In Japan, similar to South Korea, oil and nuclear power are followed by coal and natural gas. By 2010, the share of coal in Northeast Asia's energy supply will be roughly 50%, nuclear energy could account for about 10%, and the share of gas is likely to grow from the current 5% to 10% of the combined subregional primary energy supply, promising a significant increase in physical volumes of imports.

In addition, China is likely to account for a huge share in the expanded subregional demand for oil. As far as worldwide oil production is concerned, by 2010 OPEC's share will increase from the current level of 41% to 50%, while the OECD countries' share will decline from 29% to 22% in 2010. The combined share of Russia and other former republics of the Soviet Union is likely to remain at 11%, with all other sources contributing 17% of world oil production. Consequently, by 2020, the rate of dependence on imported oil will increase from 45% to 58% for North America, from 53% to 79% for the European OECD economies, and from 60% to 84% for Asia. In Asia, by 2020, the share of oil supplies from the Persian Gulf is likely to reach 86% of total imports, compared with 22% for North America and 26% for Western Europe.

In Asia, China is becoming a very large net importer of oil, following Japan and South Korea. In addition, North Korea, Taiwan, the Philippines, Thailand, Laos and Cambodia are oil importers. India and Vietnam, despite some domestic oil production, also import oil. This makes the relationship between Asia and the Middle Eastern countries extremely important in military, economic and strategic terms. Similarly, sea-lanes from the Persian Gulf to East Asia will remain critical for oil imports, including the transit of oil cargoes through the Strait of Malacca and the

Taiwan Strait.

Towards the end of the 1990s, OPEC countries' share of world oil supply was 41%, but by 2020 it could reach 55%. With regional oil production in Asia remaining unchanged in the 1990s, and oil consumption and imports expanding, Asia's dependence on oil supplies from other regions, the Persian Gulf in particular, is likely to increase from about 50% of the total primary energy supply to 69% by 2010.

Japan's oil dependence stands at 51%, with 85% of that coming from the Middle East. Both South Korea and North Korea rely on the Middle East, while China also imports oil from distant sources, including the Persian Gulf. Considerable reserves of gas and oil have been found and confirmed in Eastern Russia, relatively near Japan, South Korea and China, so we must consider how to utilize these reserves, improving the energy security of energy-dependent economies.

Cross-border trade in natural gas in Northeast Asia also promises enhanced energy security. South Korea already has a domestic trunk gas pipeline system. China is also enthusiastically promoting a West-East gas pipeline project. A pipeline network will become a necessity for Japan as well, therefore a network like the one built in Europe is likely to be constructed sooner or later in Northeast Asia.

There is already a gas pipeline connecting Niigata and Sendai, in addition to pipelines in some other areas. It seems to me that when expressways are built on national land, pipelines should be part of these projects. At present, a feasibility study is taking place regarding whether we should build a pipeline on land or offshore. I have been involved in this kind of discussion for four or five years. At first, such efforts seemed impractical, but now the atmosphere has changed, including within the Energy Resources Division of the Ministry of Foreign Affairs.

The supporters of this approach are the gas companies, including Osaka Gas. However, the potential users of gas in Japan are electricity producers. The problem is that they are all thinking exclusively about their own companies' profits and have yet to look at these issues from a wider perspective. Furthermore, there are alternative methods of delivering gas from Eastern Russia to markets in Northeast Asia, with LNG as one option.

Gas reserves in Irkutskaya Oblast, Yakutia and Sakhalin are quite large. In China, proven reserves of gas are relatively small, particularly in comparison with coal. Heavy reliance on coal in China is likely to continue, contributing to the emission of greenhouse gases (GHGs). At the 9th Northeast Asia Economic Forum, held in Tianjin in 1999, some Chinese speakers indicated that

China would continue to rely predominantly on coal for the next 50 years. Given such an attitude, the question of how to solve air pollution problems, as well as contain water and soil degradation and how to substitute coal with cleaner energy, is becoming a major issue.

Between 1999 and 2020, carbon dioxide (CO₂) emissions originating in the three largest economies of Northeast Asia are likely to increase much more rapidly compared with other regions, with their combined share exceeding 31% of the world's total emissions. These projections require a comprehensive assessment of different opinions and scenarios regarding the future of the Kyoto Protocol and possible efforts directed at CO₂ emission reductions.

A concept for the gas pipeline network in Northeast Asia is among the tools necessary to deal with the problems of energy security and emission reductions. Russia and China have reached an agreement on a feasibility study for the Kovykta gas project that could also involve South Korea. With regard to Japan, Sakhalin gas could become available in about 2-3 years time, following oil.

At present, there are several ideas for covering the cost of laying pipelines in Northeast Asia, including the creation of a Northeast Asian Development Bank or a special section (an investment fund) established within the Asian Development Bank. Whichever option is taken, the problem of a secure and reliable supply of energy appears to be an issue common to the whole of Northeast Asia, which needs a cross-border infrastructure for delivering gas to consumers.

In Europe, the gas pipeline network runs for 80,000 kilometers, while the one crossing Mexico, the U.S. and Canada runs for 40,000 kilometers. Even during the Cold War, gas was supplied to Germany and some other European economies from the Soviet Union. There is no question that pipeline gas can be used in order to promote the prosperity of Northeast Asia while protecting its environment. These goals must form the foundations of cooperative policies among the countries in the region. If a pipeline network is laid, the region's economic development will progress. Cross-border supplies of gas via a pipeline will contribute to security and peace in Asia.

A subregional community needs to be created in Northeast Asia in order to boost the economic development of this area and solve the problem of instability. Regarding the format of such a community, the answer, of course, lies in the realm of energy production, transportation and use. From this point of view, I have been proposing the concept of a Northeast Asian gas pipeline network for several years. The idea is to start discussion on the establishment of a fund that would make this project possible. It is very important that the countries of Northeast Asia and the United States gather together to discuss various proposals for gas projects, which involve political,

economic and environmental issues.

I would like to thank ERINA for its contribution in this field and express my full support for this project's concept. There are many research institutions in the countries neighboring Japan. Business contacts are developing and trade and investment links growing stronger. When I look at the long list of sister city relationships established across the Sea of Japan, also known as the East Sea, my confidence in the success of such efforts is growing. That is why I sincerely hope that we will be able to promote such a concept. I am also making my own effort to convene a conference of experts from Japan and other countries in Northeast Asia within the next year, to discuss how to coordinate energy policies to ensure the security of the energy supply to all these economies. I would be very happy if we could convene a conference to discuss these issues again.

Thank you very much.

BRIEF BIOGRAPHY OF DR. TARO NAKAYAMA

Born 27th August 1924

- 1955 Elected as an Osaka Prefectural Assembly Member for the first time (Osaka Ikuno Ward). Subsequently re-elected three times in succession.
- 1960 Receives Doctorate of Medical Science (research on infantile paralysis, Osaka Medical College)
- 1968 Elected to the House of Councilors (Upper House) for the first time (Osaka Region Ward). Subsequently re-elected three times in succession.
- 1971 Parliamentary undersecretary for labor
- 1976 Chairman, House of Councilors Cabinet Committee
- 1980 Minister of State, Director General of Management and Coordination Agency, Director General of the Okinawa Development Agency
- 1983 Chief Secretary of the Liberal Democratic Party, House of Councilors
- 1986 Elected to the House of Representatives (Lower House) for the first time. Subsequently re-elected five times in succession.
- 1989 Minister for Foreign Affairs
- 2000 Chairman, House of Representatives Commission on the Constitution

Posts currently held include Chairman of the House of Representatives Commission on the Constitution; Chairman of the LDP Research Commission on Foreign Affairs; and Chairman of the Japan-EU Parliament Inter-Parliamentary Group.

INTRODUCTION

On June 26-28, the Tainai Park Hotel, located near the resort of Kurokawa village, Niigata, was host to an international academic conference organized by the Economic Research Institute for Northeast Asia. The focus of the workshop was on cooperative policies in the context of energy security and sustainable development in Northeast Asia.

Funded by ERINA and the Japan Foundation Center for Global Partnership, the project aims at combining multilateral dialogue with collaborative research and network development, and involves experts from various fields, both researchers and practitioners.

Twenty panelists from China, Japan, the Republic of Korea, Russia and the United States were invited, including those from the International Energy Agency, the Asia-Pacific Energy Research Center, the Atlantic Council of the United States, the James Baker Institute for Public Policy, Mitsubishi Research Institute—to name only a few of them¹—and also NGOs such as the Northeast Asia Gas & Pipeline Forum.

The workshop marked the opening of a two-year-long project initiated by ERINA with the participation of the Northeast Asia Economic Forum (Honolulu, Hawaii) and the

Monterey Institute of International Studies (Monterey, California).²

Preparing for this project, ERINA was aware that interest in the issues of energy security and sustainable development continues to grow worldwide. Studies, forums and other professional efforts undertaken by national and international agencies, universities, major research centers, and non-governmental organizations focus in detail on the numerous and complex problems in these and related fields.

One of the key issues under examination is gas, because of its wide range of applications and environmental advantages. Potentially, increased reliance on gas would reduce the need for oil imports and the scale of coal consumption. Increased gas production and gas trade will also lead to the diversification of supplies.

Also, renewable energy and new, cleaner technologies that could enhance energy efficiency, reduce atmospheric pollution and ultimately change the structure of energy use are a major focus of debate. Yet another critical problem is the growing consumption

¹ See the list of workshop participants and their affiliation at the end of this overview.

² In December 1999, the Institute, also with support from the Japan Foundation, organized a similar workshop focused on Japan-Russia relations, interests, and policies in the field of energy.

The workshop report is available online at <http://www.erina.or.jp/publication/Energy.htm>

of oil in Asia and the intensifying dependence on oil imports from the Persian Gulf.

For “island” economies with little or no fossil fuel resources, such as Japan, the Republic of Korea (South Korea) and Taiwan, energy security means a host of troubling issues. In short, the “five highs” represent both their long-standing and more recent concerns: high dependence on imported fossil fuels; high dependence on oil; high dependence on oil from the Middle East; high dependence on long-distance sea routes; and high projected demand on the part of China and India.

By 2015, Asia is likely to account for more than half of the world’s total increase in energy demand. Pacific Asia and India will drive the expansion in energy demand, replacing North America as the leading energy-consuming region. China and India will see especially dramatic increases in energy consumption and, according to forecasts, by 2015 only one-tenth of Persian Gulf oil will be directed to western markets, while three-quarters will go to Asia.

In the next fifteen years, gas consumption will increase more rapidly than that of any other energy source, doubling worldwide and tripling in Asia.

Within this larger framework, the Northeast Asian subregion encompasses the exceptionally large energy markets of China, Japan and South Korea and represents one of the leading energy-consuming regions in the world, heavily dependent on energy imports.

Japan is the world's fourth largest energy consumer and second largest energy importer (after the United States). South Korea is the fourth largest oil importer and the second largest importer of liquefied natural gas (LNG) after Japan.

Two decades from now, China’s imports of energy could be as high as its current energy production. China is the world’s largest producer and consumer of coal. On the other hand, its dependence on imports of energy, including oil and gas, is bound to grow dramatically. China’s electricity demand more than doubled in the 1990s and is likely to quadruple by 2020.

SUMMARY

From the outset it was expected that the participants would first review policies and prospects for, and impediments to promoting greater energy security for individual economies. Secondly, the goal of the workshop was to review the prospects for reconciling expanding energy use driven by economic development with environmental constraints.

1. During the opening session of the workshop on *Energy Security for Northeast Asia*, papers were delivered by Amy Jaffe of the Baker Institute, Rice University (“Asia and the World of Energy”), and Tatsujiro Suzuki of the Central Research Institute of the Electric Power Industry (“A Comprehensive Concept of Energy Security and New Energy Policy for Japan.”)

Both speakers emphasized that the policy landscape and security perceptions are changing, allowing new approaches to issues of vital national importance such as energy supply stability, an expanded choice of fuels and new directions for imports.

Amy Jaffe offered the following ideas in answering the question “What can be done for the future of energy cooperation?”:

? Building a network of personal

relationships

- ? Establishing a dialogue that transcends not only national borders but also professions, disciplines, and institutions
- ? Creating an ethos of consultation among traditionally suspicious governments
- ? Sharing resources in a coordinated fashion rather than acting alone, with the Sakhalin projects and the dialogue focusing on Kovykta gas resources representing the stepping stones
- ? Research efforts aimed at developing joint strategies for the conservation, stockpiling and development of alternative energy sources.

She also noted that energy resource availability has traditionally been discussed in terms of its potential for conflict, with countries competing for diminishing oil supplies and prices rising. However, this is an unnecessarily pessimistic view, considering that energy could serve as a unifying factor—the question is how to make it available to all on a long-term basis and at reasonable prices.

Diversification in fuels and the origin of supplies makes offshore and inland resources of gas and oil, including those in Eastern Russia, particularly attractive. Cooperation in the development and utilization of these resources would enhance energy security and, at the same time, could reduce energy-related

uncertainties. As a factor of interdependence, energy trade could strengthen security.

Tatsujiro Suzuki discussed two groups of issues, including “building blocks” for comprehensive energy security and also possible directions for changes in Japan’s energy policy. He emphasized that traditional concepts of energy security have focused on the long-term risk of oil depletion and the short-term risk of oil supply disruption. With the oil crises, importers were trying to shift away from oil, particularly from supplies originating in the Middle East, promoting diversification to nuclear power, coal and gas. However, a new paradigm is needed to deal with energy security issues.

A review of Japan’s energy policy will be completed in 2003 and its approach to energy security policy is already moving beyond independent measures and increasingly towards cooperative interdependence.

When the Japanese energy market is restructured, the expansion of gas could take place. This would, however, require further deregulation of energy markets. There are also fears that liberalization could compromise energy security and adversely affect the environment.

2. Cleaner energy options and efforts aimed at promoting a comprehensive and lasting energy-environment regime were the topics of the second session entitled *Development-Energy-Environment ‘Trilemma’*. The papers were presented by Norio Ehara of the International Energy Agency (“World Energy Outlook and Challenges for the Sustainable Energy Future”) and Fengqi Zhou, Energy Research Institute, State Development Planning Commission (“Environmental Protection and Natural Gas in China.”)

The first speaker mentioned that fast-growing energy demand in Asia’s non-OECD economies, in particular China and India, requires a cooperative approach in enhancing energy security and promoting sustainable development by safeguarding energy supplies through diversification and coordinating response mechanisms.

He identified major challenges related to the sustainability of energy use in developing countries such as China. However, not only for developing but also for developed economies, the transition to sustainable energy use will be a complex and gradual process, depending on changes in the structure of the energy sector, and social and economic behaviour. Therefore, sustainable development is dependent upon balancing the

interplay of economic, environmental and social policies.

In the next two decades China will be the world leader in expanding power production. Cumulative investments in the electric power industry are estimated at hundreds of billions of dollars, with priority given to coal. Coal-based electricity generation will more than double compared with current levels.

It is expected, however, that increasing awareness of the costs of pollution from coal, the need for improved economic efficiency and a desire to diversify energy sources will compel China to change its policy of predominant reliance on coal.

The second speaker provided an outline of China's atmospheric environment, including cities and provinces, as well as coal-related forms of air pollution such as acid rain. In this context, China needs to promote gas from domestic and external sources, including those in Siberia and the Far Eastern region in Russia.

The natural gas share in primary energy consumption in China is less than 3%. However, between 2002 and 2009, China plans to build a 4,000 kilometer-long West-East pipeline worth US\$18-19 billion, linking the Tarim Basin and Shanghai and supplying gas to nine provinces and some major cities. This project will promote the development of

Xinjiang and areas in the central and western regions of China, creating new jobs and bringing economic and social benefits.

Also, the wider use of gas through imports from Russia, Kazakhstan and other sources requires extensive gas distribution infrastructure.

On the other hand, a harsh climate and a shortage of capital prevent the expansion of the exploitation rate in Eastern Russia. Confirmed reserves are concentrated in Kovykta, near Irkutsk, Sakhalin and the Veliuy River basin in Yakutia. The production of gas in these regions amounted to only 1.8 billion cubic meters (Bcm) in 1985 and increased to about 3.3 Bcm in the 1990s, while the existing infrastructure for gas transport is limited in terms of its range and capacity.

Moreover, major gas export-oriented projects in Eastern Russia depend on foreign companies, with the total investment requirements estimated at US\$40~70 billion. It is expected that only after 2010 could about 20 Bcm of gas be exported from Eastern Siberia to China, South Korea and Japan.

3 During the third session on *China's Energy Needs and Asia*, Daojiong Zha of the International University of Japan spoke about

electricity industry governance in China. The second paper (by Kang Wu, East-West Center) addressed energy security and the roles of Asia's leading oil importers, including China and India.

The problem of governance in the energy sector is important, including the positions and attitudes of national bureaucracies, industries and regions. What is needed is to examine China's governance of its electric power industry. How the electric power industry is managed has a direct impact on cross-border projects that provide additional and/or competing energy sources for consumption in the provinces of Northeastern China.

On the other hand, the dynamics of China's domestic political economy are likely to influence energy links in Northeast Asia just as much as the larger issues of international politics and economics.

Currently coal is used to generate electric power, and replacing coal with gas for household use is certainly desirable. Cross-border energy cooperation in Northeast Asia can benefit from working with the local arms of China's electricity governance apparatus in the northeastern provinces, building a web of stakeholders.

The problem is that China's northeastern provinces, in contrast with the western

provinces, are not enjoying the same kind of political attention and investment plans under the control of the central government. In addition, the northeastern provinces have in recent years lagged far behind the coastal provinces in developing their own industrial bases. These and other factors limit their capacities to raise funds to develop the energy resources in areas under their administrative jurisdiction. However, the future is not totally bleak. Once a national electric power grid is in place, the power suppliers in Northeastern China will benefit through selling electricity to the national network.

The second paper addressed the issues of oil imports and energy security in the Asia-Pacific region, with a special emphasis on the role of the four largest oil importers—Japan, South Korea, China and India. The author also provided an overview of the structure of energy use in the Asia-Pacific region as a whole, examining the issue of energy dependence with respect to coal, oil, and gas. His outlook for oil demand and supply in the region revealed rising oil import dependence that could be alleviated through regional cooperation. The most important lesson is that energy security can be achieved through the efficient operation of market forces, both at home and abroad, and energy markets can enhance energy security.

During this session, Susumu Yoshida, ERINA's Director-General also offered his views on the latest Japan-Russia conferences, public-private sector meetings and his most recent participation in the Keidanren Imai Mission to Russia on June 2-8, 2001.

The speaker emphasized that Russia should become the energy supply center for Asia in order to help maintain the energy balance. It is necessary to implement the Sakhalin projects which are likely to initiate full-scale production of oil and gas by 2010.

In parallel, progress should be made on exploratory and preparatory works for the Sakhalin 3, 4 and 5 projects, as well as on surveys of the mouth of the Amur River, Magadanskaya Oblast and the Kamchatka peninsula continental shelf. The Kovykta gas project and a pipeline to China and the Republic of Korea should also be implemented.

In the future, the production of gas in Yakutia should be expanded, and a pipeline from Yakutia to Kovykta built and connected to the Kovykta cross-border pipeline. According to RUSIA Petroleum, the feasibility study on Kovykta will soon be completed. There are 1.59 trillion cubic meters of reserves, 1.1 trillion cubic meters of which has been confirmed, and it is expected that 2003 will see the confirmation of 2

trillion cubic meters of reserves. Discussions in the State Duma about the production sharing agreement are also progressing.

Japan's participation in this project is likely to be the focus of attention. A clear policy is needed, including an assessment of the possible effects of demand-supply misalignments in Asia on Japan. In addition, the scale of the financial requirements and shares of participating countries is very important, as well as an evaluation of the Kovykta project in terms of energy security and environmental conservation.

4. During the fourth session on *Sustainable Development and Northeast Asia*, Yonghun Jung of the Asia Pacific Energy Research Center (APEREC) and Alexander Sheingauz of the Khabarovsk Economic Research Institute of the Russian Academy of Sciences discussed sustainable energy strategies for Northeast Asia and the Kyoto process in the context of Far Eastern Russia, respectively.

The first speaker emphasized that the rational use of conventional energy should be based on full-cost pricing, cost-effective resource development, and the expansion of energy infrastructure to ensure economies of scale in the energy sector. Cleaner energy options include the expansion of gas and

renewable energy. In this context, technology development and diffusion is important, including combine-cycle gas turbines, fuel cells, micro-turbine and clean coal technology.

Depending on technological advances, the potential of renewable sources of energy, including photovoltaics, wind and fuel cells, can be commercialized. Innovation holds the key to the future of energy, while consumer acceptance and cost reduction are surfacing as major issues. In this regard, although nuclear power generation may not be seen by many as a desirable option, it is necessary - for the time being, at least.

In addition, economic mechanisms for managing energy use by increasing the user cost of depletable resources should be considered. One of the missions in enhancing energy security and reducing the environmental costs of energy use is to create efficient markets to reflect the "full cost" in prices by internalizing the externalities. Reduced energy consumption and improved energy efficiency make energy demand more elastic, lowering the user cost of depletable energy resources. The introduction of competition tailored to meet individual needs helps, but there is no "one size fits all" deregulation formula.

Governments are expected to facilitate infrastructure development and help

renewable technology penetrate the market. Timely infrastructure development offers an opportunity to capture most of the economies of scale and promote energy resource diversification.

Regional cooperation aimed at more energy trade will lower the supply cost, making infrastructure, particularly gas pipelines, less costly, more efficient and easier to build. A vision for power interconnection is also needed.

Interdependent relationships based on a combination of market, technology and capital embodied in cross-border projects, and coordinated efforts in the development of renewable energy sources will contribute to both local and global environmental protection. Coordination of environmental policies—based perhaps on "common but differentiated" responsibilities—is needed, as well as research focused on the comprehensive integration of energy and environment policies.

The second speaker addressed the problem of differences among various regions in terms of their carbon emissions and carbon storage capacity, and therefore different roles in the Kyoto process. In this respect, Far Eastern Russia, with its vast unpopulated areas and very large forests serving as a carbon sink, should be considered as a net

storage region.

It is located close to net emitters such as China, Japan and South Korea and its capacity to absorb carbon is estimated at 359 million tons a year by 2010. For example, young forests' vegetation rate can reach 14-20 cubic meters per hectare a year, creating a significant addition to the forests' carbon sink capacity.

The Kyoto Protocol, however, failed to take into account the factor of the forests' rejuvenation, which in the case of Khabarovskiy Krai is estimated at 1.9% a year.

On the other hand, the Kyoto mechanism of emissions quota trading does not distinguish between states and regions. In reality, all four international cooperation schemes proposed under the Kyoto Protocol are applicable to Far Eastern Russia. Moreover, inclusion of this area in the Kyoto process could represent an attractive economic option, promoting reforestation and enhancing forest fire control. In addition, as a major importer of timber from the Far Eastern region and Khabarovskiy Krai in particular, Japan could play a special role in forest management programs and efforts aimed at enhancing fire control capacity in Far Eastern Russia.

5. During the fifth session on *National, Bilateral and Multilateral Frameworks*, Susumu Abe of Toshiba Corporation and Xiaojie Xu of the Petroleum Economics and Information Center discussed the role of gas from both the national and regional perspectives.

The first speaker provided an outline of the activities of the Northeast Asian Natural Gas & Pipeline Forum (NAGPF), established to promote the construction of the international pipeline network. Such a network is essential for both enhanced energy security and sustainable development in the area.

The NAGPF organizes an annual international conference. During the past year, the NAGPF has worked on its first joint international research project and published a report on "A Long-term Vision for a Natural Gas Trunk Line in Northeast Asia."

The objectives of the research were to (1) provide a comprehensive compilation of existing materials, such as papers presented at the previous conferences; (2) review trends in gas supply and demand by examining the gas policy of each country and area; and (3) with the approval of the member organizations, envision a network of gas trunk lines in Northeast Asia.

The NAGPF is engaged in international

activities, making policy recommendations to international organizations and governments, and emphasizing that cross-border gas supply via a pipeline network will contribute to energy cost reductions, the diversification of energy sources and the introduction of competition into the energy sector.

The promotion of gas, as well as its export and import, contributes to interdependent links among countries and areas. This requires coordination of rules and domestic practices related to the promotion of gas business through the international pipeline. It is also important to establish an international cooperative framework, aiming, in the longer-term, at a “Northeast Asian Energy Community” formation and the adoption of a Northeast Asian Energy Charter.

The second speaker (“China’s Energy Cooperation with Japan and the Koreans: Prospects and Opportunities”) offered an overview of growing imbalances between energy demand and supply in the economies of the subregion. He elaborated on prospects for cooperative approaches in developing new energy sources by all energy-importing economies of the region, as well as their rationales for considering such approaches.

China-Russia gas and oil connections were given special attention, considering their key role in balancing Northeast Asian energy

markets. Japanese, Korean and Chinese energy companies are searching for major energy opportunities in Eastern Siberia and the Far Eastern region of Russia. Joint exploration and production (E&P) ventures are essential for importers to exercise some degree of control over supplies.

In February 2001, when Vladimir Putin visited Seoul to meet with South Korean President Kim Dae-jung, Russia and South Korea expressed interest in jointly developing gas reserves in the Irkutsk area and promoting Sakhalin projects. Central governments could help the companies to develop bilateral and multilateral linkages with their counterparts in neighboring countries. Intergovernmental coordination is indispensable to support industry-to-industry and private-sector cooperation, and promote cross-border mega-projects. What is needed is government level cooperation and coordination in project financing and risk management.

On the other hand, legislation and governmental regulations are needed to oversee and facilitate pipeline construction and operation. Russia is already working on production sharing schemes and has deregulated some sectors, including E&P and delivery infrastructure. China is currently working on a new gas pricing policy, while Japan and South Korea are in the middle of

deregulating their power sectors. In addition to gas and oil cooperation, electric power development and transmission projects are also of interest to all parties.

6. At the last session devoted to individual papers, on *Interests, Policies and Perspectives: Private Sector, Countries, Regions and Localities*, presentations were made by Tsuneo Akaha of the Monterey Institute of International Studies and Vladimir Ivanov of ERINA.

Tsuneo Akaha spoke about the likely challenges that will face efforts to establish an institutional framework for regional cooperation in energy security. The problem is that there is neither a consensus nor a sense of urgency among Japan, Russia and China with regard to institutional measures thus far. South Korea is eager to play an active role in regional affairs but its resource base and international influence are substantially smaller than those of the major powers.

The speaker addressed the issue of norms, rules, and principles that should guide the operation of a multilateral framework, mentioning the Tumen River Area Development Program, the non-governmental Northeast Asia Economic Forum and the Niigata Economic Conference. Other multilateral schemes are dealing with

traditional security issues, including the Northeast Asia Cooperation Dialogue (NEACD) and the Council for Security Cooperation in Asia Pacific (CSCAP). These schemes offer lessons that could be taken into consideration in developing institutionalized energy cooperation in Northeast Asia.

On the other hand, as suggested in the second paper presented at this session, lessons from other regions could be learned and applied. The direct adoption of European models and methods, for example, may not be easy, but the “Euro-Mediterranean Partnership in the Field of Energy” launched in 1995 could be thoroughly studied. This approach emphasizes the central role of the energy sector in achieving the objectives of Euro-Mediterranean economic cooperation. The framework focuses on a regional approach to security of supply, convergence of energy policy priorities between EU and Mediterranean countries, industry-level cooperation, and electricity and gas infrastructure interconnection. It also deals with legal instruments for encouraging the development of decentralized and liberalized gas and electricity markets, sustainable energy use and joint environmental projects in urban areas.³

³ Council – Energy Press Release 2267, May 30, 2000, Brussels at <http://ue.eu.int/Newsroom/>

In addition to the developing bilateral dialogue, initiatives undertaken by APEC and other international organizations, such as the IEA, the World Bank and the Asian Development Bank, should be considered. The Natural Gas Initiative adopted by APEC seems to be suited to the Northeast Asian subregion of APEC. On the other hand, the economies of Northeast Asia represent a convincing case study exhibiting the difficulties in implementing this initiative.

7. In the morning of June 28, a general discussion and concluding session were held, where participants made supplementary remarks and offered recommendations. The bottom line of these two sessions is that potential investors, policy-makers and energy experts should be educated about the long-term significance of the Northeast Asian subregion. It was agreed that energy is the key to sustainable development, as environmental issues are gradually infiltrating energy security concepts. In this context, natural gas utilization will help to reduce dependence on coal, oil and nuclear power and limit associated environmental burdens in the region. The following is a list of proposed topics aimed at identifying a common ground for enhancing energy security and supporting

sustainable development:

The first group of recommendations encompasses methodological approaches to the problems of energy security and sustainable development in Northeast Asia.

Energy security can be seen as one of the non-traditional security issues and a conceptual framework for energy cooperation could be the focus of the project. In this context, addressing the question of how to work together to improve the energy mix, diversify the sources of supply and combat energy-related pollution is essential.

Cooperative policies require adjustments in national energy plans. International commitments must be domesticated, and sound national policies such as Japan's 3E-energy principles⁴ should be regionally adopted.

The second group of issues encompasses the examination of previous and current energy policies adopted by the economies, defining choices in favor of certain fuels, and sources of existing and possible imports and transportation technologies. This is a vital component in the goal of constructing a conceptual framework that integrates energy security needs and the limitations of sustainable development. In addition, the security environment in Asia is critically

⁴ 3E stands for economic development, energy security, and environmental protection.

important for the stability of supplies. Prospects for new sources of oil supply and oil stockpiles should be examined.

The environment—energy production and usage dilemma constitutes the third group of issues, including acid rain and its cross-border aspects, carbon dioxide emissions and alternative scenarios for dealing with this type of pollution. Emissions trading and power plant modernization, the transfer of technologies and the mobilization of funding, ODA and the environment nexus, and the side effects of energy projects also should be evaluated.

Moreover, the approaches adopted by multilateral organizations, including the OECD, ADB and the World Bank, and regional organizations and forums, such as the EU, APEC, and PECC, should be analyzed with regard to specific energy and environmental issues relevant or related to the subregion. In this context, KEDO also requires an assessment.

The fourth group of issues concerns the development financing needed to realize the potential for cleaner energy, including gas, clean coal technologies, hydro power and other renewable energy. It deals with the investment environment in countries and regions, involving the activities of transnational corporations, their ongoing and

planned projects, production sharing and other risk-reduction arrangements.

Prospects for cooperation in view of domestic priorities, including the pricing of energy, regional and local interests, and long-term strategies interconnected with energy sector development and environmental protection constitute the fifth group of issues to consider. Greater coordination is required between different organizations, including the exchange of the latest information.

Issues that transcend national borders often cannot be dealt with unilaterally. Trans-border environmental problems require that any project with a significant environmental component must be discussed jointly.

It was mentioned that the project would benefit if there were more inputs from stakeholders in the discussion, including representatives from industry, government experts, and environmental organizations. Also, U.S.-Japan cooperation is an important part of the bigger picture, involving the subregion. This factor could contribute towards subregional cooperation in terms of helping to formulate the “rules of the road” in the environment, investment and other fields.

It was emphasized that the issue of outreach to practitioners and business interests is very important. The project will benefit from a closer look at the views from

governments, the business community and industry. In this regard, it could be helpful to look at the APEC energy regulators' forum (trans-border pipeline issues) and the energy business network (high-ranking personnel from the leading companies). Also, collaboration with the IEA could provide this project with access to member governments.

In any event, experience in working with governments should be shared and analyzed by the participants, using the increasing transparency of governments and their agencies. This constitutes the sixth group of recommendations pertinent to the project goals.

In conclusion, a proposal was advanced with regard to promoting the establishment of a subregional cooperative framework, which would increase energy security stability for all countries, enhancing at the same time the potential for sustainable development and creating a win-win situation. For example, it was noted that China holds the key to increases in energy consumption and volumes of CO₂ emissions. Russia, on the other hand, aims to use gas exports for the economic reconstruction of its eastern territories. Northeast Asian energy security should be a major interest for the United States because world energy markets are highly integrated—what happens in Asia will affect the rest of the

world—and because Americans are involved in many existing projects in the region.

Energy cooperation should be a model for multilateralism and a source of positive experiences. What is needed is transparency in order to keep third parties informed of the intentions of any bilateral agreements.

On the other hand, an opinion was expressed that the main focus should be on bilateral schemes, as the participation of a 'third party' complicates matters, as illustrated by the case of gas transportation from Russia to Europe via Ukraine.

Moreover, energy issues are closely related to military problems, therefore military considerations are very important for the success of cross-border projects. It is anticipated that a gas pipeline project would relieve military tension in the Korean peninsula, reducing the need for the United States to provide a security umbrella. In this context, the project should address existing energy cooperation frameworks, including those formed between Russia and Europe in the fields of pipeline gas and power grids.

It was also agreed that participants should evaluate the social benefits and potential for social advancement linked to cross-border projects. However, potential negative impacts of large-scale cross-border projects, including technical risks, must also

be assessed.

Technical and research cooperation are serving as tools in implementing governmental policies through exchanging ideas and discussing differences on longer-term strategic issues. A “second track” dialogue on energy and environmental issues, and the value of these exchanges for energy-development-environment cooperation, has yet to be emphasized and promoted.

The role of academics was further stressed, on the grounds that they are in a position to make suggestions without being tainted by self-interest, thereby providing discussions with a broader perspective.

On the other hand, the academic community should not only supply ideas, but also ‘consume’ ideas generated by collaborative efforts towards the establishment of an energy community in Northeast Asia, to teach future generations how the community came about and how it can be sustained.

It was proposed that ERINA synthesize the ideas and data included in the project papers to create a more comprehensive, concrete and objective analysis to see whether the gas pipelines make economic sense, considering and comparing them with other options.

It should be noted in conclusion that the

governments of Northeast Asian countries have demonstrated willingness but not yet a strong commitment to cooperating on energy issues. In this respect, efforts undertaken by prominent politicians such as Dr. Taro Nakayama could have an enormous influence.

ENERGY SECURITY AND SUSTAINABLE DEVELOPMENT
IN NORTHEAST ASIA:
PROSPECTS FOR COOPERATIVE POLICIES

A DISCUSSION

1. Energy Security

Energy issues in the context of Northeast Asia are normally seen as a potential source of friction, with prices rising and economies competing for diminishing oil supplies.

Traditional concepts of energy security have focused on the long-term risk of oil depletion and the short-term risk of oil supply disruption, with the goals being to move away from oil and obtain oil supplies from sources other than the Middle East. Also, there has long been an artificial divide between energy experts and traditional military security analysts, except when oil and war have converged, particularly in the Middle East.

However, there is an alternative to this unnecessarily pessimistic view. In terms of energy use, all economies are “in the same boat”, with energy-importing countries needing access to energy sources, while energy-exporting economies depend on export markets.

Energy security should not be seen as a ‘zero sum’ game and could be a unifying force, while competition can be avoided. The key question is how to make energy resources available and affordable to all. The price of oil, on the other hand, is based on a myriad of political factors and, if cooperative policies are emphasized, the economies of Northeast Asia

can develop alternative oil reserves and/or promote gas-based automotive fuels.

The gap between oil demand and indigenous crude supply in the region is widening. In 1999, due to the continuous decline in China’s coal consumption since 1996, oil overtook coal as the leading source of primary commercial energy in the region. Crude oil use, including oil used for power generation in the Asia-Pacific region, is forecast to increase rapidly towards 2010, leading to a rise in imports. Overall oil import dependence—the share of imported oil in overall oil demand—is forecast to surge to 72% by 2010. At the same time, regional crude oil production is expected to decrease due to declining production in Australia and Indonesia.

Japan, China, South Korea and India are the four largest oil consumers in the region, accounting for over 70% of the region’s total petroleum product demand and nearly 80% of the region’s net imports. Not surprisingly, the security of energy supplies in Northeast Asia has been directly associated with oil.

This notion was based on a number of given parameters and stated objectives, depending on the circumstances of each country. For example, for North Korea and, until very recently, Mongolia, the security of oil supplies was closely interconnected with politico-military ties with the Soviet Union.

These relationships of “oil dependence” are now being transformed, with North Korea switching to China as a supplier of oil, and Mongolia adopting market principles in relations with Russia.

China is central to the Asia-Pacific region’s energy demand-supply equation. It is becoming a major oil importer, raising the question of whether it is destined for strategic competition with Japan and South Korea in importing oil from both distant and nearby sources.

The government and state oil companies have made efforts to improve oil supply security since the mid-1990s, adopting plans for strategic oil reserves and storage facilities, expanding domestic and overseas upstream oil investments, developing gas resources and considering oil and gas imports from Russia and Central Asia.

The governments of Japan and South Korea have tried to amass their own production capacities in the upstream oil industry through overseas investment, joint ventures, bilateral agreements and concessions. They have also intervened in the energy sector domestically, using taxes and legislation to improve energy efficiency and reduce energy intensity. Both economies succeeded in diversifying away from oil in power generation, in favor of gas and nuclear power.

Since the mid-1990s, the Japanese government has been taking steps to deregulate the oil industry, while the restructuring and downsizing of the downstream segment is also underway. Japan is moving away from intervention towards the newer concept of market operation.

South Korea has taken steps towards the privatization and liberalization of the energy sector, mainly the electric power and gas segments, in order to increase energy efficiency. Due to a massive expansion in refining capacity South Korea is currently a net exporter of refined oil products. It has gradually opened up its oil market to private and foreign competition, but foreign investment in the downstream oil sector has been discouraged by excessive refining capacity.

It is important to note that none of these large and growing importers of oil succeeded in reducing their oil imports from the Middle East. As per capita incomes rise and industry develops, the associated increase in energy use is largely accounted for by increased usage in the transport sector, where there is currently no alternative to using oil. Consequently, until new technologies for cars are developed, this problem will not go away.

In this context, Russia’s huge oil and gas resources can be used. Russia appears

genuinely interested in developing its export potential to meet growing demand in Northeast Asia. This, however, will be possible only if investment and other barriers are lowered. Oil and gas resources in Eastern Russia are located at great distances from markets.

While gas has huge potential for future growth, international pipelines and long-term LNG contracts require close international cooperation, both at the government and private sector levels. The development, transportation and marketing of gas are very costly. Governments could either invest public funds in building gas supply infrastructure or design incentives to attract private investment.

Natural gas is a favored option in Japan—the world’s largest importer of LNG. If the proposed new nuclear plants were not built due to the objections of Japanese public, 1.5 – 2.5 million barrels of oil a day may be required over the next 10 years to cover the shortfall. This gap, however, could be bridged through expanded reliance on gas.

Interests in gas shared by Japan, South Korea, China and Russia could open up many possibilities for cooperation, including gas-related technologies. For example, the cost of transporting gas is dropping and, although gas prices are currently increasing, the decrease in

the cost of facilities and LNG shipping charges would make it cheaper.

In the future, there is the possibility of gas liquefaction taking place on tankers, thereby eliminating the need for expensive export terminals. Also, the gas market is likely to change, with spot markets developing, assisted by technologies that eliminate the need for receiving terminals.

Auto manufacturers in the United States see the field of gasoline-substituting technologies for cars as an export opportunity. Through the development of fuel cells, hydrogen and hybrid technology, the U.S. may be able to grasp the initiative and claw back some of the ground it lost after rejecting the Kyoto Protocol, as well as providing a partial alternative to the currently predominant reliance on oil in the transportation sector.

All these potentially lead to a redefinition of the very notion of energy security in the 21st Century. The first priority in redefining energy security is to answer the three key questions of security policy: (1) what do we want to protect?; (2) what are the sources of risks?; and (3) what are the tools available to cope with risks?

Not so long ago, energy imports were described as “the oxygen to the Japanese economy’s breathing”, but the current lack of economic growth has resulted in lower

growth in energy demand. At the same time, as industrial demand is declining, demand for energy in the transportation sector, and gas and electricity for the commercial sector and households continues to grow.

Due to a variety of socio-political factors, the future of nuclear industry does not appear to be as promising as expected. The Tokyo Electric Power Company (TEPCO) has put on hold various nuclear power plant projects. Further diversification is required in the primary energy mix and also in fuels for the power sector. This is likely to make gas the most realistic substitute for other fuels. But it may be unrealistic to expect that deregulation will bring lower prices, because in many cases prices rise after deregulation.

Japan's electric power supply structure is well balanced, but with pipeline gas added, the fuel diversity index will improve significantly. The substitution of oil and coal with gas could help reduce oil dominance in the primary energy supply and minimize CO₂ emissions.

Moreover, increasing the share of nuclear power in the energy mix will not reduce oil consumption in the transport sector, which accounts for only 15% of the electric power supply. Therefore, gas may have a greater effect through gas-to-liquid technologies and fuel cells.

The Ministry of Economy, Trade and

Industry (METI) is also looking at new technologies for transporting gas. Interest in self-generation and co-generation using gas is growing. If a decision is taken to construct the international gas pipeline, Sakhalin gas is likely to be available in 2008, but the question of key users of this pipeline gas still lingers.

A review of Japan's energy policy will be completed in 2003.⁵ When the Japanese energy market is restructured, the expansion of gas is likely to occur, requiring further deregulation. As of today, however, there is a fear that deregulation could compromise both energy security and the environmental goals.

All that is needed is to restructure existing taxes to protect the environment. In Japan, the energy tax system structured in the 1970s to help reduce oil dependence is crucial to the environmental component of energy security. In addition, investment in research and development of gas turbine technology is required.

⁵ In early 2001, the Advisory Committee for Natural Resources and Energy under Japan's Ministry of Economy, Trade and Industry proposed raising the share of gas in the primary energy supply from the current 13% to 20% by 2020.

2. The Development-Energy-Environment “Trilemma”

Unsustainable development was recognized as a serious global challenge in the 1970s, when Jimmy Carter warned about the problem of energy use threatening the environment. This problem was a subject for discussion at the ministerial-level meeting convened by the Organization for Economic Cooperation and Development (OECD) and the International Energy Agency (IEA).

The Paris conference on sustainable development in April 2001 focused on inter-linkages between energy use for power generation and transportation, and atmospheric pollution. The issue of sustainable development will top the agenda at the “Rio plus 10” conference to be held in September 2002.

In the total world primary energy supply, the weight of OECD countries is decreasing, while the share of developing economies is growing. The OECD share is projected to fall from the current 54% to 44% by 2020, while that of developing countries will rise to 45% from the current 34%. The share of transition economies is projected to decrease slightly from 12% to 11%. In absolute terms, total energy demand on the part of developing economies will more than double, accounting

for two-thirds of the total increase in world energy demand between 1997 and 2020. Drastic increases will be seen in India and China, driven by the rising standard of living, industrial expansion and also subsidized energy prices. The projected increase in energy demand on the part of China is likely to be equivalent to the increase in energy demand in all OECD countries combined.

The OECD has assembled a list of common sustainability objectives, including those aimed at safeguarding energy supply security, energy market reform, increased efficiency, widening use of renewable energy, and promoting sustainable technologies in transport. Implementation of these measures contributes to the prevention of climate change.

In non-OECD countries, the financing issue is particularly important for sustainable development. Advanced energy infrastructure improves efficiency, responding to the large incremental demand in these economies. In addition, the way in which new energy projects are built and the types of technology chosen have a significant impact on sustainability. Energy infrastructure has a long life cycle, requiring each project to use the cleanest and most efficient technologies currently available.

Measures that improve access to private

capital include Independent Power Producer (IPP) schemes, the privatization of state electricity companies, the issue of bonds by state utilities, the development of domestic capital markets and wider reliance on private suppliers for the procurement of goods and services for large energy-producing entities.

The investment climate also depends on corporate governance, stability in the fiscal regime, and clarity in the legal base for investment projects, including uniformity of regional and federal laws, and avoidance of price distortions through subsidies for residential electricity and heating and non-payment of electricity bills.

The problem is that efforts aimed at establishing energy markets through pricing reform tend to result in job losses and energy price increases, leading to social strains. In addition, while pricing reform could help the promotion of advanced environmentally friendly technology, competition through pricing may impede the introduction of renewable energy projects because of their higher cost.

China has vast coal resources, but the costs of extracting and moving coal to the centers of demand are increasing and ought to be reexamined. Until now, the government has absorbed the cost of moving coal from the north, where it is mined, to the south,

where most demand is concentrated.

The scrapping of energy subsidies, while unpopular due to the resulting social hardships, reduces distortions in energy pricing, rationalizing primary energy consumption, lowering CO₂ emissions and increasing economic efficiency. China has made some progress in reducing subsidies, by linking domestic oil prices with world prices and moving electricity prices close to international levels. Technology transfer in the transport sector is currently taking place in China, where most car factories are cooperating with foreign companies.

In addition, the Chinese government could deregulate the cost of rail transportation for coal and oil, to incorporate it into end costs. Also, while removing subsidies, a number of countries have tested schemes protecting those suffering social hardships, such as the targeted subsidy of minimum electricity supplies for the poor. On the other hand, subsidies could be used in certain cases, such as in Germany, where the purchase of wind turbines costing \$6,000 has been subsidized by the government in order to encourage their installation by farmers and other users.

Finally, in many developing countries, which have focused solely on economic growth, awareness of the need for

environmental protection is growing only as environmental degradation increasingly affects the lives of people, resulting in higher public health expenditure. China, for example, has experienced a particular problem with acid rain—30% of the country's territory is affected and acid precipitation is reaching the Korean Peninsula and Japan

Promoting gas in China is also very important, given the condition of China's atmosphere. At present, China is too dependent on coal—a major source of pollution, including sulfur dioxide emissions resulting in acid rain and many other complications. Such pollution is a very serious problem and gas will help alleviate it. In certain sulfur dioxide and acid rain control zones designated by the Chinese government, de-sulfurization devices have been introduced in some power plants. Development of new coal mines with a sulfur content higher than 3% is now prohibited. Through such measures and a variety of legal regulations, the Chinese government has been working to protect the environment. Suggestions for measures aimed at tackling environmental problems include improved environmental standards in urban centers through centralized measures, upgraded industrial structure with less ecological pressure, improved energy efficiency and energy mix, wider reliance on

clean coal technologies, and economic tools to internalize environmental costs through environmental legislation.

If China could introduce gas to a level of 20% of the total primary energy supply, it would be a huge leap towards sustainability. Also, a closer look needs to be taken at clean coal technology (CCT).

3. China's Energy Needs and Asia

China's primary energy consumption is dominated by coal, but the share of oil is also significant. Oil consumption has been growing very fast since the beginning of the 1990s and the country is expected to succeed Japan as the largest oil consumer in the region before 2010. Domestic oil production has been growing only modestly and will likely level off in the near future.

China's first priority until at least 2010 is to develop its domestic resources of gas. Between 2002 and 2009, China plans to build a national long-distance West-East gas pipeline. This project is not entirely based on considerations of economic efficiency, being seen in the context of social and economic development plans for Western China.

China possesses the resource base for the large-scale development of gas. In terms of utilization, gas will mainly be geared towards

power generation, residential use, the chemical industry and gas-powered cars. Domestic production is likely to meet demand up to 2010, after which it will be necessary to import gas in order to keep up.

China's current domestic production of gas is only 25 Bcm, or about 4% of Russian output. China is yet to acquire a "gas culture." Natural gas accounts for less than 3% of the total primary supply of commercial energy, but this share is expected to grow to 9-10% by 2020. This will make China the largest market for pipeline gas from Siberia and Sakhalin, as well as from Central Asian sources. By 2020, China may need to import as much gas as the European Union does today, in addition to about 6-8 million barrels of oil per day.

China is likely to play a significant role in developing the gas market in East Asia. It needs to increase its development and utilization of gas as soon as possible in order to reach a medium level of economic development.

China's cooperative relations with Russia in the realm of gas trade and transportation appear a priority since both countries have solid economic and political reasons to promote and prioritize energy cooperation.

In theory, Russia could contend for significant shares of energy markets in China,

Japan and South Korea. Russia, on the other hand, must export energy to protect its overall economic security and mobilize capital for the development of eastern provinces.

Eastern Russia accounts for 90% of natural gas production, 75% of crude oil, 80% of coal and 30% of electricity generation. However, Eastern Siberia and the Far Eastern region in particular have yet to become "energy surplus" areas. To achieve this, energy producers in Eastern Siberia and the Far Eastern region need much larger production volumes than the domestic market can absorb.

Energy demand on the part of the economies of Northeast Asia will determine both the scale and speed of energy resource development in Eastern Russia. It is estimated that their combined annual production of gas and oil could reach 80 Bcm and 60 million tons of oil, respectively.

There is significant electricity production potential in Eastern Siberia and the Far Eastern region. These areas have more than three-fourths of the country's economically viable hydropower resources. Excess power from Irkutsk and Krasnoyarsk oblasts together with the underutilized electric power output in Chitinskaya Oblast (after completion of the Kharanorskiy power plant and the Bureiskaya hydropower station) could

reach 50 billion kWh a year.

At various conferences, a variety of proposals are made for energy infrastructure—pipelines and electricity supply lines—that could link Eastern Russia with its neighbors in Northeast Asia. These proposals, however, are not always well coordinated in terms of the timing of implementation, funding and market needs. A comprehensive assessment of these proposals will help to identify priorities, contributing to cost reductions in large-scale infrastructure projects. For example, the recently-adopted Energy Program 2020 requires about US\$150 billion in investment, including more than US\$50 billion for the development of new reserves and infrastructure construction.

Russia could be a source of gas for Northeast Asia, but it must be noted that the exploration and production rates for gas in Eastern Siberia and the Far Eastern region are still low, being limited by severe climatic conditions, lack of infrastructure and a shortage of investment. It is estimated that about US\$40-70 billion in investment will be needed for oil and gas projects in these areas. Natural gas production off Sakhalin and in southwestern Yakutia could reach 55-75 Bcm in 2020, with exports accounting for 35-50 Bcm.

Natural gas in Western Siberia can also

be considered for export to Northeast Asian countries via a 6,500 kilometer-long pipeline, which would eventually integrate all of the gas projects in Eastern Siberia, Yakutia and Sakhalin. On the other hand, investment in pipeline construction from Western Siberia to coastal areas of China could be as high as US\$15 billion. Natural gas from Central Asia is another option. Turkmenistan has proposed an 8,000 kilometer-long pipeline with a capacity of 20 Bcm, running to Japan via China, but the cost of this project would be as high as US\$23 billion.

The list of problems to overcome includes the expansion of exploration activities to confirm reserves, reform of the price system for gas in order to develop markets and cultivate demand, and investment mobilization. Within the framework of the West-East gas pipeline project, the government of China encourages the participation of foreign companies in a variety of forms, including joint ventures and other forms of investment cooperation. Foreign investors were even allowed to own the equity that allows control over the enterprise. It was suggested that in addition to the West-to-East project, pipelines should be constructed from north to south and from offshore gas fields. Moreover, LNG landing facilities should be constructed in the major coastal centers. It

should be borne in mind that when gas attracts greater attention in the developed coastal areas of China, both authorities and investors could opt for smaller-scale and easier-to-assemble LNG projects integrated with combined-cycle power plants.

Prospects for the wider use of gas in China will be determined by the power sector. China's electricity sector was controlled by a state monopoly until 1985, when the State Council initiated reforms that diversified electricity industry operators. These reforms created some confusion because the investors were not necessarily private ones.

In addition, the central government retained control over the price of electricity for industrial, commercial and household use, limiting incentives for competition. Until 1993, the construction of a national power grid network progressed rather slowly and was insufficiently funded. Consequently, electricity was transmitted directly from the generator to consumers, allowing local monopolies to emerge.

In 1996 the government enacted China's first Electric Power Law, to regulate the market. The law endorsed the principle that "whoever invests, benefits" and had the unintended consequence of legalizing a distorted market rather than promoting a unitary one.

Also in 1996, the China State Power Company was created as the national-level industry operator, giving the power companies more autonomy in their operations. In 1998 the Ministry of Electric Power was abolished, with its policy-making and coordination functions transferred to the State Economic and Trade Commission. In early 2001, the above-mentioned law was revised. The 1998 national reforms have been copied at the local level.

All these measures simplified bureaucracy and promoted efficiency among the power sector operators, but there is still no real market. The government has focused its efforts on the special economic zones and other regions, to the detriment of the central and northeastern regions. Local governments, on the other hand, are gaining more authority in determining which electricity projects to fund and are very unlikely to be supportive of competition.

Proposals for launching cooperative cross-border energy projects involving Northeastern China should clearly identify potential Chinese partners, beginning with interested parties at the provincial level. Regional and local governments must be involved in proposed projects; otherwise they may have no incentives to keep these projects running. A diverse range of stakeholders and

shareholders, including local, regional and national government agencies, the private sector and multilateral development agencies, should minimize investment risks.

4. National, Bilateral and Multilateral Frameworks

It seems that a new, cooperative concept of energy security is crucial for the economies of Northeast Asia, which need a set of common goals for shifting to gas and hydrogen-based technologies and an immediate action plan for pipeline project implementation. Also, energy security logic dictates that these economies should consider relying more on gas in their mid-term and longer-term planning.

Regional cooperation in securing energy supply could work better than traditional approaches narrowly centered on national interests. Pipelines will play a major role in diversifying and securing Northeast Asia's energy supply, while an international pipeline network will be vital for fostering a sense of energy security in the region.

Moreover, a cross-border gas pipeline network will be a driving force for creating a regional energy alliance. The conditions for establishing such an alliance are favorable, including abundant energy resources in Eastern Russia, sizeable energy markets in

China, and markets and advanced technologies in South Korea and Japan. There is a need for a 'semi-official' organization—one that works independently but with some relation to government agencies.

Thus far, no comprehensive vision for an international gas pipeline has been proposed, although individual projects have been discussed at the conferences of the Northeast Asian Gas and Pipeline Forum (NEAGPF). This organization has initiated international research aimed at a long-term vision for a gas trunk pipeline network in Northeast Asia. The objectives were to undertake a comprehensive examination of existing materials; to review supply and demand trends in gas by examining gas policies; and to propose a concept for cross-border cooperation.

The study confirmed that gas demand in China, South Korea, Japan, Mongolia and North Korea would exceed supply. In order to bridge this gap, it is necessary to increase gas imports from Indonesia and other sources, such as Eastern Russia. It was estimated that by 2010, about 28 Bcm of gas could be produced in Eastern Siberia and another 26 Bcm would be available from Sakhalin. The volume of exports could reach approximately 28 Bcm, which is unlikely to cover the gap between supply and demand in Northeast Asia. Therefore, Northeast Asian economies

should also consider additional reserves, including those in Western Siberia and Central Asia.

In the future, the NAGPF's major task will be to undertake further international research activities, including establishing a framework for international cooperation and the creation of an international organization to support and promote the implementation of proposed pipeline projects.

The West-East pipeline project is the immediate priority for the Chinese government and participating transnational companies. This 4,000 kilometer-long pipeline will be the first long-distance pipeline in Northeast Asia.

In addition, prospects for importing gas through a pipeline are improving in theory as South Korea and North Korea talk about a railway opening between Seoul and Pyongyang. Discussions are now taking place about building a gas pipeline through North Korean territory. There is little doubt that if the inland gas pipeline is constructed, it will contribute to the energy security of South Korea and inter-Korean cooperation.

South Korea and Taiwan already have pipeline systems, while Japan has yet to come up with a plan for a domestic pipeline project, working on this issue simultaneously with preparations for an import pipeline project. In

Russia, it appears that the top priority is a pipeline project linking Sakhalin with Vladivostok, with a possible extension to the Korean Peninsula.

However, demand is crucial for pipeline gas, and the construction of a pipeline is possible only if users are ready to buy gas. For any such projects, a workable binding framework is necessary. With regard to the Sakhalin-1 project, Exxon Mobil recently announced that the supply of gas to Japan would begin in 2008. It has also been announced that LNG shipments from Sakhalin-2 will start in 2006, targeting not only Japan, but also other neighboring markets.

Further research and government support is required to promote discussions on power grid interconnection in Northeast Asia. Some cross-border energy projects, such as a trans-Korean gas pipeline or power transmission, will require multilateral effort, while other projects could be bilateral. In the case of the Sakhalin-1 project, bilateral frameworks will suffice. If bilateral projects are implemented successfully, this might then promote the building of a multilateral framework.

5. Sustainable Development

Regulatory reforms are in progress in a number of APEC economies, including Chile, Peru, the United States, Japan and South Korea. Awareness of climate change and local air pollution is rising, although efforts to tackle the former are stagnating due to the unwillingness of a number of governments to act. In addition, the financial sector's influence is increasing, which means that the economic feasibility of projects is becoming more important than ever before.

There is a widening gap between short-term private and long-term public objectives. Approaches driven by short-term interests are more common due to competition enhanced by deregulation, therefore governments have an important role to play in filling this gap.

On the other hand, while nuclear power has a part to play in achieving sustainability, there are problems with public acceptance. For example, no new nuclear power plants have been built in the United States for 20 years, not because of a government ban, but because they are unpopular and capital-intensive. However, without the use of nuclear power, it could be impossible to achieve Kyoto Protocol targets.

Furthermore, if there are no changes in consumption patterns, then it is inevitable

that depletable resources will, by definition, be depleted, no matter how fast technologies are developed. Carbon dioxide and other emissions from households are growing substantially faster than those from businesses. In this case, the matter of changes to individual lifestyles and living standards is paramount. Environmental consciousness and a sense of urgency at the grassroots level are lacking. The questions are how to persuade households to change their behavior and what to do when China enters the phase of mass motorization.

Sustainability is hard to define, because it depends on "inter-generational justice." The fundamental question of sustainability is whether we care for the welfare of future generations and whether future generations have the same economic benefits we enjoy now. Moreover, these future generations do not have bargaining power and may have different preferences and concepts of well-being.

One definition of sustainability suggests that as long as the total value of capital is maintained at a certain level over a number of generations, sustainability is achieved. However, defining capital is a problem, as in addition to physical capital, there is also such capital as the environment and depletable resources—these categories of capital are not

substitutable. Other definitions take this limited substitutability into account.

Forests in Eastern Russia have a major impact on the carbon balance, both in positive and negative terms. In terms of the latter, forest fires are very common, leading to substantial carbon dioxide emissions. Forest fires have almost the same impact on emissions as vehicles. Harvesting wood from the forests has a less harmful impact. Deforestation is not a problem—forest rejuvenation is expanding contributing to their carbon sink capacity.

On the other hand, methods of calculating emissions and measurement standards need to be improved drastically to conform to internationally approved standards. However, improving the system requires significant investment.

In addition, it is important that regions, not only countries, participate in the implementation of the Kyoto Protocol. Eastern Russia, including the Far Eastern region, has a positive carbon balance, so it could be ascribed a special role in the protocol.

Therefore, research is needed on how to place regions within the agreement, through joint implementation, for instance. APERC, for example, is looking at the options presented by hydropower, although this energy form is not totally free of associated

environmental impacts. One such impact is what was described as “hydroelectric power refugees.” In addition, hydropower plant dams contain methane-emitting sediments, which have an impact in terms of climate change.

At the same time, expanding gas and renewable resources is the only viable option. There is huge potential for gas imports, given a sizeable gap between projected demand and existing supply contracts.

Currently, gas in Northeast Asia is consumed almost exclusively in the form of LNG, while pipeline gas is still under consideration. Although the cost of pipelines is high, consumption along the pipeline routes is essential; otherwise, end-users will have to bear the full transportation cost. Marketing is important, because it has to compete against other fuels—merely telling consumers that it is environmentally friendly and therefore good is not sufficient.

Natural gas is a market-driven rather than supply-driven fuel and the question of who will pay for the pipeline itself is a major problem, as construction over long distances requires a great deal of resources. It is worth remembering that in Europe, governments mostly paid for pipelines.

In addition, gas is likely to offer only a temporary solution for the next 20-30 years.

Technological breakthroughs in the field of new energies have reduced their costs substantially, but the returns from these technologies are still lower than the market can accept. In addition, in the case of solar and wind power, it is difficult to match supply and demand. Consequently, this lowers the rate of return on investment in these options, which are also very capital-intensive.

There is a contradiction between sustainability and the principles on which markets are based, including the efficient allocation of resources. Only potent government can persuade businesses to promote emission reductions and other measures through regulations and the taxation system. Tax incentives, organizational support, the creation of infrastructure and government loans can be used to promote ecological business.

For a sustainable future, governments must create efficient markets that reflect full costs. They should also cooperate in funding research and development. Moreover, timely implementation of key infrastructure is very important. What is needed is to adopt laws and regulations complementing energy and environment policies aimed at a sustainable future. This takes time, so a step-by-step approach is needed. Green portfolios were proposed as part of this, as were higher

energy efficiency standards. International cooperation, research and development, region-wide surveys for renewable energy, and the coordination of environmental policies are also necessary.

A pool of environmentally friendly technologies for dissemination is needed, and Russia can play a role in this field by using its under-utilized R&D capacity. Stronger links could be forged between official development assistance and environmental protection. Institutionalized frameworks, such as a Northeast Asian Economic Community, should be considered to promote sustainable development and environmental conservation. Steps have already been taken in this direction in Southeast Asia.

6. Interests, Policies, Perspectives

As emphasized in other sessions, there is a need to develop a multilateral institutional mechanism for economic cooperation and energy security in Northeast Asia. Governments have an essential role to play in investing the necessary administrative and financial resources for ensuring the sustainable production, transportation and use of energy, coal, oil and gas in particular.

Although the ultimate purpose may be to ensure an efficient, economically and

ecologically sustainable network of supplies and markets connected by cross-border delivery systems, one of the most important by-products of such projects will be confidence-building.

Multilateral cooperation can exist only on a foundation of solid bilateral cooperation. The reality, however, is that national perspectives on multilateral cooperation in Northeast Asia are varied, with strong nationalistic tendencies prevailing. Views on energy security are still dominated by the need for self-sufficiency, and multilateral cooperation will only be considered if it serves narrowly defined national interests.

As far as political relationships are concerned, there is neither a consensus nor a sense of urgency among China, Japan and Russia with regard to the need to make cooperation in Northeast Asia multilateral. Due to the situation on the Korean Peninsula, both Koreas have to devote primary attention and military preparedness to each other, thereby constraining resource allocation. The continued isolation of North Korea is a formidable barrier to the development of dialogue. In this situation, the kind of role the Korean Peninsula Energy Development Organization (KEDO) should play is a topic for further discussion.

Among the existing frameworks that may

be relevant to energy cooperation in Northeast Asia are the Tumen River Area Program, the Northeast Asia Economic Forum, the Northeast Asia Cooperation Dialogue, the Council for Security Cooperation in the Asia-Pacific, the Niigata Northeast Asia Economic Conference, and the Northeast Asia Gas and Pipeline Forum.

By and large, these organizations are non-governmental, but when it comes to economic security issues that require national strategic decisions, the early involvement of central governmental authorities is necessary.

A 'Track Two' approach was suggested in approaching energy security issues, involving the business community, the economic sector, and the academic community. In this context, natural gas projects are expected to be the main pillar of such a community. But the APEC natural gas initiative, although a very fine plan in theory, could be unrealistic in the context of Northeast Asia, if the region's economies choose to move away from gas, towards nuclear power and coal.

Yet another obstacle to overcome in establishing such a community is that Russia's gas, oil and hydropower resources are separated from markets not only by physical distance and lack of investment, but from the perspective of lacking progress. As has been stated, gas markets are demand-driven as

opposed to supply-driven. For example, without market access, the Sakhalin projects are likely to be delayed.

The strategic supporters of potential gas pipeline projects that may link Sakhalin with Japan are the Ministry of Foreign Affairs and METI, with their influence and decision-making powers, as well as the Japan Bank for International Cooperation (JBIC). Their involvement is also necessary in order to rectify a situation in which oil exploration and development activities undertaken by the Japanese National Oil Corporation have basically avoided Russia.

With regard to the Sakhalin project, it is quite appropriate for Japanese initiatives to complement Russian efforts, but such initiatives cannot be a substitute for action on Russia's part.

When looking at the future of the Far Eastern region and assessing energy projects, Russians themselves must calculate the significance of their environmental impact. Then, these considerations can be used to engage Japanese partners in a dialogue, as well as attracting funding from the JBIC, which could consider projects in terms of the environmental benefits for Northeast Asia.

Although much is said about Russia's potential to export energy, attention needs to be given to marketing and the engineering

designs necessary to deliver these resources. Moscow is not paying sufficient attention to its strategic interests, and is neglecting its contacts with organizations such as APEC.

At the moment, there is little specific focus on Northeast Asia within APEC and there have been no requests from Russia, Japan, China or South Korea for APEC to evaluate the prospects for cross-border gas pipeline projects. Indeed, APEC could provide a network and an implementation strategy for gas projects, which could serve as a vehicle for attracting more attention to Northeast Asia.

Russia should consider building an efficient infrastructure for delivering gas to users based on multiple sources, which would be also aimed at multiple gas markets. This strategy must include not only China, but also Japan and the Koreas. Japan's policy in further promoting gas is crucial because its gas market is the largest in Northeast Asia, and its opening to pipeline gas will constitute a major change. The major attraction of projects involving Japan is that it has the wherewithal to pay for the gas while in South Korea the domestic gas trunk pipeline system is already in place.

Although the gas market in Northeast Asia is likely to continue expanding, for the next few years this is likely to be the LNG

market only, given that pipelines take time to build. As of today, Japan and South Korea are exclusively locked into the LNG option⁶ and there also is a possibility that the pipeline from Sakhalin will never be built, due to domestic constraints on building such infrastructure. South Korea, similarly to Japan, is completely locked into the LNG option.

In this context, Australia seems to have a well-focused strategy, its LNG exports reached A\$2 billion, with 7.5 Mtpa exported to Japan alone. Six major new LNG projects are now under discussion, and the Australian government's target is to export 25 Mtpa of LNG. In short, Australia plans to expand its share of the LNG market in East Asia from the current 10% to 30% by 2010-2015. One of the markets to be targeted in other regions is the United States.

On the other hand, Russian planners should not overlook domestic opportunities and needs complementary to the needs of its neighbors. One such opportunity is access to the markets of Northeastern China, which

could absorb at least 20 Bcm of gas a year. The Canadian gas industry is characterized by a "production in the west, consumption in the east" pattern. This is clearly reflected in the gas delivery infrastructure, with all production fields, gathering pipelines and processing plants located in the west. The single West-East transmission pipeline system moves gas across the country and along the border with the United States. The export points for gas delivered to the United States are spread out along this border and there are currently 16 pipeline interconnections with a total annual maximum capacity of 86 Bcm (in Canada, about 60 Bcm of gas is consumed domestically and 78-80 Bcm is exported).

Why not consider this as possible model for exporting Russian gas to neighboring markets in Northeast Asia? Furthermore, in Eastern Russia, as in Canada, vulnerability to supply shortages and disruptions in a west-east trans-continental gas delivery system could be mitigated by substantial upstream reserves of gas in Western Siberia.

In short, what Russia needs is a long-term, comprehensive and consistent approach to developing, delivering and distributing Siberian and Far Eastern gas to domestic and external markets. This strategy must first of all aim for an integrated approach to commercializing gas reserves. Second, the

⁶ Japan currently imports about 52-53 Mtpa of LNG (about 65 Bcm), and in 2010, under the old scenario, it may require between 57 Mtpa and 65 Mtpa of gas. With a scaled-down nuclear power program, the total demand could rise by 2020 to 70-80 Mtpa. A conservative estimate for South Korea is 21 Mtpa by 2010, and it is quite likely that it could reach 30-35 Mtpa by 2020. China's LNG imports in 2010 are estimated in the range of 5 Mtpa to 10 Mtpa, while Taiwan's LNG imports are likely to reach 10-12 Mtpa in 2010. World Bank experts project China to import LNG in the range of 20 Bcm to 60 Bcm by 2020.

number of potential exporters must be maximized, so ideally a pipeline, like a railway, should be kept "neutral" and open to all major exporters. Third, key transmission pipelines should be designed to collect and transport significantly more than the level of current and projected domestic demand, sufficient to supply gas to Northeastern China and the Koreans. Finally, this integrated approach must include efforts to target LNG markets in Asia. This will allow wider marketing of gas, involving LNG users in Japan, South Korea, China, Taiwan, India, and elsewhere.

A "west-to-east" trunk pipeline infrastructure constructed in Eastern Russia will allow flexible marketing and expanded reserves of gas to be traded via pipelines and as LNG. It will also facilitate coordination between the Sakhalin projects and the Kovykta, or Yakutia projects. A trans-continental trunk pipeline constructed along the Trans-Siberian Railway will enable the commercialization of gas reserves in Krasnoyarskiy Krai, Irkutskaya Oblast and Yakutia. These integrated reserves will be sufficient to supply gas to domestic users, while the proposed infrastructure will allow significant cross-border gas exports to China, the Koreans, Mongolia and even supplies of LNG to Japanese, South Korean and Taiwanese LNG users, provided that an

expanded LNG export capacity were available on the Pacific coast of Russia.

On the other hand, it is important to note that 39 individual LNG cargoes were sold "spot" in 2000, accounting for about 8% of traded LNG volume. If the Asian market for LNG evolves, with additional LNG sources opened and receiving terminals built, the sale of LNG on a spot basis and more intensive introduction of LNG-based power generation facilities may considerably improve the prospects for Russian pipeline gas exports to East Asia.

China, Japan, South Korea and Russia could become partners in changing LNG markets for their mutual benefit. Swap arrangements involving already-developed LNG markets and new opportunities in the coastal regions of China and India could facilitate the marketing of Russian gas. India, for example, has entered several LNG supply agreements, and a state-owned company has recently bought a large share in the Sakhalin-1 project. When five LNG receiving terminals under construction or announced are completed, India could import about 23 Mtpa of gas, or almost half of Japan's current LNG import volume. India will import most of its LNG from the same sources that currently supply LNG to Japan, South Korea and Taiwan.

When LNG from the Sakhalin fields becomes available, both Japan and South Korea will have an opportunity to “swap” some LNG cargoes with Indian importers of LNG, reducing both transportation costs and delivery time. It is projected that the share of spot deals could grow to 12% by 2010 and it seems that this new trend deserves careful evaluation. In the longer-term, if the East Asian market for LNG evolves, with additional receiving terminals built, the sale of LNG on a spot basis may considerably expand the market for Russian LNG. Therefore, an expanded production base will be needed to capture such an opportunity — another argument in favor of the Trans-Siberian pipeline that could, at some point, be extended to the Korean peninsula and interconnected with the Trans-China pipeline by “north-to-south” joints.

7. Conclusion

Energy security frameworks have now gone beyond oil supply to cover such challenges as improved market efficiency through deregulation and the introduction of competition, the environment, technology advancements and technological risks such as nuclear accidents, demand-side risks, socio-cultural factors and public attitudes, and risks

and opportunities in the realm of international relations and foreign policy.

It seems that any new energy security policy tailored to meet these uncertainties must conform to the five interconnected “insurance principles”, including: (1) cost sharing; (2) multi-dimensional and multi-purpose approaches; (3) minimum cost; (4) greater flexibility and fuel switchability; and (5) no expectation of returns or tangible side benefits.

What can be done in this context for the future of energy cooperation in Northeast Asia? Ideally, a new institutional framework could be necessary in order both to promote and manage energy interdependence in this subregion. It was suggested that a cooperative environment be created at first through further dialogue and research, including the following “building blocks”:

- ✍ A network of personal and expert-level relationships
- ✍ A dialogue that transcends both national borders and academic disciplines
- ✍ An ethos of consultation among governments
- ✍ Coordination of interests both in discussions and project development
- ✍ Joint strategies for conservation,

stockpiling, and research and development of alternative energy sources.

While acting along these lines, it is equally important to keep the focus on the economics of energy sector. For example, the transport sector is growing rapidly, but fuel demand estimates are unreliable. A lack of detailed and shared understanding of future trends cause impacts from vested economic interests to be downplayed, discouraging potential stakeholders in cross-border energy projects and reducing interest in cooperation.

Indeed, only a justifiable common economic interest can initiate and enhance cooperation. For example, even marginal improvements in energy efficiency in Japan have enormous value both in terms of economics and know-how.

Many areas potentially suitable for subregional cooperation may offer attractive low-cost options in terms of the economics of energy supply and environmental safeguards. Gas pipeline projects should be seen as a long-term investment, deserving government guarantees to ensure progress. On the other hand, a multilateral oil-stockpiling project for emergencies could be the first step for the economies of Northeast Asia, followed by tackling sea-lane piracy.

Collaboration in cross-border energy

projects may be possible, but only if properly designed and advanced by national governments. In short, governments can adopt the following measures to reconcile energy security and energy production, and use them with measures aimed at sustainable development:

- ✍ Diversified energy supplies and response mechanisms to deal with disruptions
- ✍ Improvements in energy efficiency and the diffusion of non-fossil fuel technologies
- ✍ Competitive and transparent energy markets with minimum price distortions
- ✍ A framework for decision-making that includes clear signals to the market
- ✍ Market liberalization compatible with environmental and social needs
- ✍ The systematic introduction of the best available technologies in new projects
- ✍ Safety standards in the operation of plants and infrastructure
- ✍ Energy research, and information exchange and dissemination.

Obviously, these measures will encourage

the market penetration of gas, pipeline gas in particular. In this context, expert-level international cooperation is essential for encouraging efforts aimed at implementing cross-border projects, the commercial applications of gas-based technologies, and changes in consumer behavior.

In this respect, although emphasis on the power sector is crucial, technological advances in the transportation sector are just as important. Possible energy systems of the future will include distributed power generation, shared infrastructure, a diversified fuel mix and shared “rules of the road.”

It is also important to assess the wider impacts of the gas pipeline projects on politico-economic and socio-economic developments in Northeast Asia that involve the following issues and areas:

- ✍ Enhanced energy security
- ✍ Environmental conservation at the global and local levels
- ✍ Competition promotion in the energy sector
- ✍ Greater reliance on regional energy sources in coping with changes in demand
- ✍ The provision of electricity to rural areas and other isolated localities

- ✍ The creation of a relationship of interdependence among Northeast Asian countries.

Dialogue between the upstream and downstream parties in energy cooperation is essential. China has both downstream needs and upstream concerns. Research analyzing the impact of a gas pipeline on industries along the pipeline and on the downstream consumer market is needed. This research should aim to achieve an integrated downstream outlook for Northeast Asia. Factors having an impact on the situation include each country’s pricing policy, the penetration of new technologies, and the increasing energy consumption of IT equipment.

It must be emphasized that technology diffusion is as important as technology development. Within the OECD, renewable energy is the fastest-growing segment, with annual growth in production of 2.8%, while wind power generation is increasing by 20% a year.

Although sustainability is an unclear and incomplete concept, there are obvious ways to promote it. In terms of energy use in conventional forms, full-cost pricing, cost-effective resource development and the expansion of energy infrastructure to take advantage of economies of scale can be

implemented. As far as developing economies are concerned, the list of challenges for promoting the sustainable use of energy includes the following major issues:

- ✍ Heavy reliance on traditional biomass energy
- ✍ Expanding access to commercial energy sources
- ✍ Limited financing for energy projects
- ✍ Distorted energy markets and the slow reform of pricing systems
- ✍ Inadequate technology transfer
- ✍ Growing disparity between economic development and the environment.

With regard to the first challenge, although in developed economies the use of biomass is promoted, and it is seen as a contribution to sustainability, in non-member countries it is associated with disadvantages, such as low efficiency, health impacts, and environmental pollution. Switching from traditional cooking stoves to those using commercial fuels, such as LPG, could improve the situation. However, poverty is the major impediment to promoting this and other simple improvements in energy use, such as off-grid small-scale hydropower, wind

power, solar electricity and thermal power, and geothermal energy.

International cooperation can accelerate the adoption of new, more efficient energy technologies in non-OECD countries. IEA Implementing Agreements were suggested as a way to provide non-OECD countries with information on cleaner energy technologies and assist them in exploring opportunities for 'third party' financing.

A lack of institutional and managerial capacity is the biggest constraint on the rapid diffusion of cleaner technologies in developing countries. The private sector has a key role to play in technology innovation, so improved communication and collaboration between the government and private sector is absolutely essential. Enhancing public awareness of the health and other impacts of pollution is also important.

In conclusion, yet another question was raised, focusing on the two groups of issues involved: conceptual and practical. The ultimate goal of discussing the conceptual aspects is to help establish a regional energy community. Therefore, on the conceptual level, discussions are likely to continue for the foreseeable future.

In terms of the practical steps, which include issues such as the construction of a gas pipeline network, discussions cannot and

must not continue forever.

The parties involved in concrete project implementation must move forward, adopting shared approaches. In summary, when a project nears the implementation stage, the role of discussions will decrease and those involved should consider how best to support companies and groups promoting concrete projects.

The private sector perspective is therefore required. Major commercial barriers to the Sakhalin project are related to negotiations on the pricing of gas. Exxon Mobil already sells LNG to Japan at a high price, so it has a vested interest in maintaining the status quo regarding previously concluded contracts. However, to promote new gas projects it is essential that prices are competitive and attractive to the end users.

One merit of building a pipeline is the reduction of transportation costs for gas and the introduction of gas-to-gas competition. There are a number of regulatory issues that require a solution; the regulatory environment in Japan is not yet stable, and the legislation necessary for building a commercial, non-government-owned pipeline is not yet in place. The LNG versus pipeline gas debate is also still ongoing.

Economic performance forecasts for any economy are vital before undertaking a large-

scale infrastructure development project that requires a huge amount of capital. Moreover, even with solid forecasts, there is always the possibility that a project may collapse due to mismanagement. However, as in the case of the railways in the United States, creating demand along the route can lay the foundation for solid economic growth in the regions and countries involved in cross-border pipeline projects, and in Northeast Asia as a whole.

In short, such projects have undeniable long-term benefits, but the participation and backing of people with political clout, those who are convinced of the benefits and those who could take the necessary gamble in backing the project, must be secured.

In this context, the highlight of the workshop was the special address presented on the morning of June 27 by Dr. Taro Nakayama, Member of the House of Representatives, Chairman, LDP Research Commission on Foreign Affairs, President of the Committee for the Promotion of the Asian Energy Community, and former Minister for Foreign Affairs.

The speaker provided an extensive set of arguments and the rationale for an Energy Community for Asia that could be seen as a comprehensive energy-environment regime; one that, at the very least, increases national

and regional awareness of the need to work multilaterally to enhance energy security and reconcile energy use with environmental protection goals.

The ongoing changes in Russia and the actions of individual countries in the region indicate that the creation of an 'energy community' is possible and that some initial steps in the right direction have been taken.

Progress on the Sakhalin projects exemplifies cooperation between Russia, Japan and the United States. Agreements between Russia and China on the development of gas fields in Eastern Siberia and connecting pipelines also testify as to the future possibilities.

WORKSHOP AGENDA

OPENING SESSION

Monday, June 26

11:00—12:50

Venue: Washington Hotel, Asuka Room

Welcome remarks

Professor Hisao KANAMORI,
Chairman of the ERINA Board of Directors,

Mr. Susumu YOSHIDA,
Director-General of ERINA.

Energy Security for Northeast Asia

Chair: Hisao KANAMORI

Co-Chair: Tsuneo AKAHA

Speakers: Amy JAFFE and Tatsujiro SUZUKI

Discussants: Roy KIM and Vladimir IVANOV

Transfer to the Main Venue of the Workshop

14:45 – 16:15

Session One:

Development-Energy-Environment ‘Trilemma’

Chair: Susumu YOSHIDA

Co-Chair: Boris SANEEV

Speakers: Norio EHARA and Fengqi ZHOU

Discussants: Martha HARRIS and Ying CHEN

16:30 – 18:15

Session Two:

China’s Energy Needs and Asia

Chair: Fengqi ZHOU

Co-Chair: Martha HARRIS

Speakers: Kang WU (paper summarized by Mr. Xiaojie XU) and Daojong ZHA

Discussants: Boris SANEEV and Chan-Woo LEE

19:00 – 20:30 Reception and dinner

Wednesday, June 27

9:00 – 10:30

Special address

Dr. Taro NAKAYAMA
Member of the House of Representatives
Chairman, LDP Research Commission on Foreign Affairs
President of the Committee for the Promotion of the Asian Energy Community
Former Minister for Foreign Affairs

10:45 – 12:30

Session Three:

Sustainable Development and Northeast Asia

Chair: Norio EHARA
Co-Chair: Ying CHEN

Speakers: Yong-Hun JUNG and Alexander SHEINGAUZ
Discussants: Hisako TSUJI and Ivan TSELITCHEV

12:30 – 13:30

Lunch

13:30 – 15:00

Session Five:

National, Bilateral and Multilateral Frameworks

Chair: Yong-Hun JUNG
Co-Chair: Antti RAUTAVAARA

Speakers: Xiaojie XU and Susumu ABE
Discussants: Kengo ASAKURA, and Tadashi SUGIMOTO

15:15 – 17:00

Session Six:

***Interests, Policies and Perspectives:
Private Sector, Countries, Regions and Localities***

Chair: Kengo ASAKURA
Co-Chair: Xiaojie XU

Speakers: Tsuneo AKAHA and Vladimir IVANOV
Discussants: Masana MINAMI, Daojiong ZHA, and Hirofumi ARAI, ERINA

18:00 – 19:30

Dinner

Thursday, June 28

9:00 – 10:30

Session Seven:

General Discussion

Chair: Tatsujiro SUZUKI
Co-Chair: Amy JAFFE

10:45 – 12:00

Closing:

***Recommendations and
Concluding Remarks***

Chair: Susumu ABE
Co-Chair: Vladimir IVANOV

12:00 – 13:00 Lunch

13:30 Depart Tainai

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** Paper only

ENERGY SECURITY AND SUSTAINABLE DEVELOPMENT
IN NORTHEAST ASIA:
PROSPECTS FOR COOPERATIVE POLICIES

International Workshop held in Seoul Palace Hotel, Seoul, March 29-31, 2002
Co-organized by the Economic Research Institute for Northeast Asia (ERINA)
With the Korean Energy Economics Institute (KEEI)
With the support of the Japan Foundation Center for Global Partnership

Report by

VLADIMIR I. IVANOV

with

ELEANOR OGUMA

THE ECONOMIC RESEARCH INSTITUTE FOR NORTHEAST ASIA
NIIGATA

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At the Workshop, all discussions were conducted on a not-for-attribution basis, and the views expressed are not necessarily those of the editors, nor those of ERINA. Instead, they represent opinions that were voiced during the meeting. Even so, the editors of the Report accept responsibility for any possible inaccuracies in presenting these views.

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1. Joint Statement by President George W. Bush and President Vladimir V. Putin on the New U.S.-Russian Energy Dialogue, Moscow-St. Petersburg, Russia, 24-26 May 2002.

2. Fifth Meeting of APEC Energy Ministers. Fostering Regional Energy Cooperation: Setting A Long Term Vision and Implementing Short Term Actions, Mexico City, Mexico, 23 July 2002.

ACKNOWLEDGEMENTS

This report summarizes the results of an international workshop convened in Seoul by the Economic Research Institute for Northeast Asia (ERINA) on March 29-31, 2002. The Workshop, which was supported by a grant from the Japan Foundation Center for Global Partnership, was the second phase of a broader project on energy issues in Northeast Asia and prospects for subregional cooperation in the fields of energy and sustainable development.

The report provides an overview of the papers prepared by Workshop participants and the discussions that took place during the meeting – both the papers and Workshop discussions are collective undertakings strongly dependent on the contributions of several individuals. We wish to thank:

Professor Sang-Gon Lee, President, Korean Energy Economics Institute, who agreed to the KEEI's cooperation in the organization of this Workshop and who also delivered the Keynote Address.

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Alexander Ognev of Vostokenergo and Pavel Minakir, of the Economic Research Institute, for their evaluations of current projects and future prospects for cross-border energy supply from Russia to the rest of Northeast Asia.

Norio Ehara of the International Energy Agency and Yong-Hun Jung of the Asia Pacific Energy Research Center for their comprehensive overviews of regional and global trends in energy use and approaches to the problems of energy security and sustainable development.

Ralph Wahnschafft and Luong Nguyen of ESCAP, for their interest in the project.

Kengo Asakura of the Northeast Asia Gas and Pipeline Forum, Boris Saneev of the Energy Systems Institute in Irkutsk, Ivan Tselitchev of the Niigata University of Management, Daojiong Zha of International University of Japan, and Roy Kim of Drexel University for their support of the project and valuable contribution to discussions.

Finally, we would like to thank Victor Ishaev, Governor of Khabarovskiy Krai, who contributed to this Workshop as a speaker and who has offered his support and cooperation in the organization of the final Workshop of this project, to be held in Khabarovsk on September 17-19 2002.

We would also like to thank Makiko Kobayashi, Chan-Woo Lee, Takako Ogura and Dmitriy Sergachev for their efforts associated in the organization of the Workshop and the publication of this report.

ABOUT THE PROJECT

This project, undertaken by ERINA in cooperation with experts from the United States and participants from Northeast Asia, aims to identify viable policies and highlight both the pressing need for and the compelling benefits of cooperation in the energy-environment realm.

What is needed is a vision for a cooperative framework and policy coordination that encompasses the energy-development-environment triad. Participating institutions and experts are proposing a shared vision for and approaches to reconciling energy use and environmental protection, where the economies of the subregion today operate independently.

In addition to the matter of energy use, a further project objective is to assess the prospects for a cooperative approach to energy security, outlining an institutional framework that could reduce the vulnerability arising from the region's current dependence on energy imports.

The ultimate goal is to lift the "strategic sights" of governments and the public above the limits of national policies and prepare a path for them through the complexities of specific cross-border projects, which have a role to play as efficient tools of development, a means of providing a stable, cost-effective energy supply, and cohesive confidence-building devices.

The main conceptual pillar of the project is the expectation that the vital interests of the economies of the subregion overlap. All players are motivated by the desire for greater energy security, development and prosperity, political stability and environmental safety, and the belief that this could constitute a framework for both cooperative engagement and multilateral, cross-border solutions in the energy sector.

The technologies, engineering skills and managerial experience critical to the success of advanced energy ventures are also available, but have rarely been applied in this area in a bilateral or multilateral format. The exceptions are limited to the Sakhalin oil and gas projects and the Korean Peninsula Energy Development Organization (KEDO), which highlight the symbiosis of energy needs and security concerns.

This subregion is also unique to the world of energy because it has a low gas penetration rate, while transportation and distribution infrastructure is either limited or has yet to be put in place. It is assumed that imports via a pipeline would promote diversification in modes of transportation, allowing gas-to-gas competition and eventually an expansion in the use of gas. Various options for cross-border gas pipelines are under discussion.

The problem is that the price tag of these projects is very high, improvements in the investment climate are still inadequate, and markets are neither easily accessible nor sufficiently secure to justify huge investment. Moreover, many of these cross-border projects require multilateral financing and concerted implementation efforts. The worst aspect, however, is the lack of long-term, comprehensive strategies that could enable partnership, both in negotiating and implementing these projects.

All these factors make the economies of the Northeast Asian subregion a unique case study for observing both the domestic economic and political hurdles, as well as the external obstacles impeding cross-border cooperation in the energy sector. The various obstacles and sources of uncertainty are wide-ranging and have yet to be fully accounted for and analyzed. Nevertheless, they amplify the necessity of working together to obtain the economic and political benefits of cooperation.

KEYNOTE ADDRESS

REGIONAL ENERGY COOPERATION IN NORTHEAST ASIA: NATIONAL AND INTERNATIONAL PERSPECTIVES

Professor Sang-Gon LEE

President, Korea Energy Economics Institute

Distinguished guests and energy experts, ladies and gentlemen. Today, I am very pleased to have the opportunity to speak at this Workshop on Energy Security and Sustainable Development in Northeast Asia, which is jointly organized by the Economic Research Institute for Northeast Asia and the Korea Energy Economics Institute. In my presentation, I would like to focus on the new challenges and trends facing the energy industry in the 21st century, as well as on prospects for energy cooperation in Northeast Asia.

New trends

As we enter the 21st century, a particular challenge lies ahead of us, especially for the countries of Northeast Asia. Energy markets are being transformed by the spread of liberalization, as governments seek competitive pricing, flexibility and innovation. In the midst of such changes, the recent financial crisis that swept Asia provided the momentum for the structural transformation of the energy industry. This was necessary because the old paradigm of a government-directed centrally planned system is unsuited to today's fast-changing business environment. Furthermore, the world is transforming itself into a knowledge-based economy, driven by new technologies, such as information and communication technologies as well as by the extensive use of the Internet and the digitalization of conventional industries. Businesses across the globe are aggressively pursuing the potential of e-commerce in such areas as procurement and trading, including Inter-Continental for energy derivatives. Thus, liberalization, globalization, and technological advances are together not only blurring international boundaries but also facilitating and expediting international energy cooperation.

In addition, the world is becoming more and more conscious of environmental issues.

Such international concern brought about the UN Framework Convention on Climate Change (UNFCCC). It now seems inevitable that a nation that does not promote efficient energy uses will face serious setbacks to its economic growth in the 21st century. The UNFCCC stipulates the abatement of greenhouse gas emissions that cause global warming. As is well known, greenhouse gas mainly arises from the combustion of fossil fuels such as oil and coal. Hence, the mitigation of greenhouse gas emissions may lead to a reduction in energy consumption, which in turn implies the contraction of economic activity. Thus, establishing an efficient and environmentally friendly energy consumption structure is of the utmost importance if we continue with economic development, preventing our economy from retrogressing.

Therefore, the “get rich now and clean up later” mentality, which prevailed in times past, is no longer acceptable. Faced with the alarming state of our environment and the reality of having to satisfy our needs, neither sustainability nor development are a matter of choice any longer. Rather, the reconciliation of environmental considerations and growth has become an obligation. Considering the abundance of environmentally friendly natural gas and hydropower reserves in the region, I believe that cooperation among Northeast Asian countries is desirable in order to deal with environmental issues as well as achieve sustainable economic growth.

Realizing that economic prosperity cannot be secured or furthered and that energy security is not assured, all regions are turning their attention to regional energy cooperation as a means to strengthen their energy security. In Northeast Asia, concerns over energy security have gained greater prominence recently, and countries are aiming to strengthen energy security through the diversification of supply sources, while procuring energy supply more cost-effectively and utilizing the advantage of geographical proximity.

Vision and challenges

The 21st century is often said to be the era of Northeast Asia. The Northeast Asian region at present accounts for 24% of the total world population, and about 19% of total world GDP. Northeast Asia is experiencing faster economic growth than any other region in the world, emerging as a center of the world economy in the 21st century.

Rapid economic growth in this region is likely to be the motive force behind a massive increase in energy demand in the region. The high growth rate of energy demand is expected to continue into the future, with energy demand in 2010 projected to be 1.6 times the 1995 level. China will be particularly important and is expected to account for 67% of future energy demand growth in the region. Although demand is likely to be greatest in

China, it will also be significant in Japan and South Korea. In addition, energy demand is expected to increase in North Korea, the Russian Far East, and Mongolia.

Gas use has grown by 10% a year, from a very low base. It still accounts for less than a tenth of the region's energy. Coal use has also grown strongly, reflecting its importance in China. However, governments are anxious to tackle the major local and regional pollution it causes.

Even if coal growth slows and gas consumption continues to expand strongly, oil will remain the dominant energy source. Moreover, the region's dependence on the Middle East for oil imports is expected to increase to 90% in 2010, from the current level of 75%. This outlook clearly indicates that regional energy security could be threatened in the event of an oil crisis in the future.

Furthermore, due to the high coal dependency of China and the high oil dependency of South Korea and Japan, the region is as vulnerable as any other to energy-environment issues. Northeast Asia is expected to overtake North America and Europe in terms of carbon dioxide emissions from energy consumption in the future and is likely to become the focus of interest in future environmental negotiations.

To mitigate energy security risks and address environmental concerns, the theme of strengthening energy cooperation among Northeast Asia countries is particularly important. However, the promotion of regional cooperation is proceeding at a relatively slow pace compared with other regions, despite its enormous potential benefits. This is mainly due to the legacy of past rivalries and conflicts, as well as differences among the countries in the region in terms of their economic levels. In particular, little progress has been made to date in energy cooperation for the development of energy resources and the construction of energy-related infrastructure in Northeast Asia – which usually requires a large amount of capital investment – because this requires substantial mutual trust and cooperation among the countries involved.

Regional energy cooperation

For countries like Korea and Japan, with few indigenous energy resources, workable schemes to reduce their exposure to energy supply disruption are severely limited. Countermeasures against such factors as fast-growing energy demand and overseas dependency, which could possibly bring about instability in energy supply in Northeast Asia, are perhaps beyond any one country's control. Individually, each country is exerting itself to improve energy efficiency and promote new and renewable energy forms, but these measures can achieve only limited results in the foreseeable future. Faced with a projected

increase in the share of oil in the total primary energy supply and in dependence on the Middle East, it is imperative that Northeast Asian nations explore other options for energy security.

To mitigate such security risks and, at the same time, secure a cost-effective energy supply, countries in Northeast Asia need to explore workable energy cooperation schemes. One potentially effective scheme is the utilization of natural gas in this region. Natural gas provides a way to lessen oil dependency as well as to address environmental concerns. Already such efforts toward regional cooperation have been initiated. For instance, China, Russia, and Korea are jointly investigating the economic feasibility of developing natural gas in Russia and transporting it through a pipeline. Expanding gas use is the most important medium-term step we can take to tackle climate change.

Another possibility is that of interconnecting power grid systems. Such energy cooperation among the countries within the Northeast Asian region can strengthen energy security through better diversification of energy importing sources, and provide benefits accruing from the complementary effects of an interconnected energy supply system. Therefore, power interconnection in this region would provide firm foundations not only for economic prosperity but also for mutual trust among the countries.

A further area for cooperation is related to oil. A common stockpile could enhance the leverage for crude oil prices and allow a safer balance of supply and demand. Japan is proposing the immediate use of Okinawa as an oil reserve center for Northeast Asia. South Korea is expected to have a surplus storage capacity of 43 million barrels in 2006, part of which has already been rented to "Statoil". Japan has 39 million barrels of idle capacity. In the longer run, interested countries can jointly invest in and construct a common reserve. Yet another possible area of cooperation is environmental quality control in oil products. Countries in the Northeast Asian region may get together and agree on the joint use of cracking facilities to reduce the environmental cost of domestic refinery industries. Such practices can be found in NAFTA and the European oil market.

An additional means of cooperation is to strengthen the bargaining power of Northeast Asia's oil consuming countries. Oil consumption in this region accounts for 65% of Asia-Pacific oil consumption and 18% of world oil consumption. With the expected increase in the magnitude of oil consumption due to China's rapid economic growth a major factor, Northeast Asia is expected to become the center of world oil consumption.

It appears that energy cooperation in Northeast Asia will not only contribute to solving the problems faced by the region but also promote a cleaner environment and regional prosperity for future generations. As you are aware, Europe has already created a regional

energy cooperative body based on the European Energy Charter, and the United States, as announced in its new energy policy last year, is emphasizing the importance of regional energy cooperation, particularly with its neighboring countries.

Thus, strengthening regional energy cooperation is a common phenomenon in other regions of the world. Northeast Asia has great potential for a mutually complementary energy cooperation structure in that there are major energy consuming countries – Japan, China and Korea – and countries with large energy reserve areas, such as East Siberia, Sakhalin, and Central Asia. I am convinced that an atmosphere conducive to the active promotion of energy cooperation in Northeast Asia has been created.

Concluding remarks

In conclusion, I would like to summarize the benefits of cooperation among Northeast Asian countries. First, the abundant energy reserves of the Russian Far East could become the key source of alternative energy for countries in the Northeast Asian region, something that would lessen the region's heavy dependence on the Middle East. Second, it would also be a cost-effective alternative because of its proximity to markets. Third, the abundance of environmentally friendly natural gas and hydropower reserves in the region is effective in dealing with environmental issues. Fourth, energy cooperation will permit land routes for energy supply to countries that have depended entirely on marine transport for imports. Fifth, the joint development of energy supply and the construction of transportation facilities will further promote efficient energy trade and facility use. Sixth, efforts aimed at energy cooperation will necessarily promote market liberalization, which will in turn raise the bargaining power of energy importers in the Northeast Asian region. The region does not currently command bargaining power in the world market commensurate with its import volumes.

I believe that this Workshop will provide us with an excellent opportunity to facilitate an exchange of expertise and ideas among energy experts regarding energy cooperation in Northeast Asia. The outcomes of and suggestions arising from this Workshop will have a positive impact on policy-making in the countries of the region.

SUMMARY

Introduction

On March 29-31, 2002, an international workshop co-organized by the Economic Research Institute for Northeast Asia (ERINA) with the Korean Energy Economics Institute (KEEI) was held at the Seoul Palace Hotel. Participants from China, Japan, the Republic of Korea, Russia, the United States and international organizations, including the International Energy Agency, APEC's Asia-Pacific Energy Research Center, the United Nations ESCAP and UNDP Tumen Secretariat, the World Bank,¹ and also the Northeast Asia Gas & Pipeline Forum attended the meeting, along with members of ERINA and KEEI.

Among the distinguished speakers were Dr. Victor ISHAEV, Governor of Khabarovskiy Krai, Dr. John MERRILL, a leading expert on East Asia and the Korean Peninsula from the U.S. Department of State, Professor Shenming LI, Vice-President of the Chinese Academy of Social Sciences, and Ambassador Evgeniy AFANASIEV,

formerly Ambassador to the Republic of Korea, now Director of the Continental East Asia Department of the Ministry of Foreign Affairs of Russia. A number of observers from the private sector, including such leading energy companies and business groups as the Korea National Oil Corporation, Mobil Oil Korea, Korea Gas Union, Korea Energy Forum and Korea Gas Corporation, also attended the workshop.

The Seoul workshop was the second conference organized within the framework of the two-and-half year project initiated by ERINA, with the cooperation of the Northeast Asia Economic Forum (Honolulu, Hawaii) and the Monterey Institute of International Studies (Monterey, California). Funded by ERINA and the Japan Foundation Center for Global Partnership, the project aims to combine multilateral dialogue with collaborative research and network development, and involves experts from various fields, both researchers and practitioners.

The opening ceremony of the workshop took place in the evening of March 29 and featured brief introductory

¹ See the list of workshop participants and their affiliation at the end of this Report.

remarks from Professor Sang-Gon LEE, President of KEEI, and Professor Hisao KANAMORI, Chairman of the ERINA Board of Trustees, followed by a special lecture by Governor ISHAEV. The guest speaker provided an overview of recent changes in the world political situation, various impacts of the globalization process, and trends toward economic cooperation in Northeast Asia that could open up new opportunities for energy exports from Eastern Russia to regional markets.

SUMMARY: DAY ONE

The first workshop of the project, which focused on China, was held in June 2001, in Tainai, Niigata (a report summarizing this workshop was published in *ERINA Report* no. 41, August 2001, and the complete report is available online at <http://www.erina.or.jp/En/E/HPresearch.html>). It served as a follow-up to an earlier ERINA effort to study the prospects for regional cooperation in the energy sector. At that workshop, held in December 1999 with the support of the Japan Foundation, the focus was on Japan-Russia relations, as well as energy-related interests and policies.²

² Reports available at ERINA's web site

<http://www.erina.or.jp/publication/Energy.htm>

At the March 2002 meeting in Seoul, the project participants focused their attention on the Koreas, and policies and developments in their energy sectors, as well as other issues related to sustainable development and regional economic cooperation in Northeast Asia. Obviously, problems surrounding the Korean Peninsula impede energy cooperation throughout Northeast Asia. The complex nature of military-political relationships centered on the DPRK is a particular challenge.

Obviously, cooperation in the energy sector requires political trust and a favorable investment climate—the elements that are basically lacking in the inter-Korean relationship.³ That is why the first session in the morning of March 30 – Northeast Asia in the 21st Century –

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³ The policy of “comprehensive engagement” with the DPRK is now under review in the United States and it is not yet clear whether the concept of “improved implementation” of the Agreed Framework will be acceptable to Pyongyang. Moreover, Russia is the only G8 country that is not part of KEDO. The 1994 Agreed Framework is not a treaty or even an agreement. Given the uncertainty that this creates, the question looms large of how resilient (or vulnerable) KEDO could be and how its dynamics could influence prospects for energy cooperation between the Koreas. However, KEDO has the potential to generate a strong catalytic impact on other inter-Korean energy ventures.

focused on both economic and political issues.

The presentations were made by Dr. MERRILL, Professor LI, and Ambassador AFANASIEV. Each speaker provided a useful overview of bilateral, regional and global trends affecting Northeast Asia and the Koreas. The first speaker mentioned that Northeast Asia's growing interest in a wider reliance on natural gas could have beneficial implications not only for economic development, energy security and environmental protection, but also for geopolitical stability. With China becoming a large-scale importer of energy resources from Russia, cross-border pipelines will enhance regional economic interdependence. A trans-Korean pipeline would also greatly assist the economic recovery of North Korea. In this context, Dr. MERRILL mentioned the positive role of the 2000 inter-Korean summit and stated that cooperation in the energy sector could significantly contribute to improving the political situation. He emphasized that, when President Bush visited the Republic of Korea in February 2002, he reiterated the support of the United States for the Sunshine Policy of South Korea's current administration.

The second speaker, while underlining the value of discussions focused on energy cooperation and environmental protection, enumerated

current geopolitical trends, economic problems and policy discourses that could negatively affect prospects for cooperation at the global, regional and subregional levels, including the situation in Northeast Asia. His main focus was on the United States and Japan, which could arguably influence, if not determine, developments in many fields, including energy sector cooperation in Northeast Asia. On the other hand, as this senior participant from China observed, the economies of Northeast Asia could develop economic links based on mutual benefits, using their economic complementarity. In particular, China, Japan and the Republic of Korea could rely on the energy resources of Eastern Russia, while the DPRK could emerge from its economic isolation by participating in regional economic cooperation and energy projects.

Ambassador AFANASIEV outlined prospects for bilateral cooperation with North Korea in the energy sector and in the field of infrastructure development. From the Russian perspective, the Korean Peninsula is central to Northeast Asia, and inter-Korean cooperation could herald a new era as far as cross-border energy projects are concerned. President Putin's visit to Pyongyang in June 2000 aided the restoration of bilateral political and economic contacts with the DPRK. During his visit to the Republic of Korea

in February 2001, he reiterated Russia's support for inter-Korean dialogue and improvements in the relationship that would facilitate such large-scale infrastructure projects as railway interconnection. There are also prospects for trilateral cooperation in the energy sector, particularly in interconnecting power grids. In the long run, a Trans-Korea gas pipeline project could be considered, as well as the renewal of cooperation with the DPRK in the nuclear power sector. These and other issues were discussed when the North Korean leader visited Moscow in the summer of 2001.

Mr. Susumu YOSHIDA delivered the luncheon address, on *“Energy Security in Northeast Asia and Prospects for Development and Economic Cooperation”*. This presentation further expanded the scope of discussion during the morning session, presenting the Japanese perspective. The speaker briefly touched upon general policy issues, concentrating on concrete economic links among the economies of the region and Japan. The prospects for multilateral cooperative projects were outlined, including KEDO and other projects that could involve North Korea, China, Japan and Russia. The presentation highlighted Japan's role in creating a cooperative framework for a stable energy supply in Northeast Asia, as well as providing an overview of the

prospects for transportation corridors in the region.

The second session, on Regional Energy Cooperation, began with a keynote address by Professor LEE. As far as the energy problems of the Northeast Asian economies are concerned, the 21st century poses new challenges and offers new opportunities. Liberalization of the energy sector enhances competition and affects prices, requiring new approaches and flexibility on the part of governments and the private sector. Energy efficiency and emissions reduction appear to be priority issues and should form the foundation for subregional energy cooperation in Northeast Asia. Subregional cooperation in the energy sector could also become an effective tool in enhancing energy security, particularly in the context of the geographical proximity of energy importing countries and potential sources of exports in Eastern Russia. Sources of “cleaner” energy, including natural gas and hydropower, are important components that could allow Northeast Asia to become a center for negotiations on reducing GHG emissions. Specific projects that the Republic of Korea would support include development of the Kovykta natural gas field, a regional oil stockpile mechanism, and the introduction of technologies that ensure higher energy efficiency and the

competitiveness of “cleaner” energy sources. Cooperation among oil importers and Russian oil producers should also be promoted to reduce the dependence of Northeast Asia on the Middle East and enhance the region’s capacity to influence world oil markets.

Dr. Boris SANEEV of the Energy Systems Institute in Irkutsk continued the discussion, referring to concrete issues concerning the development of new energy resources in Eastern Russia, including oil and gas projects offshore from Sakhalin, a natural gas project in Irkutskaya Oblast, and the prospects for a subregional natural gas pipeline network and electric power grid interconnection. In total, these projects are likely to require tens of billions of dollars of capital investment and it is vital to ensure their proper coordination, taking economic efficiency and environmental soundness into consideration.

The next speaker, Mr. Norio EHARA of the International Energy Agency, provided a comprehensive overview of energy sector liberalization in South Korea, which became a full member of the IEA on March 28, 2002. In reforming the energy sector, the government has adopted the so-called IEA shared goals, including greater reliance on the market in energy pricing and the promotion of regional energy cooperation. More specifically, according to this speaker, as

an IEA member country and one of the leading economies in Northeast Asia, the Republic of Korea should play a more active role in promoting regional energy cooperation in Northeast Asia, including closer contacts with such key non-member countries as Russia, China and India. South Korea could act as a model for developing an emergency oil stockpiling system and should share its experience with China. Both Korea and Japan have a valuable pool of knowledge about energy sector reforms and promoting energy-saving technology. South Korea could also provide greater ODA-type assistance to other Northeast Asian economies, in order to facilitate improvements in the energy sector and protect the environment.

Representatives from ESCAP (Bangkok) and the UNDP Tumen Secretariat (Beijing) also took part in the workshop. The participants from ESCAP described their “concept report” on energy issues and policies in Northeast Asia, and requested the assistance of a number of government-level country representatives as co-authors, to enhance the value of the report for policymakers. The first section of their draft provided an overview of the status of the energy sector in each country, including China, the Koreas, Japan, Mongolia and Russia, with a brief overview of their policies; the latter part then presented a scenario

for multilateral energy cooperation in Northeast Asia.

It is important to note in this context that the main goal of the workshops, as well as of the project as a whole, is exactly the same: to generate—through joint research and discussions—the capacity to propose a set of realistic recommendations that are not only relevant to policy-making, but also firmly linked to the national interests of the actors involved. It is hoped that ERINA's project – supported by CGP – will eventually allow us to assemble just such a list of priority issues to enable the economies of Northeast Asia to promote advanced, cost-efficient energy technologies, pricing mechanisms and cross-border infrastructure projects that reconcile energy use and environmental protection through a multilateral cooperative framework.

After dinner, Mr. Bradley BABSON, Advisor on the DPRK to the World Bank, made a presentation on *“Searching for the Right Side of History in Northeast Asia: The Potential Role of Energy Cooperation with North Korea”*, in which he offered a rather skeptical line of analysis concerning the future of the KEDO project. In his opinion, a trans-Korean gas pipeline and power grid rehabilitation in North Korea could be a viable alternative to KEDO. The North-South gas pipeline project could better serve the energy and

economic needs of North Korea, expanding the market for Russian natural gas, involving China and Russia in the inter-governmental setting of the project and contributing to political trust on the Korean Peninsula.

SUMMARY: DAY TWO

The theme of the two sessions in the morning of the second day of the workshop was cross-border Energy Delivery Infrastructure Projects and related issues. Dr. Alexander OGNEV, of Vostokenergo, UES Russia, gave an overview of possible economic scenarios for the Russian economy in 2002-2020, making projections with regard to energy consumption patterns and electric power demand in the Far Eastern region. His main conclusion was that, under any circumstances, new power plants built in Chitinsjkaya and Amurskaya oblasts, as well as in Khabarovskiy and Primorskiy krais, would be able to provide significant volumes of electric power for exports to China and the Korean Peninsula.

Dr. Pavel MINAKIR followed this up with an outline of the two Sakhalin projects currently underway, which could, in a few years, provide natural gas for LNG plants currently under construction, as well as for a cross-border pipeline to China and/or the Korean Peninsula and Japan. These projects are the largest investment undertakings anywhere in

Russia; more large-scale oil and gas ventures are likely to be launched in Sakhalinskaya Oblast in four or five years' time.

Dr. Hyun Jae KIM of KEEI focused on the power sector of South Korea and prospects for the interconnection of power grids between the North and South. Such interconnection is particularly important in the context of the KEDO project, given that the power system of North Korea is small relative to the capacity of the two LWRs and currently very unstable. Three high-voltage interconnections between the ROK and the DPRK are needed to solve these problems, but prior to the feasibility study phase for such a project, the flow of information and technical exchanges must be promoted. As of today, such exchanges are limited; one of the options for expanding contacts is to rely on the services of a "third party", such as the United Nations. Noting also that China and Russia do not participate in KEDO, the Korean expert emphasized that they have a role to play in power interconnection projects involving the two Koreas.

During the next session, on Cross-Border Projects and Plans, presentations were made by Dr. Kengo ASAKURA of the Northeast Asia Gas & Pipeline Forum, and Ms. Hisako TSUJI

and Dr. Vladimir IVANOV, both representing ERINA.

The first speaker proposed a concept for a regional gas pipeline network—a mega-project that could potentially play a pivotal role in facilitating economic cooperation between the two Koreas. This regional gas pipeline network is based on a "ladder" concept, including two west-to-east transcontinental pipeline systems to be built in China and Eastern Russia, with north-to-south interconnections between them. The first west-to-east pipeline is now under construction in China, while the second one could be built in Russia along the Trans-Siberian railway, connecting gas fields in the Irkutsk and Yakutia areas with those in Krasnoyarskiy Krai and Western Siberia. The north-to-south interconnections would ensure wider market access for natural gas and more reliable operation of the entire system. In the eastern section, the two trans-continental pipelines are expected to be interconnected in a more complex "circular" pattern, including a "western" circular line that covers the west coast of the Korean Peninsula and an "eastern" circular line, supplying gas to the east coast. The "western" circular line is seen as part of the gas pipeline network to be built in Northeastern China, while the "eastern" circular line would include Sakhalin, Khabarovskiy and Primorskiy

krais in Russia, and also Japan. The main message of this paper, which also contains technical parameters for the future pipeline network, is that such a network will not only respond to growing energy needs and economic development plans, but also contribute to political stability and sustainable development in Northeast Asia, leading ultimately to the formation of a regional energy community.

The presentation made by the second speaker complemented the preceding paper, focusing on the prospects for railway interconnection between the North and South, with access to the Trans-Siberian and Trans-China railways. ERINA is monitoring international cargo transportation via the Trans-Siberian railway, as well as the North-South dialogue on railway system interconnection. The latter project is relatively new and its implementation could serve as an indicator of the feasibility of the Trans-Korea gas pipeline project. Nevertheless, the sobering reality is that the cost of North Korean railway rehabilitation is estimated at between US\$1.3-1.8 billion. The cost of a Trans-Korean gas pipeline is likely to be even higher.

In his presentation by Dr. IVANOV advocated giving consideration to building a Trans-Siberian pipeline along the Trans-Siberian railway. It is important

to acknowledge in this context that, similarly to China, the implementation of pipeline projects in Eastern Russia will benefit local economies and regional governments, particularly if the infrastructure is built in areas with an appropriate number of domestic consumers and industries.

What Russia needs is a long-term, comprehensive and consistent approach to developing, delivering and distributing Siberian and Far Eastern natural gas to domestic and external markets. This strategy must first of all be aimed at an integrated approach to commercializing natural gas reserves, including those in Krasnoyarskiy Krai, Irkutskaya Oblast, Yakutia and Sakhalin. Secondly, the number of potential exporters must be maximized, so ideally a pipeline, like a railway, should be kept “neutral” and open to all major exporters. Third, key transmission pipelines should be designed to collect and transport to Northeastern China and the Koreas significantly more than the level of current and projected domestic demand. Finally, this integrated approach must include efforts to target LNG markets in Asia. This will allow the broader marketing of natural gas, involving LNG users in Japan, South Korea, China, Taiwan, India, and elsewhere.

In the discussion, Dr. Myung-Nam KIM, General Manager of the Korea Gas

Corporation (KOGAS), mentioned that the Kovykta project is the most realistic and attractive source of natural gas for Korean users and that KOGAS is participating in a pipeline feasibility study with Russia and China. This pipeline, however, is currently envisaged as crossing Northeastern China and the Yellow (West) Sea, before reaching the Korean Peninsula.

Mr. EHARA delivered the luncheon address, on *“Prospects for Cross-border Energy Projects in Northeast Asia”* in the context of another conference on cross-border gas trade organized by the IEA in Paris, on March 26-27. As mentioned during the brief discussion following this informative presentation, Northeast Asia, quite regretfully, was left out of the conference framework, with the attention of the participants focused on Europe, the Americas and Southeast Asia.

During the first afternoon session, on Energy and Environment, the list of speakers included Mr. Chan Woo LEE, Visiting Researcher at ERINA, Mr. Susumu ABE, Advisor to Toshiba Corporation, Professor Fengqi ZHOU of the Energy Research Institute of the State Development Planning Commission of China, and Dr. Zin Oh KIM of KEEI.

Among the issues discussed by the first speaker were prospects and options for providing energy sector assistance to the DPRK, as well as the need to promote

South-North technical exchange. The options for energy assistance to North Korea include coal supplies, rehabilitation of the power grid and professional training. The prospects for the implementation of the KEDO project were also outlined, including both technical and political impediments. The main problem is that the ROK government, according to this paper, is expected to serve as the principal source of funding for “energy aid” to the DPRK, but the estimated cost of the proposed cooperative projects amounts to hundreds of millions of dollars. It was therefore proposed that a possible multilateral option be sought, involving Russia, China and Japan as co-sponsors of the rehabilitation and energy aid efforts. In this context, a trans-Korean gas pipeline is seen as the most promising way of supplying energy to North Korea and assisting its economic recovery.

The Chinese speaker provided a detailed overview of energy sector development up to 2005 and projections up to 2010. China has demonstrated significant progress in improving energy efficiency and intensity levels, constructing large power plants, modernizing technologies and improving management systems. For example, since the early 1970s, energy use per unit of GDP has been reduced by 30%. At the same time, the share of high-quality fuels

in the total primary energy supply remains low, while coal is the dominant fuel. Although its technical capacity in coal mining is more than sufficient, coal conditioning facilities, including coal washing, are scarce and underdeveloped.

In the oil industry, demand exceeds production, which in turn significantly exceeds the rate of reserve enlargement. China's dependence on imported oil is growing fast. In addition, power transmission lines are technologically obsolete, impeding interconnection of regional power grids. Chaotic construction of small power plants decreases overall nationwide energy efficiency and exacerbates the problem of emissions. A further serious problem is that local power distribution grids in both urban and rural areas remain poor, limiting the potential for electricity production and transmission, and adversely affecting living standards and social conditions.

In the current decade, China will concentrate its resources on oil and gas sector development, energy sector reforms, energy efficiency and renewable energy. For the next 5-10 years, hydroelectric power capacity expansion and the west-to-east gas pipeline will be the priority direction in developing China's energy sector. The government will also take steps to create an emergency oil stockpile, promote clean coal

technologies and improve energy efficiency standards.

Mr. ABE discussed the 3Es—Energy Security, Environmental Protection and Economic Growth—and the relevance of this approach from the standpoint of subregional energy cooperation in Northeast Asia. Economic globalization presents new challenges that require innovative approaches to energy security issues, which must be derived from a wider perspective, taking all possible factors into consideration. Taking the view that energy serves as “the catalyst for human development, not an element restricting it”, an energy system based upon sharing wisdom and prioritizing the available opportunities must be devised, which overcomes both technological and social limitations. The various problems we face today in the field of energy and the environment are not necessarily related to the impacts of past oil shocks. However, it seems that a crisis could be stealing up on Asia, of which it is as yet unaware. Compared to the previous century's paradigm of “development and growth”, the 21st century is likely to be an era of development that aims for “continuity and harmony”. Energy and environmental protection are issues of common concern to mankind and should be tackled accordingly. Concerted action must be taken in each region of the world to establish a mechanism that promotes a

“think globally, act locally” approach. It is important, therefore, to begin with common recognition of the need to aim for the simultaneous achievement of 3E goals in Northeast Asia, positioning this as the long-term focus of energy policy.

Prospects for the utilization of renewable energy sources and their potential contribution to energy cooperation between North and South Korea were outlined in the paper presented by Dr. Zin Oh KIM. He proposed the formation of a joint expert-level team to evaluate the potential for renewable energy, particularly in North Korea, which has already accumulated some experience in this field through cooperation with international NGOs. If this work took place on a large scale, the mountain terrain of North Korea could provide a unique opportunity for the utilization of small and very small hydropower generators. There is significant potential for cooperation in using wind and solar energy. Given this broad spectrum of opportunities for cooperation in utilizing renewables, governments should work together to incorporate this into long-term and mutually beneficial economic cooperation.

In the last paper presented at the workshop, Dr. Chung-II NAHM (KEEI) evaluated the parameters of the KEDO project and the technical measures

required implement it within the current schedule. As an electric power engineer, the speaker advised giving greater consideration to North-South power grid interconnection. Such a project would ensure that the necessary power transmission infrastructure would be put in place before the first LWR were commissioned. This project would require cooperation in many other related fields, including the preparation of a feasibility study, which should be carried out at an early date to allow the construction of the five high-voltage transmission lines, commissioning the first one by 2006. This will, however, be both technologically complex and expensive.

In the discussion, Dr. Daojiong ZHA of the International University of Japan mentioned that the presentations made during this last session of the workshop shed light on a significant number of issues that need to be solved, as well as the complexities associated with the vision for structural energy cooperation in Northeast Asia. “Structural” in this context refers to government-level commitment in the form of a regional development body dedicated to promoting energy development in Northeast Asia.

An update provided by Mr. ABE about the latest changes in Japan’s energy policies implied that Japan could choose

to consume more energy resources from Northeast Asia. His observation that “policies aimed at enhancing energy security have usually been shaped by the international situations of the time and reflect the ‘instincts of the past’” deserves careful consideration by practitioners.

The overall economic benefits of North-South cooperation in the energy sector, as described by Mr. Chan-Woo LEE, also serve as a reminder of the value in continuing to aim for structural energy cooperation. Professor ZHOU’s update regarding energy policy reforms in China informs us that decision-making is being delegated from the central government to local governments, providing more scope for market factors in shaping energy policies. Moreover, all speakers agreed on the geopolitical constraints that could complicate energy cooperation in the region.

CONCLUSIONS

As was noted during the concluding session, the participants received a positive impression of issues relating to the prospects for energy cooperation involving the Korean Peninsula, gaining a particular understanding of the extent of enthusiasm in the ROK for cooperation with the DPRK.

Cooperation may not be as easy to achieve in Northeast Asia as it was in Europe. There is a history of conflict and differing social systems. However,

pipeline politics involving the Koreans could be an important diplomatic tool, given that West Germany’s *Ostpolitik* eventually led to a considerable improvement of economic and policy links with the USSR. Similarly, a trans-Korean pipeline should be seen as a positive cooperative project.

If required, the IEA should offer its expertise in developing a concept for a regional energy security system. Perhaps one of the more striking aspects of the conference was a feeling that it is now time to stop talking and start taking action, both for the sake of achieving political stability and economic growth in the region, and halting environmental degeneration.

Energy and environmental issues are seen as constraining economic growth. Renewable energy cooperation between the Koreans has potential because it will involve localities and communities. Renewable energy projects are small in scale, so can be started relatively quickly. Solar-powered water heaters could be developed quickly, while small-scale hydropower would be very easy to develop and use.

Cooperation in the field of energy and environmental protection in Northeast Asia is a battle against uncertainty. International partners have yet to start trying to build trust through multilateral efforts, because uncertainty

tends to result in inaction and lack of motivation to make a decision. It was suggested by one of the speakers that efforts should continue to be made to persuade the ministries of foreign affairs of the relevant countries to disseminate a positive message about cooperation in Northeast Asia.

Indeed, at the time of the workshop, uncertain geopolitical developments with potentially grave policy implications had been triggered by the Bush Administration's denunciation of North Korea as part of an 'axis of evil' (together with Iran and Iraq). It was proposed in the concluding sessions of the workshop, however, that the rhetoric be put in context, given 2002 mid-term elections to the U.S. Congress.

The Republican Party, which President Bush represents, has good reasons to cash in on the momentum of support for the President's anti-terrorist policies and stance. In other words, this rhetoric was intended for a domestic audience. Secondly, the three countries identified as the 'axis' cannot individually be much of a real threat to the United States. Their main defenders, namely China and Russia, compete with the United States over global geopolitical issues. Yet the help of both China and Russia can be enlisted in preventing those three regimes from becoming a bigger problem.

Indeed, as subsequent events demonstrated, President Bush did openly ask the Chinese leadership to assist the U.S. in re-opening a dialogue with North Korea. It is, therefore, possible that the rhetoric was also intended for a foreign audience. In the short term, we have good reason to believe that the 'axis of evil' animadversion may have more to do with finding a way to practice workable diplomacy than seriously preparing for a U.S.-led war on the three targeted countries, particularly North Korea.

It is also important to realize that uncertainties are part of the geopolitical practice of the major powers. A case in point is that, between countries in formal strategic alliances (for instance, the United States and Japan), there exist significant differences both in dealing with each other and in approaching third countries and global issues. Therefore, if one sees energy development projects as subject to shifts in geopolitical practice and foreign rhetoric, then the perceptions of progress in such projects will be affected negatively. In contrast, progressing with project designs based more on market rationale can foster greater confidence and a desire for interdependence. Thinking in terms of interdependence can, in turn, help contain drastic swings in geopolitical policies and pronouncements. It is therefore critically important to move

forward on sound energy development projects, rather than waiting for the geopolitical situation to change, because favorable geopolitical moments come and go fairly frequently.

In addition, research efforts have thus far been devoted to researching the upstream reserves and downstream markets for oil and gas in Northeast Asia. This assumes the Russia's Far Eastern and Siberia regions to be supply areas only, while South Korea, Japan, China and North Korea are seen as the demand areas. The problem with such an approach is that the country as a whole is usually treated as the unit in the analysis.

Indeed, structural cooperation does require policy commitment on the part of the national governments of the relevant countries. This conceptualization treats the three Northeastern Chinese provinces and North Korea (and Mongolia for that matter, as well as the provinces in Eastern Russia) as little more than areas providing a transit route for oil and natural gas to reach the consumers in South Korea, Japan and coastal regions of China. This type of thinking has its limitations. Instead, the transit areas ought to be treated as full-scale markets as well, if for no other reason than giving the governments and societies there a tangible stake in ensuring the physical security of the pipelines, as well as providing the expectation of economic

and social benefits.

Society and politics are becoming more populist, requiring that a wider audience be included in discussions, as it will be hard to obtain government support if there is no public backing for projects. People should not underestimate the potential for cooperation in this region, nor should they concentrate only on the economic aspects of projects. Economics is not the sole reason for undertaking projects in the region.

Different questions should be asked and answered in this regard. Do we need a Northeast Asian cross-border pipeline? We need to ask why there have been no practical developments to date, and why things are moving so slowly. Contemplating Eastern Russia and Northeastern China as a full part of the transit (mid-stream) market has particular significance because it will help to reduce the continuing reliance of these areas on abundant but polluting coal. There is also a limit to what international aid can do for North Korea in overcoming energy shortages. Research should consider how North Korea could find ways to pay for energy imported from Russia.

Taking the transit markets seriously also means that the feasibility studies on small-scale projects and, better still, construction work can begin. Such ventures can serve as pilot projects for

larger undertakings in the future. The report by the Director-General of ERINA on the Angarsk–Daqing oil pipeline serves as an excellent example. Indeed, we can envisage a ‘bottom-up’ future, with short-distance links between localities in Russia and Northeast China extending southward to Korea and Japan.

Finally, our thinking about and research efforts into energy cooperation

in Northeast Asian should take into consideration the human dimension.

The participants also agreed that the workshop was well timed, as improved relations between the two Koreas require a comprehensive framework for economic cooperation and the exchange of information and ideas.

DISCUSSION: DETAILS AND FACTS

1. REGIONAL PANORAMA

Northeast Asia represents a unique case study for observing both the formation of domestic policies and the direction that discussions on subregional energy cooperation are taking. Such cooperation is expected to enhance energy security, promoting at the same time the use of energy resources in a manner that reduces the impact on the global climate and alleviates trans-border environmental challenges.

1.1 Regional energy profile

There are certain characteristics that make Northeast Asia different from other major energy importing regions such as North America and Europe. First of all, natural gas⁴ still accounts for a much smaller share of the region's primary energy consumption, although its use is expanding. The share of natural gas in the primary energy supply is about 2% in China, 8% in South Korea, and 12% in Japan, as compared with 19% in Europe,

24% in the U.S., and 52% in Russia.

Secondly, reliance on coal has intensified in absolute terms, reflecting its importance in China, but is likely to slow as a result of the pollution associated with coal burning. However, coal will remain dominant as a fuel.

Thirdly, nuclear power-based electricity generation is likely to rise, unlike in Europe where most nuclear power projects have been suspended or abandoned. Japan has had to scale back its program for new nuclear power plants in the face of increased public opposition, so natural gas is likely to fill the resulting gap. The existing 51 nuclear reactors provide about 35% of the total electric power output. The plan was to boost this share to 45%, but these plans are now being questioned due to a reassessment of safety risks and the problems of nuclear waste management. Also, the competitiveness of electricity produced by the nuclear power plants is open to question, if the cost of decommissioning is included.

Fourthly, as environmental concerns and other factors come into play, the reliance of Northeast Asia on natural gas

⁴ Japan, South Korea, and Taiwan account for three-quarters of total world LNG trade

will probably grow and pipeline gas would be of help in meeting rising energy demand. This will partially alleviate energy security concerns, helping to reconcile growing energy consumption with environmental protection. An expansion in natural gas usage will also help to ease the demand pressure on energy markets on the part of China and India.

Finally, the subregion's dependence on the Middle East for oil imports is expected to rise to 90% in 2010 from the present level of 75%. China, Indonesia and Malaysia produce oil in significant volumes. In 2000, their combined oil production was 266 Mt, including 162 Mt of crude oil extracted in China, 68 Mt in Indonesia and 36 Mt in Malaysia.

On the other hand, the leading consumers of crude oil are Japan (253.5 Mt), the Republic of Korea (102 Mt), Singapore (30 Mt), Taiwan (40 Mt) and China (227 Mt). In 2000, China imported 70 Mt of oil and 18 Mt of oil products, while Japanese imports totaled 215 Mt and 49 Mt correspondingly.⁶

In 2000, Japan, South Korea, Taiwan and Hong Kong together imported US\$159 billion worth of various fuels, nearing the fuel imports of the United

States (Table 1). The share of oil is close to two-thirds of their entire energy imports.

In addition, oil extraction is forecast to be flat in Indonesia and Malaysia, allowing the output of these oil-producing economies to be maintained at about 280-290 Mt a year to 2010. On the other hand, the import demand for crude oil on the part of Japan, South Korea and China (including Taiwan and Hong Kong) may reach 550-600 Mt by 2010.⁷

1.2 Sources of vulnerability

In terms of energy security and environmental impacts, Northeast Asia's problems are obvious. First of all, this subregion is home to a number of fast-growing and/or energy importing economies, namely Japan, the Republic of Korea (South Korea) and China (including Taiwan). The region's dependence on imports, particularly of oil from the Middle East, is expected to grow dramatically. Demand projections suggest that regional oil reserves are insufficient, leaving its economies ill-prepared for a crisis.

China is already the world's second-largest consumer of energy.

⁶ *BP Statistical Review of World Energy*, June 2001, 6, 9 and 19.

⁷ Since the late 1960s, oil demand has grown at 14% a year, and is expected to increase at about 9% per year up to 2020, leading to the 800 million-ton annual increase in import volumes.

Between 2001-2010, China will have the largest incremental energy demand growth of any country in the world. Although its per capita energy use is less than a quarter of Japan's level in absolute terms, China's energy consumption from 2000 to 2020 is projected to double, equaling the energy consumption increase of the OECD countries combined: a rise of 25-30%. Nevertheless, it is still the case that only about 80% of the population is connected to the electrical grid.

Japan is the world's fourth largest energy consumer and second largest energy importer (after the United States). South Korea is also important to world energy markets as the fourth largest oil importer and the second largest importer of liquefied natural gas (LNG) after Japan.

Secondly, by 2020, developing countries will account for more than two-thirds of the increase, with China's additional emissions matching those of the whole of the OECD. China's power generation as a share of the world total will increase from 8% to 14% with its CO₂ emissions as a share of the world total rising from the current 14% to 18%, or more than three-quarters in absolute terms. Emissions from the transport sector will grow by nearly as much.

Thirdly, the Democratic People's Republic of Korea (North Korea) is an

energy-starved economy. In 1994, North Korea signed an agreement sponsored by the United States, Japan, and South Korea to halt its graphite technology nuclear program in exchange for two light water nuclear reactors. In the meantime, the United States is supplying fuel oil to provide for electric power generation in North Korea until the first reactor is commissioned.

The Korean Peninsula Energy Development Organization (KEDO) appears to be the first state-led multilateral cooperative energy project in Northeast Asia. Although this agreement has been delayed considerably, it is very hard to tell whether an alternative could be found to help North Korea to secure reliable energy supplies in exchange for scrapping its nuclear program. Also, North Korea occupies a strategic location bordering China, South Korea, and Russia, potentially influencing investment decisions on cross-border energy projects in the subregion.

Finally, Russia—itsself the third world's largest consumer of energy—possesses rich energy resources located in the Far Eastern and Siberian provinces. It is well positioned to become a potential exporter of energy to Northeast Asia. The problem, however, is that the cost of the proposed export-oriented projects is very high, improvements in the investment climate

are still inadequate and neighboring markets are neither easily accessible nor sufficiently open.

1.3 Current policies

The good news is that the regional political climate is gradually improving, evolving into one that could allow new cooperative approaches toward energy security. There are signs of growing political and economic cooperation among the countries of the region. The ASEAN+3 meetings are opening up the way for deepening trade and investment cooperation between China, Japan and South Korea. China's accession to the World Trade Organization will accelerate this process. The recent signing of the Friendship Accord between China and Russia is expected to increase collaboration in a wide range of fields, while Japanese and Russian economic cooperation is also progressing. Last but not least, the Asia-Pacific Economic Cooperation (APEC) forum is making progress, indirectly facilitating contacts in Northeast Asia.

The energy policies of the economies of the area are evolving, responding to changing domestic priorities, as well as external challenges and opportunities. Energy security concerns are likely to intensify as dependence on energy from sources outside the region increases. In this context, the countries of Northeast Asia

have become increasingly interested in procuring oil from sources within the region and enlarging the share of natural gas in their energy mix for economic, environmental and geopolitical reasons. Projects aimed at increasing gas penetration in the region are now in various stages of progress.

In China, efforts to optimize the energy mix have taken place over the last decade. The proportion of coal in primary energy consumption has been reduced. About 30,000 small and illegal coal mines were closed. Measures have been introduced to reform the pricing mechanism, but only in 1998 was the decision made to link crude oil prices with international prices. The state-regulated price for coal in the mid-1990s was approximately one-quarter of the market price and subsidies amounted to US\$2.5 billion annually.

The removal of distortions in energy prices, including 20% indirect subsidies for coal provided through subsidized rail transport, would lead to energy savings of about 14% and a reduction in CO₂ emissions of some 13%. In tackling its dependence on coal, China is prioritizing the construction of coal mines and coal-washing plants, and the development of clean coal technology.

In the 1990s, China became a net energy importing economy, joining Japan

and South Korea, which are both heavily dependent on imported energy. Energy security is increasingly becoming an issue as more crude oil and oil products have been imported. It is estimated that China's import dependence rate will reach 30% in 2005, rising to as much as 55–60% in 2020. Over the next five to ten years, China should set up a strategic oil stockpile, diversify its oil imports and promote oil substitutes. The major focus of western region development is a gas pipeline project.

In Japan, from 1980, the dependence on energy imports (as a share of commercial energy use) decreased from 88% to 80%, primarily due to newly built nuclear power plants. Some experts argue that if Japan follows global trends, maintaining the share of nuclear power in electricity generation at the current level, the role of natural gas should rise from the current level of 24% to 30% or more to fill the gap. At the same time, the official projection for 2008 with regard to the share of natural gas was only 22.4%.

The regional energy companies have acquired enormous influence in determining the future of the nuclear power industry. They originally envisioned constructing about 20 new nuclear reactors. However, at this stage, only two nuclear reactors are under construction, with two more units in the planning stage. After these reactors begin

operating, the estimated gap between the target and the actual generating capacity could range from 16 GW to 20 GW.

South Korea already has a national pipeline grid for transporting natural gas. It is better positioned for absorbing large volumes of pipeline gas than Japan. The total length of its domestic trunk pipelines is almost 2,450 km. However, by 2015, the share of gas in the power sector is expected to decline to 11%, despite significantly increased output and a 50% expansion of capacity.

Russia, by supplying natural gas, oil, coal and electricity to its neighbors in Europe, has become the key actor in regional energy markets. In 2001, 129 billion cubic meters (Bcm) of natural gas was exported, while exports to the former Soviet republics totaled 89 Bcm. Russia's share of the EU's natural gas imports reached 65%, while its share of total natural gas consumption amounted to 26%. From 2010-2020, the supply of gas to Europe is expected to increase to 200 Bcm, solidifying the Russia-Europe "energy alliance".

The situation in Northeast Asia is very different—thus far only coal has been exported to Japan, and in relatively limited quantities at that. Technically, there are opportunities to export oil, natural gas and electricity to neighboring markets. In the oil trade, in particular, the dependence of Northeast Asian

economies on the Middle East is very high and likely to grow further. Consequently, sources of oil in Eastern Russia could become a decisive factor in ensuring the security and stability of supplies.

1.4 The DPRK problem

Against a background of generally positive developments in Northeast Asia, the continuing tensions on the Korean Peninsula serve as a reminder of the burden that unresolved issues are placing on the ability to bring the vision of deepening economic links to fruition. Economic cooperation with North Korea is necessary for the stable development of the subregion and its economies.

In this context, given the serious energy shortages suffered by the DPRK, so much depends upon the political and economic relationship between the two Koreas. In theory, their cooperation could involve the construction of a gas pipeline, electrical grid interconnections and railway links. Of course, other nations and multilateral institutions, such as the World Bank and the UN, particularly ESCAP, have a mission to facilitate such cooperation.

While on his recent official trip to South Korea, President George Bush expressed his support for President Kim Dae-Jung's "Sunshine Policy" and for the

construction of road and rail links between the two Koreas. He also stated his readiness to reopen step-by-step talks with the DPRK, aimed at improving the situation on the Korean Peninsula. In emphasizing that the U.S. had no intention of invading or attacking the DPRK, but planned to continue the long-standing humanitarian policy of providing food aid to the country, President Bush has provided some reassurance to those alarmed by his denunciation of North Korea as part of an "Axis of Evil." It seems that a new economic dimension is possible in U.S. policy in Northeast Asia and that energy could be a transforming factor in relations on the Korean Peninsula.

During his 2001 visit to South Korea, President Clinton emphasized that Russia would do its utmost to contribute to North-South rapprochement. Pipeline projects could be a path to economic cooperation. Connecting the DPRK to the ROK by means of a gas pipeline would provide a long-term boost to the economy and forge closer ties between Pyongyang and its neighbors. It remains to be seen, however, whether the terms for such a project will be realistic.

1.5 Facing the challenges

The primary challenge for those who favor subregional economic cooperation in Northeast Asia is to formulate a

specific mission that this area could perform in the larger region encompassed by APEC.⁸ The APEC 2000 Energy Ministers' Meeting in San Diego adopted three documents, including the Declaration, the Joint Statement on Clean Energy and Sustainable Development, and the Implementation Strategy for APEC's Energy Program. In short, the Declaration proposed developing a common understanding on regional energy principles in the following areas:

- development harmonized with energy security and sustainability
 - the environmental impacts of energy production and use
 - the cooperative promotion of domestic and cross-border energy infrastructure
 - cooperation in the development of a regional trading network
 - energy supply diversification
 - non-discrimination, market openness and the promotion of competition
- complementarity of regulatory and institutional regimes.

Another formidable task for the countries of Northeast Asia is to devise a comprehensive, yet realistic cooperative framework that incorporates the wide-ranging interests of domestic energy producers and users, the development needs of neighboring provinces, the policies of central governments and expectations on the part of foreign investors. The development of delivery infrastructure appears to be the key goal of this framework.

Moreover, economic globalization presents new challenges that call for new perspectives on energy security issues. These must be derived from a wider perspective, including geography and many other factors in all related fields. We should take the view that energy is the catalyst for human development, rather than an element restricting it, and establish an energy system based on the creation of wisdom and the prioritization of available options, which overcomes both technological and social limitations.

2. ENERGY COOPERATION

Energy security interests can serve as an incentive for cooperation, even though energy supply concerns could provoke conflict. The topic of energy in the

⁸ Geographically, Northeast Asia is part of this larger area. Some of the economies of this subregion, including China, Hong Kong, Taiwan (Chinese Taipei), Japan, the Republic of Korea, and Russia, belong to the Asia Pacific Economic Cooperation (APEC) forum, while others, such as Mongolia and the Democratic People's Republic of Korea, are not related to this regional body.

context of Northeast Asia has the potential to connect countries of the region in a positive way. Regional energy cooperation is increasingly seen as a means of strengthening energy security.

2.1 Problem-solving mechanisms

Northeast Asia has ample potential for mutually complementary energy cooperation, reminiscent of that seen in the EU. Indeed, pipelines and other cross-border infrastructure projects instituted in Europe were able to reduce tensions among states, as they had a vested interest in maintaining the flow of income and resources, thereby helping to maintain regional peace.

Cooperation in supply and transportation in Northeast Asia would permit the establishment of land routes and submarine pipelines for energy supply to economies that have depended exclusively on deep-sea port-based imports (Japan, South Korea and Taiwan). This would also promote competition and efficient energy trade, as well as encouraging market liberalization (China). All energy importing economies in Northeast Asia will benefit due to improved bargaining power vis-à-vis exporters from other regions.

However, despite the possible benefits, a fundamental change is required in defining the energy cooperation vision for the region. This vision should be

based on a comprehensive assessment of the different options for cooperation, including specific needs and recommendations regarding the implementation of the projects selected. A regional framework similar to the European Energy Charter would provide the basic principles for subregional energy cooperation. Although the Energy Charter Treaty⁹ can be perceived as a

⁹The Energy Charter Treaty has its roots in the "European Energy Charter" that was signed by 53 countries in The Hague in December 1991, including the EU, the United States, Australia, Japan, the central and eastern European states and member states of the Commonwealth of Independent States. It represented a political commitment to cooperation in the energy sector, based on the principles of open energy markets, non-discrimination between participants, respect for state sovereignty over natural resources, and recognition of the importance of environmentally sound and energy-efficient policies.

The Energy Charter Treaty was signed in Lisbon on 17 December 1994, and entered into force on 16 April 1998. As of today 45 countries have ratified it, including all European countries and all CIS countries other than Russia and Belarus. These two countries apply the Treaty provisionally. In Russia, the ratification process is still pending in the federal legislature.

Observer states include some Southern Mediterranean countries (Algeria, Morocco, Tunisia) and major oil-producing countries from the Middle East (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) as well as the People's Republic of China.

Eurocentric concept, Russia and Japan are involved as members and China as an observer.

The objective of the Energy Charter process is to further the complementary relationship in energy matters between the major complementary areas. The “eastern constituency” of the Energy Charter process together with Norway and the United Kingdom may cover up to 50% of the net energy imports of the “western constituency”.

It lays down as its purpose the establishment of a legal framework in order to promote long-term cooperation in the energy field, based on complementarities and mutual benefits between the parties

The main energy issues addressed in the Treaty are: (1) transit, (2) investment protection, (3) trade and energy efficiency, (4) related environmental aspects, and (5) dispute settlement. Transit is defined as the movement of crude oil, oil products, natural gas or electricity from one contracting party of the Treaty through the territory of another contracting party, destined for the territory of a third contracting party. Energy transport facilities are defined as transportation grids that are used to transport crude oil, oil products, natural gas or electricity.

The major transit obligation is to facilitate transit based on the principle of freedom of transit without distinction as

to the origin, destination or ownership of the energy and without discrimination as to pricing on the basis of such distinctions. Contracting parties are obliged to encourage cooperation in the interconnection, development and operation of energy transport facilities, including mitigation of the effects of an interruption of the supply of energy. It is also stipulated that energy in transit shall be treated no less favorably than that country’s transportation provisions treat energy produced domestically and exported or energy imported.

The established flows of energy in transit are to be secured and made free of obstacles obstructing new energy transport facilities, unless the security or the efficiency of existing energy transport facilities is endangered. In such cases, construction or modification permits for new or additional transit may not be granted.

In addition, under the WTO provisions, the most convenient route for international transit is to be used. The main substantive difference between the trade regime of the Treaty and that of the WTO is that no tariff-binding regime applies under the former. Under the WTO approach (the *most favored nation* principle) internal taxes and charges, laws, and regulations affecting the internal sale of energy, including internal quantitative regulations regarding the mixture,

processing or use of energy in specific proportions, may not be applied to imported or domestic energy carriers so as to afford protection to domestic production.

Energy imported from any other contracting party may not be subject to internal taxes or other internal charges in excess of those applied to similar domestic energy carriers. Such energy must be treated like any energy carriers of national origin (*national treatment* principle). The transportation charge may differ from the domestic transportation charge only if that pricing decision is based on the economics of transportation and not on the nationality of the energy.

Internal quantitative regulations requiring part of the energy supply to be from domestic sources must be avoided. Also, no quantitative regulation should allocate the proportion of energy among external sources of supply.

Based on the model of bilateral investment treaties, the Treaty grants a number of fundamental rights to foreign investors with regard to their investment in the host country. Not only does it require the minimizing, in an economically efficient manner, of harmful environmental impacts resulting from all operations within the energy cycle in its area, but it also requires market-oriented price formation to be promoted and environmental costs to be

reflected. The Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) was negotiated, opened for signature and entered into force at the same time as the Treaty, on 16 April 1998. PEEREA provides a mechanism for international cooperation and exchange of experience and ideas between less developed countries and countries with twenty years or more of experience in this area.

The Treaty also includes an international dispute resolution mechanism. In general, the trade dispute resolution mechanism of the Treaty is lighter, less detailed and simpler than that developed in the WTO. It establishes a mutual information and consultation mechanism relating to the interpretation and application of national competition laws. The provision reflects the fact that the Treaty does not establish a common competition regime between contracting parties.

2.2 A framework for Northeast Asia

Asia is an important part of the world economy and future development in Asia can contribute to the sustainable development of the global economy. In Northeast Asia, it will probably take time to develop a concept of an energy community or to agree on a set of obligations and rules similar to the Energy Charter.

Today, there is no subregional organization or government-level framework to support multilateral energy exchanges. In this context, the so-called “track two” dialogue to prepare the ground for an inter-governmental process could be useful. Given the multiplicity of high-level meetings that have already taken place, the goal of such dialogue could be to analyze regional specifics and sources of misunderstanding.

Information-sharing and the compilation of existing research to help governments with policy formulation, as well as working towards the harmonization of relevant national legislation by starting with an assessment of national laws to bring them in line with international best practice, could form the basis for a multilateral agreement to guide energy cooperation in Northeast Asia, once the relevant countries are ready for it.

Ideally, recommendations should be made with regard to how to facilitate energy trade and cross-border infrastructure projects. At the government, administrative and private sector levels, not only “horizontal” collaboration between countries but also vertical links within each country must be promoted. A forum for interaction in the fields of technology and research should also be considered.

In addition, the focused application of existing cooperative structures relevant to the subregion, including such inter-governmental frameworks as APEC, the IEA and the UN must be prioritized. The IEA plans to organize workshops on emergency stocks and oil security for China and ASEAN countries during 2002 and 2003. However, multilateral energy dialogue will be of little use if it does not lead to concrete achievements.

Yet another venue is the UNDP Tumen River Area Development Program, which was established in 1991. The Program can play an important role because of its existing intergovernmental mechanism. It has experience in facilitating the reduction of non-fiscal impediments to cross-border trade and transport. The focus of the working group should be on the harmonization of regulations, in order to assist the construction of a more environmentally friendly energy network that would meet the development requirements of the region. Energy is emerging as new area on which the program will focus. The first meeting of the Tumen Program’s energy working group took place on March 28th in Beijing.¹⁰ Also, in October 2001,

¹⁰ Some delegations, notably the DPRK, felt that it would be possible for the Tumen Program to play a catalytic role in the development of a policy framework for the transport and utilization of natural gas in Northeast Asia

ESCAP organized an inter-governmental expert group meeting in Khabarovsk focused on electricity sector development.

2.3 Russia in Northeast Asia

Russia is also interested in developing bilateral energy cooperation with the DPRK. Without overcoming the problem of electric power shortages, it will be impossible to make progress in other areas. The modernization of power plants in the DPRK is a cost-effective measure that would enable the country to alleviate the power shortage problem. Russia should participate in such projects, because the plants were built with Soviet assistance, and the necessary technical expertise and equipment are available. With regard to Moscow-Seoul-Pyongyang electricity interconnection, the political preconditions for cooperation between Russia and the DPRK are in place, although the negotiation and trilateral liaison process might be a long and difficult one.

More generally, Russia's intention to become an active player in Northeast Asian energy markets is well reflected in its energy strategy up to 2020. Eastern Siberia and the Far Eastern region have an important role to play in realizing these intentions to develop energy links with Northeast Asian countries. Abundant

natural gas, oil and hydropower reserves in these two regions will help to lessen the dependence of Northeast Asian importers on the Middle East, reduce the cost of energy imports and assist in dealing with environmental issues. Russia is very positive about power sector cooperation among Northeast Asian countries, particularly power trade with China and South Korea. The energy sector development plans for eastern regions emphasize cross-border energy infrastructure projects.

2.4 Areas for cooperation

The most important part of Northeast Asian energy cooperation is promoting common recognition of the non-zero sum game and the simultaneous pursuit of the 3Es, on which Japan already has a policy.¹² Enhancing environmentally sound technology transfer within the region also represents a potential area for cooperation. However, even in discussing the 3Es, the emphases on the three goals differ from country to country, hence totally different—possibly conflicting—policies could be arrived at. Nevertheless, this process could promote the establishment of a Northeast Asian economic community, bringing order,

¹² 3Es = **E**conomic growth, **E**nergy security, and **E**nvironmental protection.

stability and prosperity to the region.

One area in which multilateral discussion could take place is the potential for natural gas utilization, which would reduce both oil dependence and the environmental burden. As of today, China, Russia and Korea are jointly investigating the economic feasibility of developing natural gas in Russia and transporting it via a pipeline. Another opportunity is power grid interconnection.

Cooperative oil projects are a matter of urgency because non-OPEC oil sources are declining. Why are Asians paying a higher price for oil than Americans or Europeans? This is because demand in Asia is more inflexible and because of the great reliance on Middle Eastern producers, who support pricing at a higher level than that set by the market. With only one dominant source of supply, oil is becoming an indispensable strategic asset, making the importing country vulnerable to the terms and conditions of the suppliers. Consequently, if there were an increase in global demand, all players would have to call upon the Middle East's resources.

Cooperation in the oil trade has great potential, given the opportunity that this would present for such projects as a Regional Joint Stockpile Facility (RJSF) aimed at oil price stabilization in the interests of importers and market access

for Russian oil majors. The recent intention of Transneft to start preparing for the Trans-Siberian oil pipeline project should be seen as a major development. In addition, the Chinese and Russian governments have already initiated a feasibility study on a 2,400 kilometer-long oil pipeline, which would transport 20–30 million tons of crude oil between Angarsk and Daqing. In this context, not only Japan but also South Korea can contribute to energy security in the region by utilizing its oil stocks and emergency preparedness systems. Korea's oil stocks system, known as the "flexibility mechanism", could be a model for the region as a whole.

A variety of options for exporting natural gas, oil and electricity are being discussed in Russia and other Northeast Asian countries. However, there is no coordination between the various pipeline and transmission line options in terms of price, volume, timing and demand on the part of importing countries. There are at least three options currently under discussion for exporting natural gas from Russia to China: the Irkutsk – China pipeline, a pipeline from Yakutia and the Gazprom pipeline from Western Siberia via the Altai region. If Chinese natural gas demand forecasts are taken into account, it is obvious that there is a need to find a middle course between these three projects.

It is commonly recognized that mutual reliance, mutual profitability and continuous dialogue will be instrumental in forging new links in Northeast Asia, which is home to economies dealing with a variety of energy-related governing factors. Progress in globalization strengthens relationships between such areas as trade, finance, investment and technological collaboration. As a result, energy issues can no longer be considered in terms of energy supply security alone, nor within the traditionally narrow limits of national interests and policies in this realm.

2.5 Power sector

East Siberia and the Russian Far East account for more than 20% of Russia's total installed electricity production capacity. The renovation of existing power plants and completion of plants under construction could result in 25–30 billion kWh of surplus electricity generation. These surpluses could be exported via high-voltage power lines.

Scenarios for the Far Eastern region suggest that its electricity export potential will increase to 3-5 billion kWh by 2020. Up to 2010, the main goal is to complete the construction of power plants on which work has already commenced. The next phase could include new hydropower stations, though such plans will be constrained by investment

availability and demand for electric power in the region and on the part of neighboring economies. The principal primary energy sources for power generation would be coal and hydropower, with only moderate use of natural gas.

The optimistic scenario posits the possibility of extensive exports of electricity to the economies of Northeast Asia, as well as investment and technological cooperation in the field of electricity. This could accelerate the construction of new hydropower plants and increase the share of natural gas in thermal power generation. Around 2010, the large-scale production of natural gas in the Sakhalin shelf could lead to an increase in its share in the fuel mix in the southern part of Far Eastern Russia, especially Khabarovskiy Krai. All these developments, combined with power sector deregulation, especially in China, would substantially expand electricity exports.

Cooperation in constructing transmission lines for electricity supply is plausible. Discussions are taking place about providing the DPRK with up to 1GW of electricity generation capacity, but these are still at a very early stage, so working groups could be formed in order to study this option. VostokEnergO is also engaged in various studies regarding the supply of electricity to South Korea, including supply routes that cross the

territory of North Korea. Trilateral cooperation between experts from both Koreas and Russia could therefore open up new opportunities.

3. INVESTMENT AND RESERVES

The four tests that any project should pass before being implemented are those relating to the availability of resources, access to physical infrastructure, affordability and merits in terms of sustainability. Investment mobilization and the expansion of reserves are the key challenges facing energy projects in Eastern Siberia and the Far Eastern region. The major questions are who will begin to construct pipelines from Eastern Siberia, Yakutia and Sakhalin, when these projects will begin and be completed, and how much all this will cost. Locating investment sources, proving the potential of projects, and identifying future markets are other issues for consideration.

3.1 Investment constraints

In this context, domestic investment plans could partially alleviate uncertainties associated with cross-border projects. For example, if every relevant Northeast Asian country can first create its own integrated electricity grid, cross-border power grid interconnection may be easier to implement. In the next five years, China

plans to develop an electric power grid connecting the whole country. On the supply side, three of the electricity companies in Far Eastern Russia are united by a power grid that exports power to Mongolia, China and technically could be extended to the DPRK, as well as Japan.

Governments used to play a very significant role in energy infrastructure development, investing taxpayers' money in the energy sector. This is unlikely to continue. In the United States, for instance, government spending is on a downward slope, leaving less money to invest in such projects. In general, China's government spending is declining in relative terms, while in Japan it has stabilized at about 10% of GDP.

Some regional players such as Japan would prefer to rely only on their own investment sources in the energy sector. Given Japan's huge government deficit, it is unlikely to have sufficient capital to invest in cross-border energy projects. In addition, Japan is very cautious about large-scale investment, particularly that related to Russia.

In some Chinese power projects, the government has provided assistance in obtaining finance, as well as providing investment guarantees. However, the Trans-China gas pipeline project is to be implemented by a consortium of Chinese and international companies, including

Shell, ExxonMobil and Gazprom, each with a 15% share in the project.

The only exception is perhaps South Korea, with its countrywide gas pipeline delivery system financed from central sources. However, South Korea's capacity for large-scale investment abroad is much smaller than that of Japan. Besides, any inland delivery infrastructure plans inevitably involve North Korea, making investment decisions even more complicated.

In Russia too, active efforts must be made to attract foreign investors to complement the investment resources available domestically. Moreover, country-related investment risks are quite significant. Financing for projects is very difficult to obtain due to various institutional barriers. In Russia, these include issues of tax and tariff stability, and a transparent and objective dispute settlement process. Not much progress has been made regarding the mechanism of production-sharing agreements and arrangements that are satisfactory to investors have yet to be made. With such barriers, even if finance is available, a higher premium will have to be paid.

Thus, the role of governments is likely to involve creating a more favorable investment climate for private investors. In addition, the role of export credit agencies and regional development banks such as the Asian Development Bank

(ADB) and the European Bank for Reconstruction and Development (EBRD) is becoming increasingly important in this sector, encompassing Central Asia, Russia's Far Eastern provinces and Siberia.¹³

Energy prices are becoming more volatile. Pipeline projects are normally delayed when energy prices are low, because the feasibility of the projects is called into question and investment seems less attractive. Difficult-to-predict energy prices create uncertainty about the returns on investment. Moreover, as capital becomes increasingly scarce, it may become more difficult to finance energy sector projects. Although stock markets were accessible before Enron's collapse, investors are now less interested

¹³ The following energy projects in the Far Eastern region were supported by the EBRD: Sakhalin II (Phase 1) Oil Project (1997), Mutnovsky Independent Power Plant project (1997) and Rosneft/Sakhalinmorneftegas (2001). In addition, future EBRD operations include Sakhalin projects currently under review, regional projects, including new transportation routes associated with new oil terminals, commercially viable transportation infrastructure for natural gas and gas utilization issues, as well as the promotion of regional cooperation in energy policy and transportation. Also, the EBRD's Strategic Environmental Assessment (SEA) may be relevant to Sakhalin oil projects. See *Natural Resources* (London: EBRD, 2001), pp. 10-12. Access at <http://www.ebrd.com/pubs/index.htm>

in energy companies and the role of governments in such projects is becoming important.

One obstacle to energy source diversification is the tendency of countries to become locked into an energy source, once one kind of energy is used. Along with oil, gas is the key to energy security in the region—for the next couple of decades, at least. The creation of efficient markets to reflect full costs is crucial in attracting investment to natural gas projects. Timely investment in gas infrastructure development, particularly on the part of the private sector, both domestically and overseas, is also very important.

3.2 Oil and natural gas reserves

The potential oil resources of Far Eastern Russia amount to 29 billion tons, with potential natural gas resources estimated at 24 trillion cubic meters (Tcm). About 99% of all proven oil and gas resources are concentrated in Yakutia and the Sakhalin shelf, technically allowing the extraction of 80–90 Bcm of natural gas a year, along with 50–60 Mt of oil. By 2020, these volumes would satisfy regional demand, also allowing exports of 30–40 Mt of oil and 50–60 Bcm of natural gas.

Estimates by the International Gas and Pipeline Forum suggest that reserves are not sufficiently large to meet the

consumption needs of Japan, South Korea and China. Therefore, a pipeline that uses recoverable reserves from the Far Eastern region alone is not fundable. Indeed, confirmed reserves account for only 4% of the total in the oil sector and 6% in the natural gas sector, although these volumes could still total about 2,500 million tons of oil equivalent (Mtoe). This is sufficient to provide South Korea with up to 10 years worth of hydrocarbons at the current consumption rate.

Total recoverable reserves¹⁴ of oil offshore from Sakhalin are estimated at 1,024 Mt and those of natural gas at 3,594 Bcm (Table 2). Gas from the Sakhalin 3-6 projects will only be able to be extracted after 2010, as the exploration and investment phases progress. Reserves on the Siberian Platform, which includes Krasnoyarskiy Krai, Irkutskaya Oblast and Yakutia, are also significant (Table 3).

4. CROSS-BORDER PROJECTS

Cross-border pipeline projects should strengthen the energy security of the economies of the region, leading to interdependence and facilitating the

¹⁴ “Recoverable hydrocarbons” means quantities of oil and gas that are not yet classified as proven reserves but are believed likely to be produced in the future.

formation of a regional energy community. A pipeline network proposed by the Northeast Asia Gas and Pipeline Forum (NEAGPF) consists of a circular pipeline and two ladder-type trunk pipelines, one running from west to east in China and the other through Russia. The proposed circular pipeline would link Russia, China, the Koreas and Japan.

Russia has been considering plans to construct a gas pipeline across China, probably involving Mongolia. It was proposed that the submarine section of this pipeline run under the Yellow Sea to South Korea. Another option is a cross-border pipeline traversing the DPRK. One of the options being considered by Gazprom is building a pipeline along the Trans-Siberian railway (TSR), down to the Pacific coast. With Gazprom as a participant, natural gas reserves in Western Siberia and the Krasnoyarsk area could also be considered, along with those of Kovykta, thereby boosting gas reserves available for a pipeline crossing Eastern Russia.

Linking the Trans-Siberian gas pipeline (TSGP) to the gas reserves of Western Siberia is quite similar to the Canadian pipeline system that has been built along the U.S.-Canada border, supplying gas to the northern areas of the United States through 16 north-south pipelines. The TSGP would ensure the availability of gas for Eastern Russia and

all neighboring economies. A Trans-Siberian pipeline could potentially be of interest to all major users of natural gas in the region at present, including Japan and the ROK.

The ROK is the world's second-largest LNG importer, with imports totaling 19 million tons in 2000. The market is far from being saturated and city-gas consumption is predicted to grow at 6% a year between 2001 and 2010. Demand could exceed 36 million tons by 2020. A nationwide grid system has almost been completed, with a 2,500 kilometer-long trunk line and three receiving terminals. In order to satisfy this increase in demand, it could be economical to link this system to non-LNG sources.

In general, a pipeline delivering gas at lower prices will assist the implementation of energy sector reforms in Japan and the ROK. In addition, advantages arising from the passage of a pipeline through the Tumen River area development zone would facilitate regional development. In the case of transit through the territory of the DPRK, transit fees would enable the DPRK to get access to natural gas.

In this context, a review of cross-border railway cooperation could be useful in identifying issues pertinent to a cross-border pipeline. As such, reconnecting the railway between the two

Koreas is seen as a vital step forward in improving rail links in the region and providing a lower-cost alternative to marine transportation. However, if railway interconnection does not progress, it will greatly diminish the prospects for building a Trans-Korean pipeline.

A pipeline is not the only option for supplying natural gas. Given the potential problems that could befall pipeline projects, greater attention must be paid to the swift advances being made in LNG use by maritime economies. On the other hand, if gas-to-liquid technology reaches the stage where it could be commercialized, a combination of railway and gas-based liquid fuel production facilities could be economical.

5. THE KEDO PROJECT

KEDO is funded through financial support from ten members, both states and international organizations, but received financial support in 1995-2001 from 29 sources in total, including Australia, New Zealand, Mexico and Finland. In December 2001, the EU signed an agreement pledging to continue its support for KEDO; it will be represented on the Executive Board of KEDO (the other board members are Japan, the Republic of Korea, and the United States).

KEDO aims, above all, to “promote peace and stability on the Korean

Peninsula,” while serving as “an example of how a cooperative and targeted international diplomatic effort can lead to the resolution of regional security or political crises. Its Mission Statement also begins with a pledge to “contribute to the strengthening of the international non-proliferation regime.”¹⁶

KEDO is an international, non-profit organization established to carry out two key provisions of the Agreed Framework negotiated in 1994 by the United States and the DPRK.¹⁷ KEDO’s primary contractor is the Korea Electric Power Corporation (KEPCO). On January 31, 2000, KEDO concluded a ¥116.5 billion-loan agreement with the Japan Bank for International Cooperation (JBIC).

Stabilizing the DPRK requires a swift reduction of political tension and the

¹⁶ See KEDO’s official web site at <http://www.kedo.org/facts.htm> and *Annual Report, 2000-2001* (New York: KEDO, 2001).

¹⁷ Specifically, in exchange for the DPRK freezing and eventually dismantling its graphite-moderated nuclear reactors, KEDO provides for the financing and supply of two proliferation-resistant light-water reactors (LWR) with a capacity of approximately 1,000 megawatts each (total cost estimated at US\$4.6 billion); as well as arranging for the supply of interim energy alternatives (500,000 metric tons of heavy fuel oil each year before the first reactor is completed), to substitute for electricity from the graphite-moderated reactors that were shut down

development of economic links among the two Koreas. Electricity supply is vital to the DPRK's economic recovery and interconnection of the power systems could be a step towards a wider sub-regional power network.

The DPRK's power generating capacity is estimated at about 7 million kW provided by hydroelectric and coal-fired power plants. About 70% of energy is derived from coal, but some coal mines have been damaged by floods, affecting coal production and power supply. In addition to power shortages, the quality of the DPRK's electricity is inferior.

Modernizing coal-fired power plants is perhaps the most realistic, cost-effective measure for solving the current energy crisis in the DPRK. The modernization of hydropower plants is yet another possibility.

Power shortages, however, are likely to continue until the KEDO's first reactor comes online. The two-reactor plant is expected to generate 10 billion kWh of electricity annually, satisfying almost half the total energy demand (17 billion kWh in 1998).

The construction of the first reactor has been delayed until 2008 at the earliest. As of November 2001, only 15% of the work had been completed. One possible way of compensating for this delay would be to supply electricity. However, there

are many problems that will need to be resolved before this can be done.

Many have argued that the KEDO project is not feasible unless the DPRK is linked to the power grids of the ROK, China and/or Russia. Nuclear plants are very sensitive to frequency variations. However, the voltage categories of the South and North differ, so a solution to this problem would need to be found.

Power sector cooperation between the Koreas can provide a firm foundation for peace and the relief of tension in Northeast Asia. In the ROK, serious problems are being experienced in acquiring land for building nuclear power plants. If agreement between the two Koreas were reached, plants supplying nuclear power to the ROK could be built in the North and power used in the South.

At the same time, the view was expressed that the basic framework for energy cooperation between North and South Korea should be rooted in a broader concept of the bilateral economic community. Stabilization of the energy supply, increased efficiency of energy systems, diversification of supply sources and greater reliance on environmentally friendly fuels, and the integration of the energy supply and demand systems of both Koreas can be seen as the four areas that should be targeted. A Trans-Korea

gas pipeline should also be considered.

6. ENVIRONMENT AND ENERGY

The various problems we face today in the field of energy and the environment do not have the great, immediate impacts of past oil shocks. However, a crisis is stealing up on Asia. Compared to the “development and growth” paradigm of the 20th century, the 21st century will be an era of development that aims for “continuity and harmony.” Consciousness of environmental issues is increasing and the “develop now, clean up later” mentality is no longer acceptable.

The energy-environmental dilemma seems to be particularly acute due to rapidly increasing energy consumption, heavy reliance on coal and growing fossil fuel use. In 1990, energy consumption in Asia accounted for about 22% of world energy consumption, but this is projected to rise to 37% in 2020. Carbon dioxide emissions from energy consumption in Northeast Asia are expected to exceed those in North America and Europe. The coal dependence of China and growing oil consumption on the part of the ROK and Japan will be major factors in this shift.

Energy and environmental protection issues are of common concern and should be tackled globally, with concerted action being taken in each region to establish a mechanism that

promotes a “think globally, act locally” approach. It is important, therefore, to begin with cooperative recognition of the need to aim for the simultaneous achievement of 3E goals in Northeast Asia as the long-term goal.

There is growing recognition that region-wide cooperative approaches to these issues are required, as the ability of individual countries to deal with them is limited. Mitigating greenhouse gas emissions resulting from the combustion of fossil fuels may help to advance cooperation.

The elements necessary for such cooperation, including resources, capital and technology could stimulate complementary relations. In this context, natural gas has recently been attracting attention. The Advanced Combined Cycle system has achieved the unprecedented level of 50% thermal efficiency.

Also, the adoption of rules and regulations complementing governmental energy and environment policies is essential. Green portfolios, for example, have been useful in raising energy efficiency standards.

However, in discussing these issues, it is important to account for distinctive economic growth experiences with differing outcomes that have shaped current conditions.

In Japan’s case, forecasts suggest that the country’s energy consumption will

not increase significantly, partly because of its obligation to reduce greenhouse gases.

The ROK, on the other hand, is free from such obligations and it remains to be seen what energy-environment balancing policy it adopts.

In Russia, the energy demand scenarios envisaged in its new energy strategy will not impede the fulfillment of its greenhouse gas commitments.

China's high economic growth, on the other hand, is expected to continue, thereby causing a rise in energy consumption. Eventually, energy use in China will be influenced by environmental considerations. Sustainable development strategy will increase the need to optimize the energy mix, promoting cleaner energy and improving energy efficiency.

7. RENEWABLE ENERGY

A prolonged period of low oil prices and the lack of economic viability of renewable energy technologies have hindered its expansion hitherto. However, in the context of the United Nations Framework on Climate Change Conference, renewable energy development is no longer a low-priority issue.

Cooperation in the field of renewable energy between the Koreas could be particularly useful. Small-scale

projects can be started relatively quickly. For example, solar-powered water heaters have been developed quickly in China. Small-scale hydropower would also be helpful. In this context, the governments of both Koreas need to be actively involved in the development and dissemination of renewable technologies.

The ROK could provide assistance in such areas as small hydropower turbine-generator manufacturing and wind power. In February 2001, the ROK government announced its Basic Plan for Alternative Energy Research and Development, which could facilitate bilateral cooperation. Both the Korea Institute of Energy Technology and the Korea Energy Management Corporation could cooperate in supporting renewable energy research and development programs in the DPRK.

As of today, municipal and industrial waste, including biomass, represent 96.6% of total new and renewable energy sources. Solar water heating, although deployed, still requires subsidies and accounts for only 2% of renewable energy. Solar energy, on the other hand, is the renewable that the DPRK is particularly interested in promoting. There are, however, some doubts as to whether the DPRK can afford solar power technology.

Wind power could constitute the second most important source of

renewable energy. In 1998, the DPRK built seven small wind turbines with the help of the Nautilus Institute, which also installed two windmills to pump water. Also, much of the DPRK's rugged topography is well suited to small, mini and micro-hydroelectric projects and the government has made hydropower projects a priority for local authorities. The DPRK does manufacture several small turbine-generator sets, but assistance in producing more reliable and cost-efficient models could help.

8. CONCLUSION

Cooperative projects in Northeast Asia involve a battle against uncertainty. Uncertainty tends to result in inaction. Difficult questions should be asked, such as why there have been little practical developments to date, and why things are moving slowly. How high up the agenda of central governments are Northeast Asian cooperation-related issues?

It seems paradoxical that Japan, China and the ROK talk to each other at the trilateral level only through ASEAN. Meanwhile, Russia is not involved in this scheme. APEC does not identify Northeast Asia as a subregion suitable for cross-border pipelines, despite the fact that China, Japan, the ROK and Russia belong to this organization. Similarly, IEA does not cover Northeast Asia in the context of cooperative energy projects,

despite its growing links with China and Russia, or the fact that Japan and the ROK are IEA members.

Raising awareness of Northeast Asia as a regional entity within various international institutions, not to mention central governments in the region, will be the first step towards obtaining support for multilateral energy cooperation. However, each country must take on a role appropriate to its position in the region. The experiences of both Europe and America show that schemes aimed at integration and cooperation can work, if the major powerhouse of the region plays an active role. In the case of Northeast Asia, that role falls to Japan. Nevertheless, Japan seems to be unwilling to take initiative at the inter-governmental level.

Cooperation may not be as easy to achieve in Northeast Asia as it was in Europe, given the region's history of conflict and differing social systems. However, the overwhelming impression gained during the conference was of the enthusiasm on the part of South Korean participants for cooperation with the DPRK.

Given the changing geopolitical situation within the region, as well as across the globe, a symbolic pilot project—perhaps in the form of a cross-border pipeline—is needed. Energy infrastructure has an important role to play, while energy efficiency is another important

consideration. In addition to assisting in diversifying energy supply, the pipeline network and other cross-border projects will also boost cooperation in other fields, including environmental conservation, leading to even broader collaboration.

In during the Cold War, when Willy Brandt engaged in his strategy called *Ostpolitik*, West Germany decided to import natural gas from Russia. Although the United States opposed this policy, it achieved a certain rapprochement between the USSR and West Germany and eventually led to a considerable improvement of economic and policy links between the two countries. In Northeast Asia also, politics is a perennial obstacle to regional cooperation, but, as in the case of KEDO, it could lead to cooperative projects.

Identifying various barriers to project development can help to smooth the way ahead. For example, as society is becoming more populist, a wider audience must be included in discussions, as it will be hard to obtain government support if there is no public backing for projects.

Therefore greater efforts must be made to reach out to the public by means of the dissemination of information. Also, a scheme for putting constructive pressure

on central governments is needed, the impetus for which should come from business community and provinces, international and non-governmental organizations.

All economies (and regions and communities within these economies) should be treated as beneficiaries of energy infrastructure development, rather than just as sources of energy, or transit countries. Alternatively, governments, international organizations and multilateral financial institutions should work on developing policies that improve the living standards of the people in the context of cross-border energy projects.

Energy security and economic factors, however, are not the only reasons for undertaking large-scale cross-border projects: the human dimension needs greater consideration. The new century has to be based on common prosperity that brings together diverse cultures. The challenge now facing all nations is not only to find new energy sources and develop them, but also to identify a way of distributing them more equitably, allowing more people to achieve a reasonable standard of living.

TABLE 1. IMPORTS OF FUELS BY ECONOMIES OF NORTHEAST ASIA, 1990-2000

	Imports, US\$ billion					Share of merchandise imports, %	
	1990	1995	1998	1999	2000	1990	2000
Japan	57.5	53.9	43.3	49.9	77.4	24.4	20.4
South Korea	11.0	19.0	18.2	22.9	38.1	15.8	23.7
Taiwan	5.9	7.1	6.7	8.2	13.0	10.9	9.3
China	1.3	5.1	6.8	8.9	20.6	2.4	9.2
Hong Kong	1.9	3.7	3.2	3.7	4.5	2.4	2.1
Retained	1.7	2.1	1.9	3.1	4.1	5.0	11.6

Source: *International Trade Statistics 2001* (Geneva: World Trade Organization, 2001), 111.

TABLE 2. SAKHALIN OFFSHORE OIL AND GAS PROJECTS: CURRENT STATUS

	Sea depth, meters	Geological phase, years	Recoverable reserves		First output	Production peak	
			Oil, Mt	Gas, Bcm		Oil, Mt	Gas, Bcm
Sakhalin-1	30-50	5	340	420	2005	8.0	9.5
Sakhalin-2			150	642	1999	8.5	19.0
Sakhalin-3							
<i>Kirinskiy</i> <i>Block</i>	< 300	6	624	873	2014	24.4	n/a
<i>East Odoptu</i> <i>and Ayashkiy</i> <i>Block</i>	< 500	6	70	30	2014	6.9	0.9
	< 500	6	97	37	2014	9.1	1.0
Sakhalin-4	< 30	5	--	100	--	--	4.3
Sakhalin-5	< 140	6	600	600	2010	35.5	34.2
Sakhalin-6	30-60	--	800 Mtoe		--	--	--

Source: Rosneft, 2002

TABLE 3. SIBERIAN PLATFORM: RESERVES OF OIL AND NATURAL GAS

	Oil, Mt		Gas, Bcm	
	A+B+C ₁	C ₂	A+B+C ₁	C ₂
Krasnoyarsk Krai				
Yurubcheno-Tokhomskiye	58.4	301.1	93.7	321.2
Sobinskoye	3.0	8.2	138.7	19.6
Irkutskaya Oblast				
Verkhne-Chonskoye	159.5	42.1	11.7	83.8
Kovyktinskoye (including Khandinsky section)	-	-	296.7	1100.7
Yakutia				
Talakanskoye	106.1	18.1	35.5	18.6
Chayandinskoye	9.9	23.1	164.8	44.7
Srednebotuobinskoye	54.4	11.9	152.3	18.6
Srednevilyuiskoye	-	-	160.0	-
Srednetyungskoye	-	-	156.2	9.2

Source: Energy Systems Institute, Irkutsk

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APPENDIX 1

**JOINT STATEMENT BY
PRESIDENT GEORGE W. BUSH AND PRESIDENT VLADIMIR V. PUTIN ON
THE NEW U.S.-RUSSIAN ENERGY DIALOGUE
Moscow - St. Petersburg, Russia, 24-26 May 2002**

Successful development of the global economy depends on timely and reliable energy delivery. In this context, we welcome the fact that the Russian Federation has confirmed its role as a major world energy provider. In order to strengthen our overall relationship and enhance global energy security and international strategic stability, we have agreed to launch a bilateral energy dialogue.

Through this Dialogue we seek to:

Develop bilateral cooperation in the energy sphere on a mutually beneficial basis in accordance with our respective national energy policies.

Reduce volatility and enhance predictability of global energy markets and reliability of global energy supply.

Facilitate commercial cooperation in the energy sector, enhancing interaction between our companies in exploration, production, refining, transportation and marketing of energy, as well as in implementation of joint projects including those in third countries.

Encourage investment aimed at the further development and modernization of the fuel and energy sector of Russia, including expansion of oil and gas production in Eastern Siberia, the Far East, and offshore areas.

Promote access to world markets for Russian energy, including through the commercial development and modernization of Russia's port and transportation infrastructures, the electric power and gas sectors, and oil refining capabilities.

Foster science, technological, and business cooperation in the use of unconventional energy sources, and energy-efficient and environmentally clean technologies.

Cooperate in elaboration and development of new ecologically safer nuclear power technologies.

We intend to discuss energy issues at our future bilateral meetings, and direct that these issues be integrated into our bilateral agenda, at all levels of our governments. In this context, we welcome the creation of the Russian-American Working-level Group on Energy Cooperation.

We are encouraged that our commercial cooperation occurs not only in Russia and neighboring areas such as the Caspian region, where multiple pipelines and joint upstream investments in the energy sector strengthen the sovereignty, prosperity, cooperation, and global economic integration of all participating states. We also welcome our commercial cooperation in the United States and in other countries where our companies' and their international partners' experience, technology, and capital can be joined to provide the commercially reliable energy supplies which are essential to fostering prosperity and global stability.

APPENDIX 2

FIFTH MEETING OF APEC ENERGY MINISTERS FOSTERING REGIONAL ENERGY COOPERATION: SETTING A LONG TERM VISION AND IMPLEMENTING SHORT TERM ACTIONS

Mexico City, Mexico, 23 July 2002

We, APEC Energy Ministers, met for the fifth time in Mexico City on 23rd July 2002 to discuss energy issues in the region, the progress made by our economies in implementing actions to achieve APEC goals and to chart the course for future activities of the APEC Energy Working Group.

1. We acknowledge the essential contribution of energy to maintaining the Asia Pacific region's economic growth and social development, and are committed to continue to strengthen simultaneously the APEC goals of economic growth, energy security and environmental protection. We note that, as outlined in Energy Outlook 2002, APEC's rapidly increasing energy demand will exceed that of any other region. Growth in the APEC region's energy supply infrastructure will therefore need to keep pace with demand if the region's development goals are to be met. A key challenge is to ensure that this growth takes place in a manner consistent with our environmental and social objectives.

2. It is estimated that substantial new investments will be required over the coming years to meet the APEC region's future energy needs. We reaffirm our commitment to energy market reform and greater transparency to attract the significant private investment needed for regional energy development, production and infrastructure. We remain committed to the environmentally responsible development and clean use of energy and to our belief that quality of life benefits flow from the availability of cleaner, more affordable energy.

3. We note the economic, environmental, and energy security benefits of the diversification of energy supplies. Continued research, development and deployment of a broad range of energy technology options will also help meet longer-term energy security objectives while addressing environmental impacts of energy use and production. Furthermore, intra-regional infrastructure development and increased energy efficiency will also help ensure that energy does not become a bottleneck to the APEC region's future economic development and social progress.

4. Recognizing that our implementation commitment and strategy established at our last meeting in San Diego, California, United States, 12th May 2000, covers a wide scope of initiatives, we commend the efforts and achievements of the Energy Working Group in implementing our decisions and in responding to calls by APEC Ministers and Economic Leaders. We welcome the opportunity to reaffirm the principles our initiatives embody and our direction that the focus should be on implementation of our initiatives for the achievement of practical results.

5. We continue to fully support the Energy Working Group's broad based work program, which covers activities aimed at, among other things, diversifying our energy mixes, improving energy efficiency, enhancing research, development and deployment of renewable energy such as photo-voltaic, wind power etc, deploying new and renewable energy technologies, promoting clean energy, facilitating energy business and trade, improving data collection and information sharing, encouraging private investment through policy and regulatory reform, and sharing best practices related to energy emergency planning.

6. We endorse the recommendations under the Energy Security Initiative as agreed by the Energy Working Group at its 23rd meeting, taking consideration that APEC's fundamental principles of

cooperation, voluntary participation and mutual respect must be recognized under the widely differing circumstances of our economies. APEC Economic Leaders welcomed the Energy Security Initiative in their declaration of November 16th 2000, and, accelerated by the events in the United States on September 11th 2001, the subsequent Leaders Statement on Counter-terrorism released on October 21st identified this APEC initiative as a key measure for enhancing counter-terrorism.

7. We commend the Energy Working Group for its solid contribution to energy security through its broad based program covering both short term and longer term options that can be drawn upon by economies. We also welcome the opportunity to share experiences and best practices with respect to emergency preparedness plans to deal with short-term supply disruptions.

8. We direct the Energy Working Group to promote the implementation of the Energy Security Initiative. In the short term, undertake work on improving monthly oil data, where available; real time emergency information sharing; the option of oil stocks among interested members; considering a feasibility study on possible joint stocks among interested members; and organizing dialogues on sea lane security issues. In the longer term, look into energy exploration and development; alternative fuels; high efficiency vehicles; and more energy-efficient modes of public transport.

9. We note the Energy Business Network concern that sustainability needs practical responses that encompass burning fuels more cleanly, capture and geological sequestration of carbon dioxide, the use of new and renewable energy technologies, and improving energy efficiency. To assist sustainable development, the member economies agree to work together to pursue collaborative research programs. We also welcome progress under the 21st Century Renewable Energy Development Initiative, which includes a strong private sector involvement and applications in rural and remote regions.

10. We acknowledge the importance of sharing information on energy standards, and the desirability of reducing barriers to trade in energy-efficient appliances and products to enhance energy efficiency. We therefore endorse the Energy Standards and Labeling Co-operation Initiative as a timely and effective policy instrument. We also welcome the Pledges of fifteen economies under the Pledge and Review process for achieving energy efficiency gains. We further encourage all economies to consider a Pledge.

11. We also recognize the importance of strengthening efforts on energy education, as proposed by one of the economies, and request that the Energy Working Group review this initiative.

12. We welcome the initiative of the Energy Working Group to showcase its contribution to energy for sustainable development through the report Energy for Sustainable Development: The Contribution and Role of the APEC Energy Working Group. We believe that the forthcoming World Summit on Sustainable Development would be an opportunity for APEC to demonstrate to a wider global audience how voluntary regional partnerships can be utilized to achieve sustainable development objectives. We therefore direct the Energy Working Group through Australia and Mexico to forward this report to the World Summit on Sustainable Development for their consideration.

13. We believe that cross-border inter-connections of energy systems have the potential to bring great economic and technical benefits to our energy systems and to provide significant energy trade opportunities. We therefore direct the Energy Working Group to expand its preliminary work on addressing barriers to cross-border connection of power grids to cover gas pipeline networks and to work closely with the Energy Business Network in this regard.

14. We believe that energy emergency planning is important, including for disasters caused by natural factors, and that economies should be encouraged to share related information. We therefore welcome the progress made on the Earthquake Response Cooperation Initiative that has resulted in information and experience sharing in this kind of emergencies for energy supply systems.

15. We re-affirm our commitment to working closely with the business sector and note their recommendations for enhancing the functioning of the energy market. In particular we note the

challenges of facilitating investment for energy infrastructure development in all member economies and the importance of clear, transparent and predictable laws and regulations to attracting foreign and private sources of capital, technology and expertise to facilitate both modernization and diversification of energy sources in the region. We are pleased to note that there have been four Implementation Facilitation Assistance Team visits directed at reform of the energy market within Thailand (twice), Peru and the Philippines, which the hosts have deemed very helpful. We note that Implementation Facilitation Assistance Teams can provide experience and advice on options and approaches to address any issues within the energy sector and encourage the use of these teams.

16. We direct the Energy Working Group to explore mechanisms for working more closely with financial institutions to facilitate the infrastructure development within the region.

17. We continue to be committed to the implementation of the for the Integration of Women in APEC, which is a significant step to enhance the ability of women to contribute to and benefit from prosperity of the region.

18. We acknowledge the efforts of the Expert Groups and APERC in continuing to support the activities of the Energy Working Group.

19. We appreciate the considerable dedication of time, resources and effort by Australia to providing a Secretariat for the Energy Working Group and hope that Australia can continue to provide this outstanding support.

20. We thank the Government of Mexico for hosting this meeting, in particular the Mexican Department of Energy for its leadership in coordinating the issues discussed at this Fifth APEC Energy Ministerial Meeting.

21. We welcome the opportunity to meet and discuss recent developments in the energy sector and the opportunity afforded by this meeting to give direction to the future of the work of the Energy Working Group. Making the best use of energy will remain a priority for all APEC economies. We are aware that using our resources in a responsible manner and ensuring the availability of energy services in our respective economies will be a contribution to the fulfillment of our longer-term vision. We are committed to meeting APEC's rapidly increasing demand for secure, reliable and affordable energy in an environmentally responsible way and direct the Energy Working Group to chart the progress in the implementation of the initiatives mentioned above and to report back at the next Ministerial meeting.