

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)
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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.

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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

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-Il 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. VostokEnergо 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-Tokhonskoye	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.