

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

International Workshop held in Khabarovsk, September 17-19, 2002  
Co-organized by the Economic Research Institute for Northeast Asia (ERINA)  
with the Institute of Economic Research, Russian Academy of Sciences,  
the Administration of Khabarovskiy Krai, and  
the Korean Energy Economics Institute (KEEI)  
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<sup>1</sup> There were five round table-type discussions during the workshop: one addressing **Japan-U.S. Interests**, moderated by Susumu YOSHIDA, Director General of ERINA; one on **Korea**, moderated by Sang-Gon LEE; the **Policy Issues** round table, moderated by Lee-Jay CHO; the round table on **China**, moderated by Jianyi HU; and the round table on **Russia**, moderated by Pavel A. MINAKIR.

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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.

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

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. Until recently, the exceptions were limited to the Sakhalin oil and gas projects and the Korean Peninsula Energy Development Organization (KEDO), which use to be seen as the symbiosis of energy needs and security concerns. In 2001-2002,

the list of new projects expanded, including an oil pipeline to China promoted by YUKOS Company and an oil pipeline to Nakhodka proposed by Transneft Company.

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. Yet, recent advances in LNG (liquefied natural gas) technologies and trading practices promise to make gas markets even more competitive.

The problem is that the price tag of the pipeline 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.

At the meeting in Khabarovsk, the project participants focused their attention on Russia and policies and developments in the energy sectors of its neighbors, as well as other issues related to sustainable development and regional economic cooperation in Northeast Asia.

The first workshop of the project, which focused on China, was held in June 2001, in Tainai, Niigata (*ERINA Report* no. 41, August 2001, pp. 44-51). It served as a follow-up to an earlier ERINA effort to study 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. The second workshop, which focused on the Korean Peninsula, took place on March 28-30, 2002 in Seoul, Republic of Korea and was co-hosted by KEEI. Reports are available at <http://www.erina.or.jp/publication/Energy.htm>

## **KEYNOTE SPEECHES**

**Takehiro TOGO,  
Senior Counselor, Mitsui & Co. Ltd.,  
Former Ambassador to Russia**

The effects of a century of conflict still cast a heavy shadow over the Northeast Asian subregion, but it seems that imperialism and militarism are retreating into the past, while ideology is ceasing to be a factor in conflict between nations. A paradigm for a new international society is being shaped, with anti-terrorism coalitions being established, transcending race and religion.

Recently, energy security and environmental problems have emerged as issues of serious concern in the subregion, particularly in the fast-growing economies of the Republic of Korea (ROK) and China, as well as in Japan, the largest importer of energy in Asia.

Following strong growth in the 1990s, the ROK's economy suffered a major blow due to the 1997 financial crisis, but bold reforms enabled it to bounce back relatively rapidly and by 1999 its energy consumption was higher than it had been in 1997. China's economic growth was also remarkable, leading to rising energy consumption and making China a net oil importer. Energy demand and imports will inevitably increase further, in line with development needs, industrialization and improved standards of living. Energy use in Japan, meanwhile, has become more efficient after the two oil shocks of the 1970s. On the other hand, energy consumption increased during the boom of the 1980s and demand has continued to grow steadily even in the post-bubble decade of the 1990s.

Given these circumstances, rising energy demand in the subregion is inevitable. However, the economies of the area are reliant upon the Middle East for most of their oil and some natural gas imports. Consideration must be given to diversifying supply sources in order to improve energy security and the efficiency of energy imports. In order to manage these problems, cooperation that encompasses natural resources in Russia is essential. Russia and Central Asia have greater oil reserves than the rest of Asia combined, not to mention the world's largest natural gas reserves in Eastern Russia.

Natural gas is significant from an environmental perspective. Nuclear power is also a promising alternative to coal and oil in terms of reducing carbon dioxide emissions, but given the problems of safety and the storage of nuclear waste, natural gas has advantages. The wider use of natural gas could particularly benefit China, which depends on coal for more than 70% of its primary energy consumption. The share of natural gas in overall

energy consumption in Japan is about 12%, but in Asia as a whole it is only 6%, which is very low compared with the 21%-30% share occupied by natural gas in the energy balances of Europe and North America. On the other hand, most of Asia currently lacks gas delivery infrastructure, including cross-border pipelines. In addition, advanced natural gas-related technology should help to expand natural gas demand in the region.

Today, the main focus of attention is China's 4,200 km-long East-West pipeline project, linking the Tarim Basin and Shanghai. The ROK is already well equipped with a nationwide pipeline network, on which KOGAS has been working steadily since LNG imports commenced in 1986. There are plans to provide nine out of ten Korean households with access to pipeline gas. In contrast, in Japan, there is only a clustered pipeline network along the coast, with town gas delivery in major urban areas. Only two of the country's natural gas pipelines exceed 100 km: Teikoku Oil's pipeline between Niigata and Tokyo and Japan Petroleum Exploration's pipeline between Niigata and Sendai.

As far as cross-border cooperation is concerned, several pipeline routes have been discussed, including one from Eastern Siberia to China and possibly to Japan, and another from Sakhalin to Japan and the Koreas, as well as from Central Asia to China. China and Russia have already concluded an agreement relating to a strategic partnership in the energy field and the ROK has agreed to undertake a joint feasibility study into the development of the Kovykta gas field in Irkutskaya Oblast. Moreover, the pipeline issue was apparently touched upon in energy-related discussions during President Vladimir Putin's visit to the DPRK in July 2000.

Apart from Sakhalin, all proposed routes for cross-border gas pipeline projects incorporating Japan traverse China and the ROK, so it is necessary to establish a framework for cooperation with those countries. Cooperation in energy infrastructure development would help in converting some Chinese power plants from coal to natural gas. Japan should take a leading role in assessing natural gas demand in Northeast Asia as a whole, as this could assist planning, reducing pipeline costs and lowering the price of natural gas.

Japan and the ROK are members of the International Energy Agency (IEA) and maintain substantial oil stockpiles. On the other hand, there is no real oil stockpile system in China (including Taiwan), a situation that should be rectified. The creation of an IEA-style stockpile for Northeast Asia could be an effective tool in dealing with potential oil supply disruptions.

Furthermore, Asia has abundant reserves of coal, which is cheaper than oil and natural gas, with prices remaining stable. However, the environmental burden arising from the use of coal cannot be ignored. China is the region's biggest coal consumer and the application

of clean coal technology is crucial, particularly given the fact that most of China's coal is of a lower quality and therefore more polluting. Coal washing, coal gasification and desulphurization are among the techniques that enable cleaner coal use. New coal-fired power plants in Japan are already using powdered coal and demonstrating generation efficiency in excess of 40%. There are opportunities in Northeast Asia to cooperate in promoting and transferring clean coal technology. Moreover, the gypsum that is a by-product of the desulphurization process can be used to treat alkaline soil, making it suitable for cultivation, including food production and reforestation.

With electrification likely to progress in the DPRK and Mongolia, cooperation in technology transfer, capital and resource allocation will be necessary. Building new export-oriented power plants that use the abundant hydroelectric power and natural gas resources of the Far Eastern Russia and Siberia would contribute to clean electrification, alleviating peak load-related problems. It is possible that the DPRK's fragile electricity network could be interconnected with power distribution lines in Northeastern China, Far Eastern Russia and the ROK. Meanwhile, a plan to build a gas-fired power plant in Sakhalin to transmit electricity to Japan would form the largest single element of the electricity network in the subregion. Given that domestic power networks have been developed to a certain degree in all countries of the area, power interconnection may require less investment than pipeline construction. Japan could cooperate in the fields of power transmission technology and the operation of power systems. Finally, various multilateral, bilateral and inter-company cooperation frameworks exist in order to promote the peaceful use of nuclear power. Incorporating the DPRK into these frameworks will be important for the political and economic stability of the region.

However, the most important task in terms of energy cooperation in Northeast Asia is to diversify oil and natural gas supply sources. Russia's track record in supplying pipeline gas and oil to Europe demonstrates that it is a partner that can be trusted. In addition, Russia's political and economic stability in recent years supports that sense of trust. Naturally, the inclusion of the DPRK, Mongolia and Taiwan, in addition to the economies mentioned above, would enhance the significance of any such regional cooperative framework. In Northeast Asia, no government-level framework exists at present, but recent efforts to overcome the difficulties of the past could lay the foundations for cooperation.

Since 1986, Mitsui and Co. has been involved with European and U.S. oil majors in the Sakhalin 2 oil and gas development project, with a total of US\$10 billion of investment. In April 1994, Shell, Mitsui, and Mitsubishi Corporation formed Sakhalin Energy, a joint venture company, to operate the project. Oil production has been taking place since the summer of 1999, with more than 30 million barrels of crude already produced. Once the

second phase of the project has been launched, natural gas will be produced along with oil. Various infrastructure projects are in the planning and construction stages, including the world's largest natural gas liquefaction plant, on which work is due to commence by 2007, with a view to exporting LNG.

The areas covered by Sakhalin 2 have oil reserves of 140 million tons (Mt) and more than 550 billion cubic meters (Bcm) of natural gas. The geographical proximity of the project's site to markets in Northeast Asia makes it an extremely important potential supply source for the area. However, despite the Production Sharing Agreement (PSA) concluded in 1994, the project has faced some problems. The PSA's legal validity was only confirmed in 1996 and even after that there were discrepancies with existing laws, causing problems with its implementation, including the customs regime issues. Furthermore, the procedures for obtaining the necessary permits were cumbersome, complex and time-consuming. Nevertheless, despite all these troubles, the governments of the Russian Federation and Sakhalinskaya Oblast have cooperated in various ways to facilitate the implementation of the project, including making efforts to revise PSA legislation.

The LNG project and the cross-border pipelines are not mutually exclusive and could have the potential to re-draw the energy map in Northeast Asia. The main problem is the implementation period—when will these projects come to fruition? This depends on how actively investors and neighboring countries become involved in cooperative energy ventures. It may be necessary to create a new subregional framework to discuss strategic responses to existing and future challenges. One option would be to set up a Northeast Asian Subcommittee within the existing APEC framework. Cross-border energy cooperation would accelerate the economic development of neighboring countries. Moreover, these countries will have a greater say in international oil and natural gas markets, as well as developing the ability to respond collectively to environmental challenges. The European Union could serve as a role model in this multilateral endeavor.

**Robert A. MANNING,  
Senior Counselor for Energy, Technology and Science,  
Department of State**

A new dimension in energy security has arisen in the aftermath of the September 11<sup>th</sup> terrorist attacks, with energy security now encompassing the physical security of energy facilities, such as power plants, electricity grids and pipelines. The new situation also offers an opportunity for rethinking the concept of energy security. National security, energy and environmental issues used to be dealt with as completely separate issues, but they should increasingly be considered as integrated elements of any well-thought-out energy policy. Energy policy is no longer a matter of matching supply and demand at the most affordable price; a longer-term, more comprehensive approach is required. In this context, natural gas will gain in importance as a fuel, especially in Asia, as well as being a huge factor in the burgeoning of energy development in Russia. Exporting natural gas to Northeast Asia will be the next step in Russia's development as a global energy producer, following on from its supply of oil and natural gas to Western Europe.

Historically, energy has been the focus of conflict and competition, but current trends seem to indicate that it is increasingly becoming an integrative force, both regionally and globally, while many of the energy reserves depletion scenarios proved invalid. Energy forecasters over the years have almost invariably been wrong. According to BP's annual survey, world reserves seem to increase each year, while world demand is also increasing. This is due to the fact that many experts have tended to underestimate technology. Over the last two decades, there has been a revolution in the way oil is produced and marketed. Energy markets have become global futures markets and this is shaping national decisions regarding energy choices and definitions of energy security.

Predictions that oil reserves will run out have also been wrong. Many wells in the North Sea that had been forecast to experience a decline in production are still producing well. Three- and four-dimensional seismic technology and the ability to produce oil more cheaply enable greater use to be made of existing oil reserves, with companies getting 50% or 60% out of a well where previously they would only have been able to recover 20% or 30% of the oil.

Many of the discussions about energy security in Northeast Asia also tend to focus on scarcity as a factor in government decisions and energy policies. However, there is in fact plenty of oil and the oil age will not end because we run out of reserves. Oil reserves are quite high if less conventional sources are included in the estimates. The situation with natural gas reserves is similar—these reserves have only begun to be looked at in recent years and have probably been underestimated. China's gas reserves, estimated at around 50

trillion cubic feet, are probably much greater because detailed explorations are still only at a relatively early stage.

On the other hand, in the past quarter of a century, Asia has driven world energy markets. Between 1971 and 1994, Asian consumption quadrupled, growing at a rate of almost three times the world average. Since 1980, China's energy consumption has grown enormously, falling just a little short of 5 million barrels of crude oil per day (Mbd), including 1.5 Mbd of imports. Despite the 1997 crisis, Asian demand for oil is projected to grow at more than twice the rate of world demand. Asia already consumes more oil than the United States, or over 20 Mbd. About 62% of Persian Gulf oil is destined for Asia and OPEC predicts that this will rise to two-thirds by 2010-2015. Japan, China, Korea and Taiwan obtain 70%-75% of oil from the Middle East. This will inevitably rise because the majority of world oil resources are located in the Middle East. Nevertheless, scarcity of oil is unlikely to be a problem, although volatility in energy markets will continue to be a major issue. It is realistic to expect that oil prices in the next 10 to 15 years will remain in the \$15-\$22 per barrel range, possibly dropping even lower at times.

The truth is that since the oil shocks of the 1970s, markets have solved many problems, affecting energy supply and demand. There are two views about which factors are now shaping major energy policy decisions. One is a mindset influenced by 19<sup>th</sup> century geo-strategic theory, focusing on competition over resources. For example, although there is no evidence of significant reserves under disputed territories, the issue of oil has become a metaphor for rising nationalism among commentators on national security and territorial disputes. Despite this, most of the major players have a much greater stake in moving in the direction of cooperation rather than competition.

This alternative is based on the geo-economic approach, which posits that the future lies in cooperation and cross-border investment, with governments providing an environment that encourages both inward and overseas investment by energy companies. In this context, despite various theories concerning an "Islamic-Confucian" alliance between Asia and the Middle East, there seems to be no evidence of such proximity, with the relationship being on a purely commercial basis. Gulf states have bought into downstream ventures, such as refineries and East Asian sales, while East Asian players have been trying to buy into Middle Eastern production.

On the other hand, a number of countries have tried to diversify supply sources and such efforts are likely to continue. The United States, for example, is not overly reliant on the Middle East for oil, with the greater share of its oil imports coming from the Atlantic, the North Sea, Mexican and other Latin American sources, as well as offshore West African projects. In recent years, U.S. and European oil companies have become

increasingly involved in Russia, while Russian oil companies with a global reach have also emerged. Not only in Russia, but also in China and other countries, the way the energy sector operates is changing. Only 10-15 years ago, state oil companies in China, including Sinopec and CNPC were ministries; now they are international oil companies, buying oilfields in Latin America, Sudan and Central Asia, and operating more in line with market rules.

Asian energy demand will continue to drive oil markets and the challenge that the major oil importers in this part of the world are facing is the diversification of their sources of imported energy. In this context, natural gas is likely to play an important role. China and Australia recently signed a US\$18 billion LNG deal. Although natural gas consumption in Asia has been growing by about 18% per annum, it is still substantially lower than the Organization for Economic Cooperation and Development (OECD) average of about 24% of total primary energy supply. Progress with cooperation in the field of pipeline natural gas is slow but steady. However, pipeline routes cannot just be decided using maps, and their economics must also be considered. China's decision to supply the southeastern coast with LNG was based on the fact that it makes the most economic sense, while pipeline gas will be more suitable for Beijing and Northeastern China. Long pipelines tend not to be economically attractive. Interest in the Sakhalin 1 project pipeline is primarily based on its convenient geographic location and the fact that the distances involved are relatively short, thus ensuring that the costs involved are lower. Although economists are uncertain whether China will actually build a pipeline, it seems likely that it will construct not only the West-East pipeline, but also a North-South one. This will take time, and progress may be in stages.

There is therefore a fair amount of scope for natural gas expansion, with the thermo-efficiency, capital cost and environmental aspects of this fuel proving to be attractive factors. China, which is reliant on coal for 63% of its primary energy supply (a 7% drop on a few years previously) has made a strategic decision to rely more on natural gas and the decline in the share of coal is likely to continue. For the foreseeable future, a greater reliance on renewable energy will be problematic, as only certain areas in a small number of countries lend themselves to wind turbines and solar cells. As long as major countries have large, cheap coal deposits, it is going to be difficult to wean them off coal and get them to invest in cleaner, but more expensive energy. Investing in clean coal technology, whether co-generation, and/or carbon-capture and sequestration options will be crucial to alleviating global warming and local pollution.

At the risk of sounding futuristic, the United States and Japan are beginning to think seriously about shifting towards a hydrogen-based economy in the long run. This transition

should be well underway by the second quarter of the century. Many are hopeful that fuel cell technology will be the way forward and the U.S. is committed to research aimed at making this technology more efficient. Whether the burgeoning middle classes in China, India and Southeast Asia are driving fuel cell or internal combustion engine-powered cars in 25 years time will determine to a great degree what the state of the environment will be.

The role nuclear power can play in the energy mix should be adequately considered also. Northeast Asia is the one region in the world where nuclear generation is expanding, particularly in the ROK and China. The U.S. is working with Russia and Japan on fourth generation nuclear reactors, looking for the most effective, efficient and low-cost option for advanced nuclear technology. About 23% of the U.S.'s electricity is produced using nuclear energy, while in Japan and the ROK this share is about 30% and 25% correspondingly.

However, over the last two decades nuclear power has been dogged by a number of problems, including public concern, which limits the expansion of the nuclear industry. Nuclear safety and the disposal of nuclear waste are pressing issues. Safety in the nuclear industry has improved dramatically, but spent fuel is still a major problem. In the short-term, spent fuel can be stored on-site, but long-term disposal needs to be considered. The United States is trying to build a long-term waste repository at Yucca Mountain. In Northeast Asia, Japan, Taiwan and the ROK are all facing the problem of what to do with their nuclear waste. The Chinese government is also taking the issue seriously. Russia has passed a law expressing a willingness to handle nuclear waste as a commercial venture and this ought to be explored as a potential source of regional energy cooperation.

Cooperation in strategic petroleum reserves should also be investigated. After the oil shocks of the 1970s, the United States and Europe united to launch strategic petroleum reserve programs and a system for sharing these in the event of any disruption to markets. Securing the sea-lanes used for oil shipments is also important, but no amount of aircraft carriers will make a difference, if something happens to disrupt Saudi oil production. Short-term disruption poses a real threat to Northeast Asia's oil supply and strategic petroleum reserves would best address this problem. A subregional system similar to the IEA could be useful. China and India have been considering establishing such reserves, while Japan and the ROK, as IEA members, already have their own oil stockpiling programs, so there is potential for multilateral cooperation in this area.

In summary, in the near future, there will be further moves towards natural gas in Northeast Asia. Moreover, investment in cleaner coal and next-generation energy-saving technologies will be required. However, it should be noted that there is a great deal of uncertainty regarding global warming – how much can be attributed to natural variation

and how much to human behavior is still unclear. Nevertheless, carbon dioxide emissions linger in the atmosphere for a long time – a century or more – so the goal of stabilizing emissions will not be reached by 2012 as specified under the terms of the Kyoto Protocol. What matters is achieving a “revolution in energy affairs” over time, moving away from a carbon-based economy to a new economy based on new energy technologies. This can only be achieved on the basis of what markets can bear, fitting in with the lifecycles of existing infrastructure and equipment. It should be noted in this context that the United States has invested more in climate science research in the last decade than the rest of the world combined.

**Evgeniy N. GALICHANIN,  
State Duma  
Committee on Energy, Transport and Communications**

I would like to touch upon three important issues in providing a brief overview of Russian policy in the energy sector, its legal underpinnings and the projects to be implemented in the near future in Eastern Siberia and the Far Eastern region. The first topic on my list is the long-term strategy for the development of the energy sector and the specific programs adopted to support its realization.

Secondly, I would like briefly to speak about federal legislation – already enacted and in the pipeline – relevant to the energy sector. I think it is important to review the realization mechanisms behind these laws, in particular the production-sharing agreement (PSA) legislation, which covers energy projects to be implemented in the Far Eastern region and Siberia, among other regions. Thirdly, I would like to share with you my views on the current status of the electric power industry as the most important part of the Russian fuels and energy complex.

First of all, the new approach towards energy sector management in Russia has been encapsulated in the framework called “Russia’s Energy Sector: Towards Sustainable Development through State-Civil Society Cooperation.” This conceptual framework is the product of a seven-year study supported by the International Fuels and Energy Association. The framework incorporates the prevailing trends in energy sector development, including the expansion of energy-saving technologies, reduced environmental impacts of energy use, shifts in the fuel mix and new approaches towards the management of resources. In addition, the framework accounts for broader economic developments, including those affecting Russia, such as energy exports and energy markets. Due attention has been paid

to growing energy consumption on the part of China, India, Japan and the ROK, and the potential of the Far Eastern region and Siberia to fit into this changing picture as energy exporting regions.

The energy sector management framework defines the prospects for the sustainable development of the Russian energy sector for the next five decades, balancing public and civil interests, economic development and improved quality of life, inter-generational justice in accessing resources, and environmental conservation. Three phases were envisaged by this framework in forming physical, organizational and financial foundations to ensure the transition towards a new energy industry aimed at the sustainable use of energy.

Short-term priority issues to be dealt with in 2000-2003 include the enforcement of legal and economic mechanisms in the energy sector that allow the improvement of the investment climate. At this point, new methodology and legal requirements concerning the sustainable energy sector shall be formulated. The list of mid-term problems to be attended to in 2004-2010 includes the formation of new energy infrastructure, support for structural adjustment, the completion of groundwork regarding long-term development programs and projects and their early implementation in the regions of Russia within an integrated, nationwide energy sector management program. The long-term goals for 2011-2020 and beyond include the following:

- Completing the transition towards a new energy sector in Russia
- Adopting advanced energy efficiency and environmental standards
- Creating conditions to ensure harmony in the “energy – development – environment – society” quadrangle.

Specific support programs are being developed to achieve these goals; some of them have already been adopted, some are entering implementation, and others are muddling through the conceptualization stages. The list of such programs includes the “Rational Energy Use Program,” “New Coal Wave,” “The Second Nuclear Power Era,” “Distributed Generation,” “New Energy Sources,” “Natural Gas: New Prospects for Sustainable Development” and “Oil Sector Modernization.” To illustrate, I would like to refer to the “Clean and Economically Accessible Energy” program, which was designed to explore viable alternatives to the traditional system of energy production and use; alternatives that would dramatically enhance the environmental friendliness of energy consumption.

The first phase of the program (2000-2015) requires gradual adjustments in the fuel mix, including a reduced share of natural gas and oil in power generation and increased reliance on cleaner and renewable energy sources. The second phase (2016-2030) would

aim to increase the share of cleaner and renewable energy, as well as reprocessed fuels, balancing these sources with traditional ones. The ambition of the third phase (2031-2050) would be to reduce the shares of primary coal, oil and natural gas, replacing them with environmentally sound and economically viable new energy sources, including clean coal-based fuels, gas hydrates, hydrogen and renewables, including hydroelectric power, wind, solar and biomass energy.

This comprehensive long-term framework envisages financing mechanisms, including the use of proceeds from royalties, energy-saving schemes, tax incentives and other concessions applied to energy producers and users that rely on new and cleaner energy technologies, as well as advanced methods of saving energy and making energy use more efficient. Moreover, the reassessment and restructuring of incomes and profits in the energy sector would help mobilize funding to support the transition to new and cleaner sources of energy.

In the second part of my presentation, which deals with the legal foundations and a regulatory framework, I would like briefly to describe the activities of the Energy, Transportation and Telecommunications Committee of the State Duma. We see our mission as being to revise existing laws and prioritize the adoption of new legislation that facilitates the transition to the new energy production and usage framework, covering the next five decades.

At present, 16 main federal-level laws, presidential decrees and cabinet instructions regulate all activities undertaken by enterprises and organizations in the energy sector. For example, the federal law on natural gas supplies in Russia specifies a role for the state in this sector, in the form of price and tariff policies aimed at the protection of both consumers and national interests. Another federal law on energy saving determines an economic and regulatory framework for enhancing the efficiency of energy use. Federal legislation concerning the production and use of coal ensures the enforcement of state policy in the coal sector. Yet another law provides for the control and regulation by the state of tariffs in the electric power and heat supply sectors. Recent changes in this legislation will ensure the introduction of a streamlined and centralized regulatory framework in this area.

The legislation on production sharing deserves special attention, particularly that segment of the legislation that regulates hydrocarbon resource development and foreign investors' participation in oil and natural gas projects. Investors took part in the formation and promotion of the production-sharing framework, which ensures adequate legal protection of investors' interests, including fair investment returns and other guarantees. In this regard, I would like to assure you that the numerous complaints and anecdotes

regarding bureaucratic hurdles and delays in the development and adoption of these regulations are often blown out of proportion. The most important precondition here is to acquire a detailed knowledge of these regulations and rely on a solid Russian partner.

For example, the 1997 law that regulates underground resource development on the basis of production-sharing includes 15 projects, including the oil and gas reserves of the Sakhalin shelf (Astrakhanovskaya seabed structure, East Ehaby, West Sabo, Katangly, Nabil, the northern dome of the Odoptu Sea, Ugleykuty and Central Okha). In 1999, production-sharing legislation incorporated another four projects in the Kirinskiy Block, included in the Sakhalin 3 project, while in 2000, seven more oil and gas fields were covered, including those of the North Astrakhanskiy area of the continental shelf.

In addition, the Energy, Transportation and Telecommunications Committee of the State Duma processed draft legislation on the use of petroleum gas and passed amendments to Article 7 (2) of the production-sharing law, which refers to the 70% share requirement for the supply of equipment and materials from domestic sources that has been routinely circumvented by operators of projects, who have exploited inconsistencies within this section of the law by using Russian intermediaries.

Within the list of seven new hydrocarbon projects to be covered by the production-sharing legislation there are three projects in Eastern Siberia and the Far Eastern region (the Odoptu Block and the East Smidtovskiy Block of the Sakhalin 3 project and the Kovykta gas field). In the very near future, the committee plans to review draft legislation proposed by the Sakhalinskaya Assembly regarding monitoring and greater transparency of ongoing projects covered by the production-sharing framework.

In 2001, the federal government adopted the federal target program “An Energy-Efficient Economy for 2002-2005 and Until 2010” as part of the general long-term energy framework. The list of initiatives concerning energy sector development in the Far Eastern region and Siberia proposed by this program includes the following steps:

1. The development of about 100 new oil fields, including those in Eastern Siberia and Sakhalin.
2. The construction of the first phase of the oil pipeline to China (2003-2005).
3. The construction of the second phase of the oil pipeline to China (2006-2010).
4. The construction of several gas pipelines in Kamchatskaya Oblast, Yakutia, Sakhalinskaya Oblast and Khabarovskiy Krai.
5. The development by 2010 of natural gas reserves in Krasnoyarskiy Krai (Peliatkinskoe field) and Irkutskaya Oblast (Kovyktinskoe field).

6. The gasification of provinces in Siberia and the Far Eastern region and the construction of 75,000-80,000km of distribution networks, with three-quarters of this network to be laid in rural areas.
7. The introduction by 2006 of about 49 million tons of capacity in the coal sector, including 21 million tons in the Kuznetsk Basin, 11.6 million tons in the Kansk-Achinsk Basin, and almost 10 million tons in the Far Eastern region.
8. The addition of a further 44 million tons of additional coal production capacity between 2006-2010, including 8.5 million tons in the Far Eastern region and 29 million tons in Siberia.
9. Several hydroelectric power projects are covered by the Program, including two power plants on the Bureya River, as well as the Ust-Srednekanskiy and Viluyiskiy hydroelectric power plants (HPP).
10. More green-field hydroelectric power projects will be started after 2010 (Zeya River, Uchur River and Low Angara River).
11. New technologies will be introduced for the development of oil and gas reserves in the northern offshore areas in the Arctic zone and the Far Eastern region, with delivery infrastructure to be constructed as well.

These plans, however, could be complicated by the ongoing reform of the energy sector, the power industry in particular. The urgent task of modernizing and reforming the power generation sector was under federal government review in 2000, when some basic principles and guidelines were introduced. The first round of reforms was meant to be completed in 2002. However, the government only proposed a set of draft legislative acts concerning the power sector in May 2002, which were rejected by our Committee because of the inconsistency of the proposed measures and the lack of a long-term vision outlined in the comprehensive energy framework. The Committee expressed much disagreement regarding some specific proposals related to regional regulatory frameworks, power distribution management and grid network privatization. The members of the Committee advocated two alternative approaches to reform. The first emphasized the need to adopt power sector charter legislation. The other was to begin with legislation on energy security, followed gradually by power sector restructuring legislation and other acts, including careful monitoring and adjustment.

**Vladimir A. POPOV,  
Vice-Governor,  
Administration of Khabarovskiy Krai**

The modernization and development of the fuel and energy supply sector in Eastern Russia is extremely important for all the provinces of Far Eastern Russia. Firstly, the energy production, supply and distribution play a vital role in this area known for its harsh and cold climate. Secondly, the development, recovery, processing, transportation and distribution of energy goods and services form a very important part of the regional economy and will retain their importance in the future. In 2001, the share of the energy sector in regional industrial output was 26%, while fuels accounted for 30% of regional exports. At the same time, businesses in the energy sector and related enterprises employed only 5% of the workforce.

From 1999-2001, with the economic recovery, the cumulative domestic regional demand for primary energy expanded by 6%, while the consumption of electricity increased by 11%, assisting the recovery of investment activity in this sector, which includes the coal industry and natural gas and oil production, as well as the electric power industry. However, the protracted crisis of the 1990s, both in Russia and the Far Eastern provinces, badly affected the energy sector, reducing its reliability, efficiency and capacity for modernization.

In March 2002, the federal government and regional administrations endorsed a comprehensive plan for the social and economic development of the provinces of the Far Eastern and Trans-Baikal regions up to 2010, a so-called Regional Development Program. Energy sector development is the main priority of the Program, aimed, first of all, at enhanced regional energy security, and, secondly, at cross-border energy cooperation with neighboring economies. In summary, to achieve a desirable level of energy security domestically, the Program proposes to improve the reliability of energy supplies, thereby increasing self-sufficiency and promoting the diversification of the fuel mix. Achieving these three goals means that the Far Eastern region will not experience shortages of fuels and power in the future, as the region will rely to the maximum degree possible on regional production and avoid excessive price volatility in energy markets, thereby ensuring that social needs are met and competitiveness of the enterprises located in this vast cold area is promoted.

The new approach to regional energy security includes the following nine priorities: (1) energy saving; (2) an expanded primary energy supply; (3) the promotion of the local and intra-regional production of fuels, heat and electric power; (4) an adequate power and heat supply; (5) increased coal production in the region; (6) sustainable power generation supported by new hydroelectric power projects (HPP) such as Bureiskaya HPP, Viluyskaya HPP and Ust-

Srednekanskaya HPP; (7) the dynamic expansion of oil and natural gas production in the region; (8) the construction of trunk pipelines and distribution networks for the gasification of urban and suburban areas in Khabarovskiy Krai, Sakhalinskaya Oblast and Primorskiy Krai, as well as in Kamchatka, Yakutia and Chukotka provinces; (9) the promotion of new and renewable energy sources, including micro-energy projects, particularly in remote areas; and (10) an enhanced focus on the processing of oil and natural gas, as well as exports of energy goods and services.

In summary, the implementation of the Regional Development Program would, first of all, require a 1.8% annual increase in primary energy supply and an estimated 3% annual growth in power generation. Secondly, the dynamic expansion of the primary energy supply from 46 million tons of oil equivalent (Mtoe) in 2006 to 108 Mtoe in 2010 will be based on increases in natural gas and crude oil production. The total domestic regional demand for primary energy in 2010 is estimated at 50.5 Mtoe, meaning that by 2007-2008, the whole of the Far East and Trans-Baikal regions will basically be energy self-sufficient, retaining economically viable links in crude oil, oil products and coal shipments from Eastern Siberia.

Thirdly, it is estimated that in 2010, regional electric power demand will exceed 50 TWh, including 34 TWh consumed in the provinces of the “southern belt.” Generally speaking, this would mean a sufficient supply of electric power to balance regional domestic demand, allowing about 3 TWh of electric power to be transmitted for exports. Moreover, the Program envisages increased reliance on renewable energy, particularly conventional hydroelectric power projects that would provide about 12 TWh by 2006 and 18 TWh by 2010, accounting for 28% and 36% of total power generation in the region.

Finally, the important part of the Program is the gasification of the region and an increase in the share of natural gas in the fuel mix for power and heat production from the current 12% to 24% in 2010. In Kamchatskaya and Sakhalinskaya oblasts, this share is expected to be 77% and 70% correspondingly, while in Khabarovskiy Krai, the figure is forecast to be 40%.

The implementation of the Program would require significant capital investment estimated at between US\$800 million and US\$1 billion a year (in 2000 prices). Regional sources are not sufficient to meet these investment needs and the Program proposes that part of the funding be generated through the implementation of cross-border energy projects with neighboring countries and international investors. By promoting cross-border energy links with those neighbors, the Far Eastern region could benefit through access not only to capital sources, but also advanced technologies. On the other hand, the construction of cross-border delivery infrastructure and expansion of exports would lead to energy efficiency and environmental sustainability in Northeast Asia, as well as enhanced competitiveness in the regional energy sector.

Moreover, the current symbolic presence of Russia in the energy markets of Northeast Asia could be transformed into genuine and comprehensive energy cooperation with neighboring economies. In this context, the following energy projects deserve special attention. The first is the development of oil and gas reserves offshore from Sakhalin, beginning with the Sakhalin 1 and 2 projects. It is expected that by 2010, crude oil output in Sakhalin could reach 28 million tons (Mt) a year, while natural gas production is estimated at 15-18 billion cubic meters (Bcm).

The second group of projects is the development of natural gas and oil reserves in Eastern Siberia and Yakutia, including the construction of natural gas delivery infrastructure centered on the Kovykta project. It is estimated that gas exports to neighboring markets from these sources could reach 30 Bcm. There are two feasibility assessments in progress regarding major oil pipeline projects in Eastern Siberia, including the Angarsk-Nakhodka pipeline with an annual capacity of 50 Mt and the Angarsk-Daqing pipeline, which has a capacity of 30 Mt.

Another promising energy project is the Elga coalfield in Yakutia, which has a confirmed 2.7 billion tons of steam and coking coal reserves. The estimated annual capacity of the project is 30 Mt, including about 20 Mt for exports. Moreover, as mentioned above, Russia is interested in cross-border power supply projects to the Korean Peninsula and China. As of today, there are power transmission lines with a limited capacity between Irkutskaya Oblast and Mongolia, as well as between Amurskaya Oblast and China (Heihe). The latter could be used for exporting about 1.5 TWh, provided its capacity were expanded. In 2001-2002, negotiations were also taking place with the DPRK regarding a power transmission project from the southern part of Primorskiy Krai. In the longer-term, two mega-scale power transmission projects using direct current technology could become feasible, linking Sakhalin with Japan, as well as Eastern Siberia and China. These, however, would require the transmission of a total of 40 TWh of electric power a year and billions of dollars of investment. In this context, Russia is interested in the liberalization and opening up of electricity markets in neighboring economies and the interconnection of energy systems throughout Northeast Asia, which potentially offers significant economic and investment benefits.

Russia is also interested in promoting cross-border energy links through projects funded on the basis of the "joint implementation" concept set out in the Kyoto Protocol. The list of such projects could potentially include a program of gasification in Far Eastern Russia, including the construction of a gas trunk pipeline from Sakhalin to Khabarovsk and Vladivostok with a capacity of about 10 Bcm. Another two gas pipeline projects on a smaller scale that are to be completed in Kamchatka and Yakutia could also fall under this category. Cooperative energy ventures funded through "joint implementation" may include the modernization of Russian

thermal power plants to reduce their carbon dioxide emission levels. In 1998-2000, in cooperation with their counterparts in Japan, Russian experts drafted pre-feasibility assessments for 22 projects that could be considered in the context of “joint implementation,” including a new combined cycle power unit at Amurskiy Power Plant 1 in Khabarovsk. In time, five more power plants in Komsomolsk-na-Amure, Khabarovsk and Sakhalinskaya Oblast could also be considered for modernization, using gas-fired combined cycle technology.

Furthermore, a number of conventional hydroelectric power projects in Far Eastern Russia could contribute to the reduction of carbon dioxide emissions, given that only 3.3% of the economically viable hydropower potential in the Far Eastern region (estimated at 350-400 TWh annually) has been utilized thus far. These projects, however, require the mobilization of sizeable investment resources and multilateral cooperation in their implementation, not to mention market transparency and openness, which may be a challenge given that the rules of the World Trade Organization (WTO) do not cover energy services. Therefore, it is our common goal to design and establish an institutional framework that will facilitate subregional cross-border energy cooperation.



## **WORKSHOP SUMMARY**

The workshop kicked off with an opening session chaired by Alexander B. LEVINTAL, Vice-Governor of Khabarovskiy Krai, during which brief welcome remarks were made by the Chair and the co-organizers of the workshop. The first to address the participants was Hisao KANAMORI, Chairman of the Board of Trustees of ERINA, who welcomed the participants and expressed his hopes for the final workshop of the series, commenting that the content of discussions has become increasingly substantial. Sang-Gon LEE, President of KEEI, Lee-Jay CHO, Chairman of NEAEF and Pavel A. MINAKIR, Director of ERI also addressed the gathering, reiterating the need to transform the region's energy supply system into an efficient, flexible environmentally friendly one that can help manage energy supply disruptions and price instability, at the same time as addressing environmental concerns. Professor LEE emphasized that, given the abundance of environmentally friendly natural gas and hydropower reserves in the region, the answer lies in collective efforts in the field of regional energy cooperation.

Keynote addresses were delivered by Ambassador Takehiro TOGO, Counselor to Mitsui & Co. Ltd., Robert MANNING, Senior Counselor for Energy, Technology and Science of the

Department of State, Evgeniy N. GALICHANIN, who represented the Committee on Energy, Transport and Communications of the State Duma of the Russian Federal Assembly, as well as Vladimir A. POPOV, Vice-Governor of Khabarovskiy Krai.

Ambassador TOGO touched upon the changing geopolitical situation in Northeast Asia in the context of energy security. For decades, Russia has been supplying gas to countries in Europe via pipelines and has forged a status for itself as a partner that can be trusted. Moreover, the political and economic stability of recent years is intensifying a sense of trust and anticipation vis-à-vis Russia on the part of neighboring countries and gas customers in Northeast Asia. A cooperative framework in the field of energy in this subregion requires many difficulties to be overcome and a considerable record of achievement to be built up at the private sector level. In this context, the development and supply of natural gas through the promotion of the Sakhalin 2 project is of the utmost significance.

This project is based on the first ever production-sharing agreement enacted in Russia and both investors and the governments of the Russian Federation and Sakhalinskaya Oblast have cooperated in various ways in implementing this project, for example, by revising twelve laws relating to

production-sharing agreements. More broadly, however, cooperation that embraces energy issues has the potential to become a vehicle for greater regional cohesion on a hitherto unprecedented scale.

Robert MANNING emphasized that historically, energy has been the focus of conflict and competition, but current trends seem to indicate that it is increasingly becoming an integrative force, both regionally and globally. Most of the major players have a much greater stake in moving in the direction of cooperation rather than competition. In recent years, U.S. and European oil companies have become more involved in Russia and Russian oil companies with a global reach have also emerged. Natural gas will grow in importance, especially in Asia, and will be a huge factor in the burgeoning of Eastern Russia's energy development. This will be the next step in Russia's evolution as an energy producer and should be seen as a part of a broader change in the world of energy.

In the past quarter of a century, Asia has driven world energy markets. Although natural gas consumption in Asia has been growing rapidly, it is still substantially below the OECD average of about 24% (about 8% in Asia). Thus there is a fair amount of scope for expansion, with the environmental aspect proving to be a very important factor. In the near-term, there will be increasing

moves towards natural gas, and investment in cleaner coal and next-generation energy technologies will be required. There is a great deal of uncertainty regarding global warming, in terms of how much can be attributed to natural variation and how much to human behavior. However, the goal of stabilizing emissions will not be reached by 2012 as specified under the terms of the Kyoto Protocol. In the near term, the one available non-carbon source of energy is nuclear power, but while safety in the nuclear industry has improved dramatically, spent fuel is still a major problem. In Northeast Asia, Japan, Taiwan and South Korea are all facing the problem of what to do with their nuclear waste; Russia has passed a law on commercial handling of nuclear waste and this ought to be explored as a vehicle for regional cooperation.

Evgeniy N. GALICHANIN provided an overview of state policy in the energy sector, its legal underpinnings and projects to be implemented in the near future in Eastern Siberia and the Far Eastern region, including the long-term strategy for the development of the energy sector, federal legislation – both that already enacted and that still in the pipeline – relevant to the energy sector, and the current status of the electric power industry as the most important part of the Russian fuels and energy complex.

The new approach towards energy sector management in Russia has been encapsulated in the framework called “Russia’s Energy Sector: Towards Sustainable Development Through State-Civil Society Cooperation”. The framework incorporates prevailing trends in energy sector development, including the expansion of energy-saving technologies, reduced environmental impacts of energy use, shifts in the fuel mix and new approaches to the management of resources. It also accounts for broader economic developments, including those affecting Russia, such as energy exports and energy markets. Due attention has been paid to growing energy consumption on the part of Asian economies, including China, India, Japan and South Korea, and the potential role of the Far Eastern region and Siberia as energy exporting regions.

The energy sector management framework defines prospects for the sustainable development of the Russian energy sector for the next five decades, balancing public and civil interests, economic development and improved quality of life, inter-generational justice in accessing resources and environmental conservation.

Short-term priority issues to be dealt with in 2000-2003 include the enforcement of legal and economic mechanisms in the energy sector that will allow the improvement of the investment

climate. New methodology and legal requirements concerning the sustainable energy sector can then be formulated.

The list of mid-term problems to be attended to in 2004-2010 includes the development of new energy infrastructure, support for structural adjustment, completion of groundwork on long-term development programs and projects, and their early implementation in the regions of Russia within an integrated, nationwide energy sector management program.

The long-term goals for 2011-2020 and beyond include the transition towards a new energy sector in Russia, adopting advanced energy efficiency and environmental standards and creating basic conditions to ensure harmony in the “energy-development-environment-society” quadrangle.

Vladimir A. POPOV delivered a report on regional and local energy needs. He emphasized that the energy sector is the key to the economic and social development of every province in the Far Eastern region, considering both climatic conditions and the 26% share occupied by the fuel and power complex in the regional economy. Over the last three years, primary energy production has increased by 6%, while the demand for electricity grew by 11%. In March 2002, in collaboration with the provinces of the Far Eastern region, the federal government launched a comprehensive

program aimed at the economic and social development of the region's eleven provinces up to the year 2010. Energy sector development is by far the most important part of this plan, which pursues two main goals: enhanced energy security and energy self-sufficiency for the entire region and the development of export-oriented cross-border energy links with neighboring economies.

It is important to note that, by 2010, the production of oil, natural gas and coal will significantly overtake domestic demand and large-scale energy exports will constitute a very important field for cooperation with the economies of Asia-Pacific region, and the Northeast Asian subregion in particular. Moreover, the share of clean hydroelectric power in total electricity production will rise to 36%. In 2010, the share of natural gas in power and heat generation will double compared with 2000, reaching 24%. However, implementation of these plans will require considerable investment, estimated at about US\$1 billion a year, necessitating the nurturing of an investment climate that encourages both domestic and overseas investors.

Moreover, promoting cross-border energy links would require the opening and liberalization of energy markets, particularly in the power sector. Russia is also interested in exploring opportunities for the joint implementation of large-scale energy projects within the Kyoto

Protocol framework, including gas pipelines and wider reliance on natural gas, the modernization of coal-fired power plants and the expansion of hydroelectric power generation. An institutional framework for energy cooperation in Northeast Asia could assist the implementation of these plans.

Susumu YOSHIDA, Director General of ERINA added to this, pointing out that Russia is rich in natural resources and is conveniently located near such potential users of these resources as Japan, South Korea and China. However, the acknowledgement of these facts has yet to be followed by concrete action. The situation in Northeast Asia is improving, including the stabilization of the domestic political situation in Russia under the leadership of Vladimir Putin. Russia maintains good relationships with the United States, China, the newly-independent states of the CIS and other countries. Its economy has also improved since the 1998 crisis and is projected to grow at 5% annually until 2010. Naturally, economic growth leads to increased demand for energy. At the same time, Russia is enhancing its presence in world energy markets, expanding its oil exports. Several export-oriented oil pipeline projects are in the implementation or planning stage, including an oil pipeline from Eastern Siberia to China. Offshore oil production has begun on Sakhalin and new projects are taking shape, in addition

to Sakhalin 1 and 2. Russia could potentially export electricity to China and the Korean Peninsula.

Japan is also keenly interested in gaining access to the energy resources of the Far Eastern region. In cooperation with Japan, Russia has successfully developed coal reserves in Yakutia, as well as oil and natural gas fields in Sakhalin, although such mega-projects as the Western Siberia-Pacific coast pipeline project have yet to be realized. In the 1990s, Japan supported feasibility studies on three gas pipelines and a hydropower station. In general, there are many opportunities for the development of energy resources in Eastern Russia and the establishment of mutually beneficial energy trade links with the economies of Northeast Asia. Russia is trying very hard to establish framework conditions for export-oriented projects. However, the practical implementation of these projects requires considerable time, in addition to the participation of neighboring economies.

In his report, which focused on international organizations, the Kyoto Protocol and Northeast Asia, Yonghun JUNG, of the Asia Pacific Energy Research Center (APEREC), indicated that the issue of sustainable development is serious to the extent that regional economies are interlinked in terms of both economic development and environmental conservation. As

globalization advances, mutual dependence among Northeast Asian economies will increase in various areas, including trade, investment and the environment. Many issues will require collective and concerted efforts by the region's component countries if they are to be resolved with less economic cost and political friction.

Unlike in ASEAN, Europe, or North America, the economies of the Northeast Asian economic subregion have neither a multilateral regional agreement for cooperation, nor an established common market or even intensive cross-border energy links. Northeast Asia lags well behind in regional energy cooperation because of the lack of initiatives among these economies. Also, there is no active involvement by international organizations as a pathfinder for and supporter of regional energy development.

The need for energy-environment cooperation seems to be urgent. Since energy consumption is forecast to rise steadily for the next twenty years, it is not inconceivable that in the near future, some cities, particularly those in China, may suffer an environmental and ecological disaster that will take a heavy toll, both on health and economic growth. Moreover, the failure to contain local air pollution will result in the migration of pollutants seriously damaging the environmental quality of neighboring

economies. This implies that timely efforts to improve local air quality need attention now rather than later, because it can be extremely costly to restore certain ecological environments once damaged, assuming that they are not already in an irrecoverable state.

However, the global environment is still a remote issue as far as most people are concerned, because they do not directly feel the impact of damage to it and causality is often hard to prove. Furthermore, the lack of understanding of the “common tragedy” aspect of global atmospheric pollution actually encourages local inaction. For the time being, the improvement of local air quality is likely to be the main impetus for mitigating greenhouse gases until the Kyoto Protocol enters into force and reaches the implementation stage.

Shagdar ENKHBAYAR, Visiting Researcher at ERINA, indicated that recent developments in the ratification process of the Kyoto Protocol have fuelled hopes that it will enter into force shortly. More than 90 countries have ratified or acceded to the Protocol, encompassing 37.1% of industrialized countries' emissions in 1990. The recent announcement by Russia that it will ratify the Protocol can make it operational.

It is believed that both developed and developing countries will benefit from the Kyoto Protocol implementation, as they enable developed nations to

mitigate the costs of compliance with their greenhouse gas reduction commitments and, at the same time, allow developing countries to acquire funds for clean development projects. Northeast Asia has an ample opportunity to benefit from the Kyoto mechanisms as it consists of both Annex I and Non-Annex I countries. China and Mongolia are already parties to the Kyoto Protocol. Their industrial structures are dominated by inefficient, wasteful and polluting technologies, and energy intensive machinery and equipment.

On the other hand, as a major industrialized nation, Japan faces immense challenges in meeting its Kyoto targets. Therefore, there is presumably a close match of “demand and supply” for cooperation, using the Kyoto mechanisms in the subregion.

Also, inefficiency in resource use and over-reliance on coal for power generation, as well as excessive agricultural development and forestry exploitation are considered to be the major causes of environmental degradation.

In order to address the aforementioned issues, joint projects should be initiated on (1) CDM/JI capacity building and (2) launching a web-based eco-industry network. The objective of the latter is to facilitate project initiatives, promote the expansion of the international market for

environmental goods and services through enhanced trade in eco-products and services, and contribute to the nurturing of domestic environmental industries through the transfer of clean technologies and best practices in different industrial sectors.

Jianyi HU, Executive Vice President of the Asia Gas and Pipeline Cooperation Research Center of China spoke about natural gas in China and Northeast Asia, and stated that in the coming 10 years, gas demand in Northeast Asia is anticipated to grow at a rate of over 10%, from a level of 130 Bcm in 2000, increasing to 260 Bcm in 2010 and reaching 460 Bcm by 2020. In China, gas demand is expected to increase from 30 Bcm in 2001 to 110 Bcm in 2010. It is projected that a gas trunkline network connecting major cities in China will be completed by 2020, with annual gas consumption reaching up to 200 Bcm.

By that time, the construction of a gas pipeline network in Northeast Asia may have been completed, forming what could be the third-largest regional gas pipeline network after those in Europe and North America. The first step for developing a gas pipeline system in Northeast Asia is to explore and establish the mechanism and regulations for gas cooperation. This can be realized by establishing an intergovernmental committee that would incorporate non-governmental organizations, in addition

to various bilateral dialogues. A formal mechanism and set of regulations for cooperation in the oil and gas sectors will accelerate the economic integration process in Northeast Asia.

The next speaker, Joonbeom LEE of the Korea National Oil Corporation discussed the problem of oil security for Northeast Asia. He mentioned that more people have begun recognize the fragile nature of the energy security framework in Northeast Asia and a need for building closer relations in the field of energy. Oil occupies center stage in energy security policies and reliable access to sources of oil supply is a strategic imperative for oil-importing economies. In establishing an emergency oil system and agreeing collectively to respond to supply disruption, oil-consuming countries have taken a step towards energy security cooperation. In summary, energy security policies have progressed toward greater cooperation rather than self-sufficiency and autarchy.

Northeast Asia's role in the global oil trade is very important, accounting for more than one-fifth of crude oil and oil product imports. On the other hand, Northeast Asia is extremely dependent on oil from the Middle East. Behind only Japan and Korea in terms of oil dependence on the Middle East, China is expected to increase this region's share in its oil imports to between 70% and 80% by 2010.

Severe political tension in the Middle Eastern region, leading to a decrease in oil production, would inevitably have an impact on the oil supply to Northeast Asia. The rapid rise in dependence on the Middle East in Northeast Asia is quite in contrast to the situation in the U.S. and Europe, which have much lower dependence levels than those of Northeast Asia countries.

In addition to the limited diversification of oil supply sources, the economies of Northeast Asia are paying for oil more than the United States and Europe do. This price difference, known as the 'East Asia Premium,' varies, but in the 1990s Saudi Arabia charged Asian buyers \$0.83/bbl on average more than European buyers and \$0.93/bbl on average more than U.S. buyers. In addition, the heavy reliance on Middle Eastern oil brings the safety of oil shipments into question, given the terrorist attack on the United States in September 2001. That attack and recent terrorist activity in Southeast Asia increase concerns that sea-lanes in the region may be endangered. The Shanghai APEC summit (2001) declared that member economies should enhance counter-terrorism cooperation in responding to threats of energy supply disruption. The best method of reinforcing oil security in Northeast Asia is to use alternative oil supply sources.

Ying CHEN of China's Research Institute of Petroleum Exploration and Development said that the high dependence of the three countries on oil from the Middle East, including the potential security threat to the sea-lanes, made oil supply security a particularly crucial issue. Since China became a net oil importing country in 1993, oil imports have increased rapidly, from 60 million tons in 2000 to 70 million tons in 2001. It is predicted that by 2005 and 2010, the shortfall could reach 100 million tons, boosting import dependence to 38%.

According to the available data, South Korea has been involved in 95 overseas oil exploration and development projects in 36 countries and has obtained oil reserves of 120 million tons, allowing the production of 2 million tons of oil per year. In addition, the ROK's gas industry has experienced significant development with the most comprehensive, best-developed gas pipeline network in the whole of the Northeast Asian subregion. This will undoubtedly promote the diversification of gas supply sources, enhancing the reliability of the energy supply.

Susumu ABE, Advisor to the Global Infrastructure Foundation and Toshiba Corporation's former vice-president, discussed the problems of energy efficiency and new technologies. One of the most important messages of his presentation was that a technology

strategy for reducing greenhouse gas emissions must be devised today, but should focus simultaneously on both the short-term and long-term goals. The expansion of energy supply is important for meeting future global demand, but energy efficiency improvements will also play a crucial role. Greater efficiency enables the available supply to last longer, helping to lower pollution. Technological development has lowered the cost of producing energy-efficient products. In numerous end-use applications, including computers, home appliances, vehicles, manufacturing equipment, and office machines, efficiency has improved dramatically. Additional advances are possible as a result of expanded R&D efforts and the proliferation of new technologies. Governments have an important role to play, often in cooperation with the private sector, in removing barriers to the deployment of clean and efficient energy technologies.

The energy-environment dilemma appears to be particularly important in Northeast Asia, where energy consumption continues to increase rapidly, reliance on coal remains high and fossil fuel imports from distant sources are growing. Moreover, there is growing recognition that the ability of an individual country to deal with these issues is limited; therefore, regional cooperative approaches are required. In this regard, it is important to start with

cooperative recognition of the need to aim for simultaneous achievement of the 3Es as the long-term policy goal. If this goal is promoted, it will be necessary to clarify the role of each nation (or market) in such realms as responses to emergencies, the diversification of supply, infrastructure construction, efficient energy use and the environment.

Currently, natural gas is coming to the forefront as an alternative to oil and coal, and an international gas pipeline network could be essential infrastructure for sustainable development in Northeast Asia in the 21<sup>st</sup> century, strengthening socio-economic ties and contributing to energy security. The conversion of existing coal-fired power plants to running on natural gas could significantly increase the efficiency of power generation and reduce carbon emissions. The simplest approach is re-powering, where the existing power plant site is reused; this, however, requires significant capital investment. A more conventional approach to re-powering includes new gas turbines and heat recovery system generators used with existing turbines and other equipment. Because of the equipment's age and the steam turbines being designed for linkage to a coal-fired boiler, this approach results in lower efficiency and higher operating costs, but requires less investment. A gas turbine can also be coupled to the existing coal boiler, with 80% of the coal firing being

maintained. Such an approach could reduce CO<sub>2</sub> emissions by 35% to 40% with only minor dislocation.

In addition, developing, adopting and disseminating energy-saving technologies and promoting higher energy efficiency standards would improve energy security in Northeast Asia.

In economic terms, Northeast Asia is no longer merely a geographic region; it is an important part of the world economy. The future economic development of this subregion has to coexist with and contribute to the sustainable development of the world economy. As of today, we can anticipate that the increase in subregional energy production will not keep pace with rising demand, making the region increasingly dependent on imported energy, especially imports from the Middle East. In this regard, the dual goal of achieving energy security and finding solutions to environmental problems must be pursued.

Keiji TAKIMOTO of the research arm of Osaka Gas made a presentation on the heat-based gas engine co-generation system for households. Household gas engine co-generation is an innovative system that reduces household energy consumption by eliminating the losses suffered by existing systems. In addition to generating electricity using a gas-powered engine installed in the customer's home, it can utilize energy more efficiently by using excess heat

generated in the process in the household heating system and to heat water. The electricity generated by means of household gas co-generation can be used efficiently, without the losses that inevitably occur in transmission.

Under this system, heat loss is reduced considerably due to the use of excess heat in the thermal load, such as the hot water supply and heating system. In addition, not only can it be installed in new houses, but it can also be used in existing ones, thereby allowing energy conservation to be implemented in many households.

By means of an inverter, the electricity generated by the gas engine is converted into electricity of the same quality as that provided by electricity companies and supplied to electrical equipment such as lighting and televisions via the distribution board in the customer's home. After accumulating in the hot water tank, the excess heat from the engine is used in the hot water supply. In addition, the excess heat from the engine can be used directly in the heater and dryer in the bathroom, as well as the rest of the heating system.

Although at 1kW it has a relatively small output, the system has a generating efficiency of 20%. Moreover, by increasing the collection rate of excess heat, it achieves a combined efficiency of 85%. Even when the electrical load of the customer's house is less than the output

of the electricity generator, it is possible to channel the surplus electricity to the heater and store it as heat in the tank. The gas engine used in this system was developed for use in geothermal heat pumps, and has a good track record in terms of its durability.

Household gas engine co-generation mainly targets detached homes, and its installation in residential areas will become more common. The noise levels of the equipment are therefore a major issue, however the gas engine is excellent in this regard, generating only about 45 dB, which is roughly equivalent to the noise generated by the external part of an air-conditioning unit. Moreover, this system predicts the amount of heat necessary for one day and the length of time for which it will be used (or this information is entered using the remote control) and decides what time to start and stop the engine based on this. Thus, the system comes equipped with a learning capability that enables the hot water tank to run very efficiently, with little heat loss.

In order to improve the user's awareness of energy efficiency, the system's remote control incorporates such features as a display showing the amount of hot water currently being stored and various lifestyle-related reference functions, as well as being equipped with navigation functions that

enable the user's lifestyle to be adapted to an energy conserving usage pattern.

Kengo ASAKURA's paper, which was co-authored with Hirofumi ARAI of ERINA, dealt with the culture of natural gas use in Japan – the largest natural gas consumer in Northeast Asia and the world's leading importer of LNG. There are 21 LNG terminals in Japan, which mainly serve the power plants and the city gas needs of the surrounding area. Furthermore, pipeline gas from the Sakhalin offshore fields could enter the Japanese gas market, stimulating the emergence of a fundamentally new gas culture along the proposed pipeline routes, either to Tokyo or Niigata.

Of course, the Sakhalin projects alone cannot change the current situation totally. There are several factors that might affect further development of gas use in terms of quality and quantity, but Japanese gas consumption culture has certainly reached a historical turning point.

The decentralization of power generation has come into its own with the advent of new technologies, such as co-generation systems, fuel cells (FC), gas microturbines (GMT), compressed natural gas (CNG) vehicles and other technologies. In fact, co-generation itself is not a fundamentally new technology, because heavy industries have a long history of using power-generating facilities that also provide heat on their

sites. However, the development of smaller-scale systems that are suitable for small factories, commercial users and residential users is stimulating the decentralization of power supply. FC and GMT are core technologies for downscaling co-generation systems. At the moment, the energy substitution process in favor of natural gas requires appropriate infrastructure, namely an LNG transportation system and a pipeline system.

Alexander OGNEV's paper focused on prospects for using renewable hydroelectric power in Far Eastern Russia. The author, working at the Vostok-Energo, United Energy Systems "Russia," provided a comprehensive account that covered both the current status of and future prospects for utilizing hydroelectric power in the region. In general, the rivers of the Far Eastern region allow the consideration of about 400 large and medium-sized hydroelectric power plant projects, including about 100 technically feasible options with an annual electric power output of 200 billion kWh. Of these, 10-12 projects could be economically efficient and realistic sometime around 2020.

Various hydropower projects on more than 130 large and medium-sized rivers have been proposed, with an estimated output of close to 400 billion kWh, equivalent to almost half of the current annual power generation in

Russia. Only 3.3% of this potential is actually being used. In Siberia, this rate is close to 20%, rising to 46.4% in the European part of the country, while the national average utilization rate is 19%. More than two-thirds of electricity is produced by thermal power plants. In 2000, they accounted for 69% of the total electric power output, while within the Vostok Unified Power Grid (UPG Vostok) this share was above 81%. Hydroelectric power plants (HPP) provide 26% of total power generation in the region, while within the UPG Vostok this share is 18.7%. At present, four new HPP projects are under way, with a total generating capacity exceeding 3 GW.

In their co-authored paper, Vladimir IVANOV of ERINA and Boris SANEEV of the Energy Systems Institute of the Siberian Branch of the Russian Academy of Sciences discussed the policy problems of energy cooperation in Northeast Asia. Access to energy markets in the Asia-Pacific region is high on Russia's list of priorities. Its eastern neighbors could undoubtedly absorb large quantities of Russian oil, natural gas and electricity. In theory, Russia could contend for a share of vast energy markets in relative geographic proximity. However, export projections regarding these new markets tend towards the overly optimistic. The down-to-earth prospects for such exports have yet to be clarified in both quantitative and

qualitative terms. Among the central questions is the time frame of the proposed projects, what constitutes a realistic market share, and delivery technologies and routes. The investment attractiveness or otherwise of the projects poses yet another uncertainty.

What seems to be a problem is that the assumptions entertained by bureaucrats and politicians alike do not necessarily accurately reflect the existing scope for energy exports in the context of new trends in power sector management. In particular, natural gas export projections underestimate both the current role and potential competition on the part of LNG, not to mention ongoing improvements in technology that could reduce the cost of LNG supplies. In the longer term, the issue of whether LNG spot market development will enhance its competitiveness vis-à-vis the pipeline projects is open to question.

Furthermore, although electricity exports to China and the Koreas are technically feasible, the realization of such projects will take longer to accomplish, given complexities related to the reform of China's domestic power sector and high investment risks in the case of trans-Korean transmission infrastructure. The oil sector seems to be the only exception to these many uncertainties. In the oil trade, in particular, the dependence of regional economies

on the Middle East is very high and rising. Consequently, sources of oil in Eastern Russia can be seen as a decisive factor in ensuring the security of supplies, in addition to economic benefits.

The relative value of Russian oil sources increased in the aftermath of the September 11<sup>th</sup> terrorist attacks. Russia's growing oil output and exports enhance global energy security and cushion the risk to supplies from violence in the Middle East, or potential volatility of supply from OPEC nations. As well as being partially reflected during the May 2002 G8 Energy Ministers meeting held in Detroit, particular emphasis was placed on this by President George Bush and President Vladimir Putin during their May 2002 summit. In this context, Russia's new energy policy and long-term development plans deserve attention.

It seems that Russia has yet to come up with a long-term comprehensive approach for promoting its oil, electricity and natural gas in Northeast Asia. This strategy must envisage coordination among specific projects, regional development needs and export opportunities. Furthermore, such a strategy should be realistically coordinated with security trends and geopolitical developments.

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In this context, the policy environment for cross-border energy projects is as important as demand for energy, market access, or the availability of delivery infrastructure.

Both regional and broader international policy settings have been improving steadily since 1992, fuelling hopes that a sensible cooperative approach will prevail sooner rather than later.

What is needed is enhanced political trust among the country's neighbors, as well as a shared vision of how to promote energy security and the sustainable use of energy in the 21<sup>st</sup> century.

Realism in assessments is also needed, including close attention to the investment attractiveness (economic feasibility) of the projects under consideration.

Among the central questions are the projects' time frames, the share size of the targeted markets, and delivery technologies and routes.

Energy infrastructure projects are not necessarily the most attractive of the numerous investment opportunities throughout the world that are competing for finance. Efforts are needed to make energy investments more attractive and provide a transparent and stable environment for potential investors.

The economies of Northeast Asia are in need of a regional organization to

harmonize their goals and interests in order to achieve a sustainable and prosperous future for the region.

## PRELIMINARY OUTCOMES OF THE PROJECT

ERINA's project on *Energy Security and Sustainable Development in Northeast Asia: Prospects for Cooperative Policies*, which includes the three workshops held in 2001-2002 in Niigata, Seoul and Khabarovsk, supported by the Japan Foundation Center for Global Partnership and other organizations in the United States, Japan, the Republic of Korea and Russia, has the following goals:

- *Identifying prospects for cooperative energy security and sustainable development policies, including national, subnational and subregional opportunities for positive change, leading to result-oriented initiatives;*
- *Reviewing attitudes and policies towards cross-border energy links and barriers to overcome in order to ensure a concordance of interests regarding major energy security issues;*
- *Proposing measures to facilitate the practical implementation of mega-projects that would enhance subregional energy security and environmental rationality.*

This multilateral research and dialogue project was launched to identify viable policies and highlight both the pressing need for and the compelling benefits of cooperation in the energy-environment realm in Northeast Asia. The project has been helpful in identifying issues relevant to—and raising the common understanding of—what the economies of the subregion need to do for the future of the subregion and their own national interests as far as energy security and sustainable development goals are concerned.

The main goal of this part of the report is to discuss and justify some preliminary findings and proposals stemming from this endeavor. This section reflects upon problems, ideas and possible mutually acceptable measures, identifying also issues on which consensus has yet to be achieved.

Some points included in this section of the report contain ideas and proposals made by the project participants not only in the framework of the project activities, but also in their publications and presentations outside the project's framework. We would like to thank in particular Susumu Abe, Kengo Asakura, Bradley Babson, Norio Ehara, Jianyi Hu, Victor Ishaev, Amy Jaffe, Yonghun Jung, Sang-Gon Lee, Chan Woo Lee, Robert Manning, Alexei Mastepanov, Pavel Minakir, Masana Minami, Boris Saneev, Tatsujiro Suzuki, Takehiro Togo, Xiaojie Xu, Susumu Yoshida, Daojiong Zha and Fenqi Zhou for their insight and advice.

## HIGHLIGHTS

- *The Second World War provided the impetus for constructive cooperation based on coal and steel in Europe. What could perhaps work for Northeast Asia is the idea of a competitive and efficient energy sector that serves the needs of consumers and the national economies of the subregion.*
- *Energy security and national efforts to protect it are among the influential forces encouraging a movement towards cooperation in Northeast Asia. The countries of the subregion share the notion that a stable and cost-effective supply of energy is an economic and, by extension, national security imperative.*
- *For the energy-importing economies of Northeast Asia, the overall external dependence on hydrocarbons cannot be reduced. However, policies that promote comprehensive energy and broader economic interdependence within Northeast Asia will reduce energy security risks.*
- *By promoting energy cooperation within the subregion, the leaders of Northeast Asia can create a path towards shared prosperity.*
- *On the other hand, effective measures to counter various energy security risks and challenges are perhaps beyond any one country's control. Workable schemes by an individual country to reduce exposure to the risk of energy supply disruptions are limited.*

## 1. BACKGROUND

In the last two decades, worldwide energy supplies have been fairly stable and prices competitive. It is also true that, in the absence of a major crisis, there has been little incentive for policy change.

Although post-September 11<sup>th</sup> policy decisions could have a moderate mid-term impact on existing crude oil flows, the concerns and emotions unleashed by the terrorist attacks are likely to lead to long-term shifts in the energy security strategies of the major importers of oil, including the United States, the European Union, Japan, China and the Republic of Korea.

## 2. CHANGING POLICY CONTEXT

As other regions demonstrate, cooperation in the energy sector requires compelling *economic reasons*, solid *policy commitment* and *readiness* to enter long-term and interdependent relationships with neighboring countries.

National bureaucracies, constrained by domestic circumstances and tested approaches to energy security issues, have to find ways of modifying and improving the policy environment.

Moreover, Northeast Asia has traditionally been seen as a problematic corner of the Pacific Rim. This perception, however, is gradually changing, with energy issues at the core of the new policy shifts.

There are signs that the economies concerned, including governments and private sector actors, are adjusting their policies. The list of recent government-level and private sector initiatives includes the following:

- The “new energy dialogue” between Russia and the U.S. (aimed at energy infrastructure development, including in Eastern Siberia and the Far Eastern region)

- *Without exception, all the neighbors' energy sectors have been affected by the legacies of the past, including problems inherited from both the command economy (China, North Korea, Mongolia and Russia) and the era of state control over energy issues (Japan and South Korea).*
- *Relevant governments and international agencies have yet to be convinced of the political feasibility and economic merits of such cooperation.*
- *Even though there is a growing inclination to promote both bilateral and multilateral energy projects, the countries of Northeast Asia are characterized by a rather insular culture. There are many hidden obstacles to which people in the region do not even want to refer publicly.*
- *However, the age when that was tolerable has passed and if the area is not regionally integrated, all the economies will be at a disadvantage compared with other regions.*
- *To mitigate energy supply security risks and to address environmental concerns, countries in Northeast Asia need to search for the solution within the subregion itself, launching workable cooperative schemes.*
- *Cooperation in energy supply and transportation would also promote competition and more efficient energy trade.*
- Japan's November 2002 energy diplomacy concept paper (proposes interdependence and regional cooperation in the energy sector)
- China-Russia Joint Statement, December 2002 (endorses cross-border energy cooperation)
- The Russia-China (Angarsk-Daqing) oil pipeline project, as well as a pipeline project promoted by Transneft (Angarsk-Nakhodka)
- Japan-Russia Summit and Action Plan, January 2003 (calls for coordination of their energy policies and confirms Japan's intention to support a Trans-Siberian delivery system for oil and natural gas)
- Exxon Mobil's announcement of its plan to build a gas pipeline from Sakhalin to the Tokyo area and/or Niigata
- Progress on the Sakhalin projects, including agreements with the Sakhalin 2 consortium regarding LNG purchases by users in Japan
- BP's multibillion-dollar move in forming an alliance involving oil and natural gas reserves in Siberia and Sakhalin.

Some of these initiatives are aimed at capturing not only bilateral, but also multilateral opportunities to enhance energy security and the stability of oil supplies.

Indeed, many essential elements for subregional cooperation in the energy sector are already in place. China represents the fastest-growing new market for energy—natural gas and oil in particular. The eastern provinces of Russia have significant potential to satisfy these needs and Russia is interested in assuming a role as an energy supplier.

- *Policy continuity should give way to policy change in responding to mounting energy security challenges. However, a significant degree of resistance should be expected along the way.*
  
- *The United States and Japan, which could arguably influence, if not determine, developments in many fields, including energy sector cooperation in Northeast Asia.*
  
- *Cooperation in the energy sector moved to the center of bilateral Japan-Russia discussions. In January 2003, an oil pipeline project to Nakhodka received support from the Japanese Prime Minister Junichiro Koizumi when he visited Russia*
  
- *A dialogue on the Angarsk-Daqing project has been taking place for the past several years, involving such players as the second largest Russian oil major YUKOS and the state-controlled China National Petroleum Corporation (CNPC).*
  
- *The Russian Energy Ministry proposed earlier this year that the Angarsk-Daqing and Angarsk-Nakhodka pipelines be integrated into a single mega-project.*
  
- *The ultimate decision, whether it involves the exclusion of one of the projects or the adoption of the integrated mega-project, could determine the future path of energy cooperation in Northeast Asia. In short, this decision will effectively test the capacity of Moscow to play the role of an “honest broker” in these and future cross-border energy ventures.*

### ***The Role of the United States***

The strong desire on the part of the United States to further diversify oil supplies away from the Middle East, thereby redistributing investment in the oil industry, could assist Russian oil exporters, which have largely been privatized and which aspire to recapture their pre-1990 share of world oil markets.

The U.S. could stimulate energy cooperation in Northeast Asia. In May 2002, during their summit meeting in Moscow, George Bush and Vladimir Putin agreed to launch a bilateral energy dialogue to (1) develop bilateral cooperation in the energy sector; (2) reduce the volatility and enhance the predictability of global energy markets; and (3) improve the reliability of the global energy supply.

The two sides agreed to facilitate commercial cooperation in the energy sector, enhancing inter-company interaction in the exploration, production, refining, transportation and marketing of energy, as well as in the implementation of joint projects, including those in third countries.

The two sides also pledged to encourage investment aimed at the further development and modernization of the fuel and energy sector in Russia, including the expansion of oil and gas production in Eastern Siberia, the Far Eastern region and offshore areas.

Moreover, access to world markets for Russian energy could be promoted through such measures as the commercial development and modernization of Russia's port and transportation infrastructure, electric power and gas sectors, and oil refining capabilities.

Russia and the U.S. stated their commitment to fostering scientific, technological, and business cooperation in the use of unconventional energy sources, and energy-efficient and environmentally clean technologies, as well as promoting cooperation in the development of safer new nuclear power reactors.

## *Japan*

- *For the economies of Northeast Asia, the challenge is to make the supply network more sustainable, reducing their one-sided dependence on the Middle East.*
- *Subregional oil cooperation would allow all economies to acquire improved bargaining power vis-à-vis exporters from other regions, enhancing domestic competition and efficiency.*
- *Given the oil security vulnerability of the subregion, there is also scope for discussing the feasibility of joint oil stocks, as well as the prospects for concerted efforts in oil exploration and development.*
- *Japan has yet to assume its responsibility by adopting a policy supporting the trilateral China-Japan-Russia relationships concerning energy and environmental issues.*
- *For countries predominantly dependent on imports, such as Japan and South Korea, competition among suppliers is important to ensure stability in energy prices. However, geographical diversification of energy imports is also important. An 'energy mix' aimed at an optimum basket of fuels and energy transportation costs is key to energy security.*
- *Investment in "alternative options", including exploration, development, transportation and conventional hydropower projects involving Eastern Russia, is likely to improve the overall economic efficiency of new and planned investment in the energy sector.*

Japan, in addition to its own energy security calculations and liberalization of energy markets, is expected to play a role in supporting Northeast Asia's development, providing countries with access to technologies and knowledge, and promoting the adoption of its 3Es energy concept (Energy security, Economic growth, and Environmental conservation) as the basis for a long-term cooperative energy policy for Northeast Asia.

Japan's role in promoting the use of natural gas cannot be underestimated. During the 8<sup>th</sup> International Energy Forum in Osaka, Japan's Minister of the Economy, Trade and Industry publicly confirmed for the first time that the share of natural gas in the total primary energy supply is expected to grow from the current 13% to 20% by 2020.

Japan's policy in promoting natural gas is crucial for the future of Northeast Asian gas projects because its gas market is the largest in the region.

The prospects for the Sakhalin 2 LNG project seem brighter in light of these shifts. It is feasible that, given these new circumstances, the power and gas companies would jointly consider a natural gas pipeline from Sakhalin, securing market access for the Sakhalin 1 project.

The Japanese Prime Minister offered support for Transneft's plan to construct a Trans-Siberian oil pipeline. Japan could contribute to regional energy cooperation through the development of energy infrastructure.

The nuclear power program in Japan, on the other hand, has been questioned. Recent inspections of nuclear power plants have revealed mounting cases of operational, technical and reporting irregularities.

These findings further damage the public image of nuclear power plants, lowering the level of acceptance of new projects. It appears that the officially stated plans to build about another 20 nuclear power reactors before 2015 could be unsustainable.

- *The subregional energy demand-supply equation could be managed differently, if politically and economically viable opportunities were fully exploited.*
- *As far as Russia is concerned, energy exports and the internationalization of its energy production complex in the eastern part of the country are strategically important.*
- *The energy sector is likely to play a major role in the economy of Russia's eastern provinces, contributing to a growing share of industrial output, budget revenues, export earnings, and progress in economic development and social advancement.*
- *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.*
- *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.*
- *However, regional energy companies have acquired enormous influence in determining the future of the nuclear power industry.*

## ***The Koreas***

It is worth noting in this context that, of all the economies in the region, South Korea is by far the best prepared for accepting natural gas via a pipeline, but it is still an "island" economy, pending improved relationships with the North.

The desperate economic situation in North Korea and the severe energy shortages precluding the revival of its industry and agriculture have in fact improved chances for cross-border links between the two Koreas.

Furthermore, at the non-governmental level, the DPRK and the ROK, together with a group of experts from the United States, have entered into an agreement on a feasibility study for a Trans-Korea natural gas pipeline connected with Sakhalin. Moreover, the governmental-level agreement on railway interconnection improves the chances for energy transit through the territory of North Korea.

## ***China***

China is central to the changing energy landscape and demand projections in Northeast Asia. Its oil imports are already significant and will grow further. This is giving rise to strong interest on the part of the Chinese in importing oil from Russia.

During the July 2001 Russia-China Summit, an agreement was signed that launched a feasibility study into the proposed 2,400 km-long oil pipeline between Angarsk and Daqing, which it is estimated would have the capacity to transport 20 million tons of oil from 2005 and 30 million tons from 2010.

By 2020, China is expected to consume (produce and import) 200-250 Bcm of gas, raising its share in the total primary energy supply from the current 2.5% to 11-12% by 2020. However, the top priority until at least 2010-2015 is the development of its domestic natural gas reserves, including the construction of the long-distance Trans-China gas pipeline.

- ❑ *To discuss energy security in Northeast Asia in a multilateral and multifaceted fashion is not an easy task. Some propose that the countries of the subregion coordinate their energy plans among themselves, with adjustments for economic and technological factors, investment and environmental needs. In theory, such coordination could be viable, but it will require fundamental changes in policies.*
- ❑ *Improved capacity to deal with price competition and supply disruptions should include a strategic shift towards oil and natural gas sources in Eastern Russia*
- ❑ *In China, the prioritization of the West-East pipeline over imports may have been a strategic error.*
- ❑ *On the other hand, Russia need not rely on pipelines alone in Northeast Asia, as it does in Europe. It should seriously consider LNG technology in combination with pipelines.*
- ❑ *A number of new development trends and concepts could enhance LNG advantages.*
- ❑ *In Russia, natural gas export projections underestimate both the current role and potential competition on the part of LNG, not to mention ongoing improvements in technology that could reduce the cost of LNG supplies.*
- ❑ *Furthermore, advanced natural gas transforming technologies could help to further moderate the region's high dependence on oil.*

This project is not entirely based on considerations of economic efficiency, being seen in the larger context of social and economic development plans for Western China and other land-locked provinces.

The available estimates show that China is unable to cover its projected demand for natural gas using domestic resources alone. The potential capacity of the market for imported gas is estimated at 45-50 Bcm in 2015-2020. As of today, however, China is not yet ready to accept imported pipeline gas because of the lack of distribution infrastructure and limited purchasing power in areas to be transited by the proposed cross-border pipelines.

Moreover, the West-East gas pipeline is very expensive and its capacity is low, considering the distance and costs. In addition, the imported LNG will be expensive compared with pipeline gas. Both these factors are likely to hold back gas market development in China, as well as cross-border gas pipeline projects, curbing gas demand at about 100 Bcm by 2020.

### ***Russia***

The *Energy Strategy of the Russian Federation 2020*, adopted in November 2000, is currently under review. The gasification of Eastern Russia is seen as a priority goal. A state program for developing gas resources in Eastern Russia, coordinated by Gazprom, should support the development of the eastern regions, creating an integrated gas industry and a unified natural gas export infrastructure.

The Kovykta gas field is a priority project that should trigger gas development throughout the area. However, the disunity of interests on the part of the state, Gazprom, the license holder, and also domestic and international investors makes the future of this project uncertain. RUSIA Petroleum, the license holder for the gas field, wants to build a pipeline to China and South Korea, while TNK has proposed a pipeline to the Pacific coast, in line with prevailing opinion in the Energy Ministry.

- *Eastern Russia is capable of supplying at least half of the projected needs of Northeast Asia in natural gas. There are, however, many difficult decisions to make regarding priority projects and infrastructure designs that will integrate diverse domestic and external interests, respond to technical constraints, and facilitate investment mobilization.*
- *In the longer term, Russia's rich reserves of hydroelectric power could contribute to energy balances in Northeast Asia.*
- *Realism is needed concerning both the political and investment feasibility of the projects currently under consideration.*
- *Given the ambitious export plans of Transneft involving a pipeline to Nakhodka, the expansion of oil reserves in Eastern Russia is particularly important, but will require huge investment and a great deal of time. According to Mikhail Khodorkovskiy, CEO of YUKOS, one million tons of additional oil production capacity from the new fields will require US\$300 million of investment.*
- *Russia should employ a proactive stance on cross-border energy ventures, focusing more on their economics and available markets, rather than reserves and the construction costs alone. It should also launch effective commercial and diplomatic policies in support of cross-border energy links.*
- *Considering public attitudes towards nuclear plants, power companies in Eastern Japan may reconsider current projects and shift to large-scale natural gas-fired plants as a replacement—an option that would justify a gas pipeline from Sakhalin.*

On the other hand, Gazprom wants to add the lucrative 2,000 Bcm gas reserves contained in Kovykta to its own reserves balance, transporting most of the gas to the west, where Gazprom's pipeline infrastructure is located.

### **3. CHALLENGES**

Unlike the members of the European Union, the component countries of Northeast Asia form a diverse area in terms of religion, political and economic systems.

The energy market in many countries of the region is rather immature. The deregulation of energy sectors is taking place, leading to increased competition. Governments have gradually sidestepped energy issues, reducing their role in decision-making and investment. On the other hand, options for project financing by domestic and international private companies have also been reduced.

#### ***China***

The Chinese leadership understands the country's centrality to Northeast Asia and the magnitude of the Chinese energy market. This understanding is partially reflected in its well-coordinated negotiating strategy, but also in the secrecy that dominates energy policy issues and demand projections. For example, Chinese negotiators insisted on a very low border price for Russian natural gas. At the same time, the city gate prices for their own West-East pipeline are projected to be the highest in the world.

#### ***Japan***

There is also resistance to cheaper pipeline gas in Japan. Revised projections show a larger role for natural gas, but nonetheless maintain the share of gas in TPES projections at 15.8% in 2020, not the 20% set as a policy target. On the other hand, the number of nuclear power units is projected to grow by 12 over the entire period with ten units commissioned beyond 2010.

- *The distancing of the state from the energy sector has created uncertainties and even insolvency, reducing the value of investment portfolios.*
- *The new situation affects the capacity of energy companies to participate in large investment undertakings, cross-border energy ventures in particular.*
- *Official forecasts still maintain that nuclear and coal-firing plants in South Korea will account for 77% to 83% of total power generation by 2010 and 2015 respectively, with natural gas remaining marginal. On the other hand, given the present state of inter-Korean relations, an inland trans-Korea gas pipeline seems unlikely.*
- *The central argument is that it is very much in Russia's interests, as well as in those of the energy importing economies of Northeast Asia, to promote a broader and more inclusive approach to energy security problems.*
- *Although current discussions in Russia on Northeast Asian energy cooperation are helpful in envisaging the "bigger picture" concerning export-oriented energy projects, these exchanges often lack focus, sometimes ignoring viable and cost-efficient options.*

Seemingly, Japan is not ready to buy Russian natural gas, particularly pipeline gas, because of the dominant influence of TEPCO in nuclear issues over other regional power companies to the north of Tokyo. These companies do not yet have an integrated gas import and wholesale structure. The creation of such a framework, including a cross-border pipeline, could undermine the competitiveness of nuclear power plants.

### ***South Korea***

As in the case of Japan, the reform and liberalization of the energy sector in the ROK makes long-term planning for energy companies difficult, as well as limiting their financial capacity to participate in large-scale investment undertakings.

Moreover, under the new leadership, Seoul needs to work on closer coordination with the United States, Japan and Russia in order to find a realistic solution for KEDO.

### ***Russia***

In Russia, privatized and semi-privatized producers of energy, including oil majors and Gazprom, tend to think in "market", rather than development terms. Concerns about investment risks and the profitability of both existing and new projects have given rise to a new climate in energy sector development. There are signs that this situation could have long-term implications for the eastern regions of the country.

Many energy cooperation schemes, such as natural gas pipeline projects and the interconnection of the electrical power grid, involve enormous investment. However, due to institutional impediments, the risks involved in investment are high. For instance, laws governing foreign investment and resource development, such as the product-sharing contract law, make the prospects for large-scale investment uncertain. On the other hand, the legislature and top managers of some Russian oil majors propose to abandon the PSA system in order to avoid unfair competition.

### ***An image problem***

- *The idea of a gas pipeline network is to provide a public asset for Northeast Asia, promoting better and cleaner energy policies within the entire subregion.*
  
- *A cross-border pipeline network requires certainty and stability on both supply and demand sides. It should be seen as something more than a simple transportation facility; it should be the product of coordinated interests and efforts.*
  
- *It is obvious that the OECD's bureaucracy, including the IEA, influences energy policymakers in the member economies. The IEA in its projections should leave the door open for more intensive energy dialogue and energy links in the subregion.*
  
- *The future cross-border gas pipeline network in Northeast Asia must be carefully designed, accounting for all possible alternatives and economically feasible options, integrating them into a larger regional picture of energy production, consumption, transmission, and rational use.*
  
- *In North Korea, the adoption of cost-effective energy options will be necessary. Furthermore, in such areas as energy statistics, modeling and human infrastructure, communication needs to be strengthened.*
  
- *A stable North Korean economy and reduced tensions on the Korean Peninsula would ensure the security of the whole of Northeast Asia.*

The most recent 2002 World Energy Outlook by the International Energy Agency (IEA), which provides projections of natural gas trade among various regions of the world by 2030, allots only a very minor role to the economies of Northeast Asia.

In general, increases in Russian gas exports to the Far Eastern markets are seen as lagging far behind the gas exporters of Southeast Asia and the Middle East. On the other hand, exports of Russian natural gas to European OECD members are projected to more than double, reaching 244 Bcm in 2030.

This skepticism may have been rooted not so much in the technical and economic parameters of the natural gas trade, as in adverse perceptions of the capacity of Northeast Asian economies to embark on cooperation.

Indeed, the shadow of past events still looms, influencing relationships between Northeast Asian countries. Hence, more than in other regions, the issue of energy cooperation tends to be entangled with political complexities, as well as the absence of delivery infrastructure.

### **4. NORTH KOREA**

One of the major impediments to energy cooperation in Northeast Asia is the political instability surrounding North Korea. Antagonism adversely affects the economy and welfare of the people of North Korea. The degradation of the power sector in the North presents the major challenge for economic reform and foreign investment. To make things worse, the DPRK has effectively withdrawn from the Non-Proliferation Treaty (NPT) and has admitted having a nuclear weapon.

On the other hand, many projects and proposals relating to the development of cross-border energy links involve North Korea, including infrastructure for delivering electricity and pipeline natural gas from resource-rich Russia to China, South Korea, and even Japan.

- *It is important that the neighboring countries cooperate in involving North Korea in the new scheme of energy dialogues.*
- *Subregional energy cooperation in Northeast Asia could serve as a vehicle and provide an opportunity for resolving North Korea's energy and economic crises.*
- *The Northeast Asian neighbors should also pursue policies aimed at assisting North Korea in overhauling its energy infrastructure.*
- *Today, North Korea's main energy policy principle is 'self-reliance'. With little energy resource endowment other than coal, this policy inevitably gives rise to energy supply shortages.*
- *In light of the uncertain future of the KEDO, there is a need to revise this framework.*
- *Large-scale trade and investment cooperation with North Korea is impossible without first resolving its chronic energy supply shortages.*
- *North Korea should accept the international community's demands regarding its nuclear reactors and relevant research programs.*
- *The North-South gas pipeline project 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.*

Involving North Korea in multilateral energy cooperation by offering it a supporting role in "energy transit" in the region could create incentives for disarmament, economic recovery, market development and political stabilization. This could also help to attract more investment to cover the costs of rehabilitating North Korea's energy sector.

### ***KEDO***

The electricity sector in North Korea has become a focus of interest because it has important political implications related to KEDO.

In October 1994, North Korea signed an Agreed Framework with the United States to halt its graphite technology nuclear program in exchange for two light water nuclear reactors. However, in early October 2002, visiting U.S. officials were told that the terms of the Agreed Framework were no longer binding.

Following these developments, the United States discontinued shipments of heavy oil stipulated under the Agreed Framework, with the last delivery taking place in November 2002.

### ***Alternatives to KEDO***

From the outset of the KEDO project, many experts indicated that the use of light water reactors, if and when they were completed, would be highly problematic, given the size and technical condition of the domestic power grid. It was clear that it would be impossible to operate the reactors safely without making serious efforts to modernize the power grid and enhance its stability.

A power transmission line connecting North Korea with Russia and South Korea has been proposed as a potential alternative. Another option is the Sakhalin 1 project, with a gas pipeline between Sakhalin and South Korea that would also supply natural gas to North Korea in lieu of transit fees, as a form of economic assistance.

## 5. POTENTIAL REWARDS

- *The challenge is to demonstrate to the large and influential group of “skeptical outsiders” that energy cooperation and large-scale cross-border energy flows are politically feasible, not to mention realistic in technical and economic terms.*
  
- *In the late 1990s, among the “six priority projects” for further study and implementation were the Bureiskaya hydropower station, development of gas deposits in Sakhalin, and three natural gas pipeline projects in Kamchatka, Yakutia, and between Sakhalin, Khabarovsk and Vladivostok.*
  
- *The national oil and gas companies of China, the ROK and Japan have yet to explore and seize opportunities that exist within the subregion, primarily in Eastern Russia.*
  
- *As far as oil supply security is concerned, a regional agreement on a scheme for stockpiling and the lease of oil stockpiling facilities is also required.*
  
- *On the other hand, Eastern Siberia and the Far Eastern region in particular have yet to become “energy surplus” areas. To achieve this, energy producers in Eastern Siberia and the Far Eastern region need much larger production volumes than the domestic market can absorb.*
  
- *Energy cooperation should be seen as an opportunity to promote regional integration; indeed, as the most important one, given that both markets and resources are available.*

In Europe, pipelines and other cross-border infrastructure projects were instrumental in enhancing the energy security of energy importing economies, reducing tensions among states at the same time. By supplying natural gas, oil, coal and electricity to its neighbors, Russia has become the key actor in European energy markets. In this context, the emerging Russia-Europe “energy alliance” could serve as a long-term goal.

A subregional energy alliance could offer a number of tangible benefits, including more competitive energy markets and reduced tariffs based on improved oil security, a subregional gas transportation network, cross-border power grid interconnections and other ventures.

### ***Oil security as a priority***

Apart from Russia, the economies of Northeast Asia belong to the most vulnerable group within APEC in terms of their energy security profiles. Their dependence on imports of hydrocarbons is already high and is projected to rise further.

The oil import dependence of Japan and the ROK is close to 100%, with supplies from the Middle East accounting for 88% of supply to Japan, 60% to China and 77% to the ROK. To remedy these imbalances even partially, decisive policy moves are required, followed by massive investment in exploration and development, as well as the construction of delivery infrastructure in Eastern Russia.

### ***More competitive environment***

In the oil trade, in particular, the exceptionally high dependence of regional economies on the Middle East is combined with the so-called “Asian premium” in oil imports.

The oil importing economies of the subregion, Japan and the ROK in particular, find themselves paying more for Middle Eastern oil compared with their OECD counterparts in Europe and North America.

- *Over the next five to ten years, China should set up a strategic oil stockpile, diversify its oil imports and promote oil substitutes. However, its overall pressure on the regional oil market will be considerable.*
  
- *To remedy oil security imbalances to any degree, decisive policy moves are required, followed by massive investment in exploration and development, as well as the construction of high-capacity delivery infrastructure.*
  
- *Gradual geographical diversification in favor of subregional oil and gas sources is both desirable and possible.*
  
- *The Northeast Asian 'energy landscape' would complement the energy initiative endorsed by APEC energy ministers at their third meeting in Okinawa, specifically the "Recommendations Concerning Accelerating Investment in Natural Gas Supplies, Infrastructure and Trading Networks in the APEC Region."*
  
- *Coordinated efforts are needed to deepen vertical cooperation within each country. For example, choosing between the YUKOS pipeline and the Transneft project involves a trade-off between ever present and legitimate commercial interests and the goals of long-term development and social advancement in Eastern Russia, which are not easily justifiable on the grounds of corporate profitability alone.*

The factors contributing to this phenomenon include (1) heavy dependence on Middle Eastern crude, (2) a lack of domestic, subregional and alternative supply sources that could stimulate competition, (3) conservative crude oil purchasing practices on the part of Japan, (4) restrictions on reselling crude, and (5) competitive European and U.S. crude oil markets.

### ***New oil supply capacity***

Russia, on the other hand, is now seen as the most dynamic player among the world's crude oil suppliers. By 2010, its oil output could reach 450-500 Mt (9-10 Mbd), while exports could recover to the 1980s level. In 2003, Russia is expected to produce more than 400 Mt (8 Mbd), exporting the bulk of the additional output.

### ***New delivery infrastructure***

The main source of uncertainty, however, is the inadequacy of the country's current oil export infrastructure. According to the oil majors, the shortage in delivery capacity under the control of Transneft has reached 50 Mt and this shortfall could expand further. It was in this context that the idea of building a 3,765km-long pipeline linking Angarsk and Nakhodka was mooted by the state-owned Transneft Company, Russia's principal oil transporter. This project acquired greater prominence with the visit of Japanese Prime Minister Junichiro Koizumi to Russia in January 2003.

### ***Regional development impact***

Apparently, the Baikal-Pacific Pipeline (BPP) option has gathered support on the part of regional administrations in Eastern Russia, who favor it for its projected impact on domestic development, oil security and access to multiple export markets. The federal government has also come to the conclusion that this sort of project deserves prime attention.

- *The most important point in promoting energy-environmental cooperation is a common desire for the simultaneous achievement of the 3Es.*
  
- *On the other hand, among the issues of energy security, energy costs and the environmental impact of energy use seem to be subordinate to the security of supplies.*
  
- *Energy issues can no longer be solved in terms of energy alone. Progress in globalization has highlighted the relationship between each field of economic activity, such as trade, finance, investment and technological collaboration.*
  
- *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, could help.*
  
- *One option is adopting some kind of a subregional energy charter, while another is to work on agreements relating to specific energy projects and sectors.*

The plan also envisages building in parallel a high-capacity gas pipeline connected with the gas pipeline network in Western Siberia. This Baikal-Pacific pipeline system (BPPS) could be extended to Daqing.

### ***Environmental benefits***

Obviously, the unique hydroelectric power potential in Eastern Russia presents an opportunity for efficient projects both in economic and environmental terms.

By 2010, the total newly commissioned capacity in both areas is likely to reach 4 GW, including 1.5 GW in Eastern Siberia and 2.5 GW in the Far Eastern region. During the following decade, new capacity is expected to total only 2.2 GW, including 1.4 GW in Eastern Siberia. After the completion of these projects, the hydroelectric power utilization rate in the Far Eastern region will be 6%.

## **6. UNIVERSAL PRINCIPLES?**

Northeast Asia has ample potential for mutually complementary energy cooperation. However, any vision for such cooperation should primarily be based on concrete projects, rather than concepts and models existing in other geographical areas.

For example, Russia and Japan are involved in the Energy Charter Treaty (ECT), while China participates as an observer. The objective of the ECT process is to further the complementary relationship in energy matters between the major complementary fields.

This framework was initially proposed by the countries of Western Europe and was aimed at stable and predictable conditions for energy trade with the former Soviet Union. The truth however is that before this concept evolved to the level of an international agreement, east-west oil and gas links had been developing for about two decades.

The “eastern constituency” of the European “energy space”, including Russia, Norway and the United Kingdom, may cover up to 50% of the net energy imports of the “western constituency”.

- *The ECT could be too broad to be adopted in Northeast Asia, because it covers all energy sectors, including technology and energy efficiency.*
- *Instead, given the multiplicity of high-level contacts that have already taken place, the goal of multilateral dialogue should be to discuss longer-term opportunities of energy cooperation in the subregion.*
- *Full use must be made of such international bodies as APEC, the UN and IEA. It may be possible to make a joint statement to APEC or parallel requests from each government, asking for APEC's support in promoting energy cooperation within the subregion.*
- *Interested governments could be encouraged to consider APEC Facilitation Assistance Team visits in order to make preliminary assessments of the effectiveness of cross-border energy links in the subregion.*
- *Active interaction should also take place in the fields of technology and research.*
- *Information sharing and research into the functioning of the energy market could help governments with policy formulation.*

The main issues addressed in the ECT are the following: (1) transit of hydrocarbons, (2) investment protection, (3) trade and energy efficiency, (4) environmental aspects, and (5) dispute settlement.

The transit rules for hydrocarbons form the heart and soul of the treaty. Under the Treaty, the parties are obliged to encourage cooperation in the modernization, interconnection, development and operation of energy transport facilities, including mitigating the effects of interruptions to the energy supply. The Treaty stipulates that energy in transit shall be treated no less favorably than that country's transportation provisions treat energy produced domestically.

Furthermore, there should be no quantitative regulations allocating the proportion of energy among external sources of supply.

### ***Environment***

The ECT not only requires the minimizing, in an economically efficient manner, of harmful environmental impacts resulting from all operations within the energy cycle in its area, but also the promotion of market-oriented price formation and the reflection therein of environmental costs. 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 the exchange of experience and ideas between less developed countries and countries with twenty years or more of experience in this area.

## **7. AN ENERGY COMMUNITY?**

Any framework to be applied to Northeast Asia must avoid talking about general concepts, promoting instead concrete projects and goal-oriented discussions.

- *Liberalization of the energy sector means that governments will have a lower profile in markets, while the private sector will have more important roles to play, albeit with fewer financial resources and reduced profits able to be devoted to cross-border infrastructure projects.*
  
- *Governments are responsible for institutional frameworks and need to reduce barriers to energy trade. Consideration could be given to establishing a subregional mechanism (institution) that would facilitate investment in such infrastructure.*
  
- *A forum based on the “track-two” model for open discussion prior to inter-governmental talks would be important in promoting horizontal cooperation between countries at the governmental, administrative and private levels.*
  
- *A “track two” dialogue to prepare the ground for an inter-governmental process could be usefully established to run in parallel with meetings of APEC energy ministers.*
  
- *It is also possible that in Northeast Asia, natural gas will be used not only for power generation, but also for newly-designed 'natural gas supported cities' in the 21<sup>st</sup> century.*

### ***A government-level framework***

In this context, a so-called “track two” dialogue to prepare the ground for inter-governmental energy discussions 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 identify sources of misunderstanding.

Information sharing and the compilation of existing research to assist governments with policy formulation could be useful. Furthermore, an assessment of national laws to bring them in line with international best practice could form the basis for a multilateral process.

### ***Public-private partnership***

In each country, a strategy aimed at subregional energy cooperation must envisage coordination among specific projects, regional development needs and export/import opportunities.

To gain a broad support base and funding, new projects require firm policy commitments to combining the interests of local communities, regions and industries with those of central bureaucracies, as well as exporters and importers.

At the governmental, 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 science and technology should also be considered.

### ***Investment facilitation***

Financial resources are becoming scarcer and ODA has been declining. The role of governments has also changed considerably, now focusing more on providing the correct environment for trade and investment.

The idea behind a Northeast Asia Development Bank (NEADB) is to mobilize capital for infrastructure construction and development in the subregion.

- *Discussions aimed at enhancing the energy security of the economies of Northeast Asia through subregional cooperation should be focused on the general public, governments, energy experts and private companies alike.*
  
- *It is important to start working towards the harmonization of relevant national legislation (for natural gas, for example), including an assessment of national laws and international best practices. This could form a logical extension of the APEC Natural Gas Infrastructure Initiative, promoting its implementation on a subregional level.*
  
- *Large-scale projects require huge investment and their feasibility improves if available resources are aimed at multiple large markets.*
  
- *Much depends on how the economies of Northeast Asia define the efficiency and environmental soundness of the new and proposed power projects, balancing domestic priorities with regional opportunities and the Kyoto targets.*
  
- *The last decade saw a growing interest in cross-border energy projects, followed in some cases by investment decisions and feasibility assessments. The countries of Northeast Asia should prioritize a shift towards energy policies and regional relationships based on a “new energy interdependence”, rather than “energy policy continuity”.*

The bank could be a force and a forum for the objective assessment of proposals for energy projects.

### ***Priorities***

The following points underline the priorities for energy sector development and trade in Northeast Asia, primarily including oil and gas exports from Eastern Russia to this subregion:

- Enlargement of reserves
- New pipelines and oil trade promotion
- Large-scale GTL production
- R&D links in the energy sector
- Local gas markets development
- Expanded LNG production
- Promotion of competition
- Environmental safety
- Support for investment financing.

Priority setting and coordination among various energy projects appear to be key preconditions for a successful energy cooperation framework. However, such coordination is impossible without the government providing the domestic private sector, multinationals and local interests with a lead. For the time being, a “track two” approach in research and government-level contacts to identify mutual and complementary interests should be explored.

## **8. CONCLUSIONS**

The project findings demonstrate that subregional energy cooperation could be viable, if it meets the following eight criteria:

- Serves national interests in general
- Enhances energy security in particular
- Promotes competition in energy prices
- Supports international competitiveness
- Assist development of regional economies
- Strengthens regional stability and security
- Provides benefits to local communities
- Facilitates environmental management.

- *What is needed is a shared vision of how to promote energy security and the sustainable use of energy in the 21<sup>st</sup> century.*
- *The cost of inaction on energy security matters may be not only extensive economic damage in the event of a crisis, but more importantly, the loss of unique opportunities for development in and international competitiveness on the part of the subregion and its economies.*
- *Intellectual and practical exchanges should be expanded to provide economic decision-makers, politicians, and the general public with a scope of the opportunities and mutual benefits that long-term cooperation in energy resource development and delivery offers.*
- *It is important that research and intellectual resources are combined to study and evaluate the long-term prospects for energy sector development in Northeast Asia.*
- *An assessment of energy needs, opportunities for energy production and trade, and the potential for mitigating energy-related environmental damage can provide a comprehensive and future oriented framework for a Northeast Asian Energy Community.*

Managing energy security involves policy choices and the setting of priorities. These choices are made by states, involving achieving a balance between continuity and innovation in policy.

The solutions available within the Northeast Asian subregion may not be free of risk, but they could reduce existing risks. In general, energy security could be seen as a trade-off between a tolerable degree of energy supply disruption risk and the economic and social costs associated with this.

Key energy security problems that the energy importing economies of the subregion are facing are held in common, i.e. not country-specific and their management could involve coordinated responses and solutions. Examples of such solutions can be found in North and South America, Europe and Southeast Asia.

Innovation includes an expanded supply of energy and new sources of oil and natural gas that can compete with existing, tried-and-tested sources, as well as more flexible and effective decision-making regarding cross-border infrastructure and technological solutions.

Further, the joint development of oil and gas in Eastern Russia could serve as a catalyst for subregional economic integration.

The combination of priorities assigned to economic development and a willingness to enter relationships of economic interdependence promises every state a stake in a peaceful environment that facilitates the resolution of disputes.

In the long-term, region-wide energy infrastructure can become the foundation for a subregional system of stable and cost-efficient energy supply and environmental management.

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