The Kyoto Protocol, Russia and Northeast Asia

Vladimir I. Ivanov
Director, Research Division, ERINA

By virtue of its size and resource endowment, Russia has the potential to play a very important role in the preservation of the global environment, especially in such areas as climate change, forestry and biodiversity. Given these realities and responding to various expectations, on October 22, 2004, the State Duma of the Federal Assembly (the lower house of the national parliament) ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), with 334 votes in favor.[1] On October 27, the Federation Council also ratified the agreement, sent it to President Vladimir Putin and the final stamp of approval was made on November 5, 2004. As a result, Russia became the 127th country to ratify the treaty, allowing this global pact on climate change entering into force early next year.

Prior to that, on September 30, 2004, the government recommended ratifying the Protocol. At the meeting, Viktor Khristenko, Minister of Industry and Energy introduced the proposal and Alexander Bedritskiy, head of the national hydro-meteorological service (Roshydromet) delivered a report (he also presented this agreement at the Duma session). Deputy Prime Minister Alexander Zhukov presided over the meeting and proposed recommending to the President that Russia join the agreement. By that time, the Protocol had been ratified by 126 countries, including 33 leading industrial economies.

This decision was taken in response to a number of issues. First of all, Russia's support for the United Nations and the UN-based system of international treaties is important. Moreover, the negotiations regarding the second phase of the Kyoto Protocol (beyond 2012) should start no later than from 2005.

By ratifying the Protocol, the leadership has demonstrated its solidarity with the European Union, the country's closest neighbor and its dominant trading partner. Environmental soundness is an important part of the EU's socio-political identity and international posture. Moreover, EU support is indispensable for Russia's accession to the WTO (World Trade Organization). The decision also symbolized Russia's partnership with Paris and Berlin, strengthened by the trilateral summit in Sochi on September 1st, on the eve of the November 2004 summit in The Hague with an enlarged EU.

Secondly, climate change is top of the list of key environmental challenges identified by Japan. It is also part of the bilateral Action Plan adopted in 2003.[2] Besides strong EU support for the agreement, the Protocol should also be seen as a "mission project" promoted by Japan. Ratification will contribute to bilateral relations, moving them towards a more substantial and diversified agenda.

Thirdly, in coming into force, the Protocol could act as a catalyst for environmental and economic cooperation along the lines of the Clean Development Mechanism (CDM) and Joint Implementation (JI) projects.[3] Moreover, participation in the agreement could enhance Russia's own prospects for developing large resources of renewable energy through the JI framework. Russia can also sell its unused emissions credits to countries that have exceeded their limits, using the International Emissions Trading (IET) mechanism.

Finally, forest fire prevention and control efforts in the fragile, globally significant ecosystems of the Far Eastern region and Siberia could be elevated to the level of international initiatives, responding to the tasks set out in the Protocol.

The Debate

It is worth noting that President Vladimir Putin himself, speaking at a meeting with EU business representatives at the Kremlin on December 3, 2003, was unenthusiastic about ratification. This has changed and the Protocol will enter into force in three months' time, after notification has been received by the United Nations.[4]

The document is the first international agreement to be implemented through the market mechanism. It aims to reduce atmospheric emissions of greenhouse gases

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[1] The Kyoto Protocol was adopted by consensus on December 11, 1997 and was signed by Russia on March 11, 1999, in New York.

[2] From the Action Plan: "In addition to the convening of the Japan-Russian Joint Committee on Environmental Conservation, cooperation in various international efforts between Japan and the Russian Federation has developed in regard to global environmental issues, including climate change issues."

[3] The *CDM* allows Annex I Parties (advanced industrialized economies) to implement projects that reduce emissions in the territories of non-Annex I Parties (developing economies). The emission reductions can be used by Annex I Parties to help meet their emission reduction targets, while also assisting developing economies in improving energy efficiency and achieving sustainable development.

Joint implementation allows Annex I Parties (industrialized economies) to invest in emission reduction or removal projects in other countries (transition economies), where there are more possibilities for cutting emissions at a lower cost.

International Emissions Trading allows one Annex I country to sell some of its allowable emissions to another Annex I country.

[4] The Kyoto Protocol must be ratified by 55 UNFCCC signatory states, whose total GHG emission volume accounts for 55% of total global emissions.

(GHG), including carbon dioxide (CO_2), which accounts for about 80% of total emissions. As the leading polluters, advanced industrial economies were set a target for the first phase (before 2008-2012) of emissions reductions under the Protocol of their emission levels as registered in 1990 minus 5%. In the case of Russia, the 1990 level of emissions has been retained and presumably must not be exceeded towards the end of the first phase.

Prior to the government motion, a nationwide discussion unfolded, involving scientists and economists, central ministries and NGOs, industrialists and regional administrators.

Scientists and climatologists were the most skeptical of the Protocol and its ratification because of (1) the uncertainty of the scientific data; (2) the unrealistically high reduction targets set for the first phase; (3) the unreasonably low prices of carbon proposed for international emissions trading; and (4) the Protocol's inability sufficiently to influence emission reductions and the process of global warming as a whole.

According to this school, the Protocol cannot prevent global warming. Proposing that the agreement remain unratified, these experts suggested instead concentrating on designing an adaptation strategy that would allow the utilization of rising temperatures for Russia's benefit.[5] However, the same group proposed assessing the economic benefits of ratification, given that its political implications are obvious. In this context, two critical issues were identified: (1) long-term projections for CO_2 emissions, given the accumulation of tradable volumes; and (2) the system of national inventories of GHG emissions.

It is worth noting that the long-term projections for CO_2 emissions made under the assumption of annual GDP growth of 5% (high case scenario) and an annual accumulation of CO_2 emissions of 1.5% have demonstrated that the country will remain within the 1990 emissions limit until 2020 and beyond. Under the assumption of annual GDP growth of 4% (realistic scenario) and an annual accumulation of CO_2 emissions of 2.5%, the country would hit the 1990 limit shortly before 2020.

However, only emissions accumulated in 2008-2012 can be traded, as opposed to the huge volumes deferred previously. At the same time, developing economies have been allowed to accumulate tradable emissions since 2002. Partially due to this, scientists and climatologists have described the Protocol as discriminatory. Representatives of this school of thought stated that in 2001-2007, the accumulation of CO_2 emissions below the 1990 limit would amount to almost 6 gigatons (Gt) of CO_2, equivalent to 80% of all emission reductions expected under the Protocol.

Among other instances of unfairness cited were: (1) the lack of provision for cold climates; (2) the lack of provision for the nuclear power industry; (3) the lack of provision for the sink capacity of forests[6] proportionate to the sink provisions allotted to other Annex 1 countries; and (4) the lack of provision for Russia as the world's largest exporter of natural gas, which helps to reduce CO_2 emissions in gas-importing countries.[7]

At times, the debate became highly emotional. From January 16, 2004, an advisory academic seminar was taking place at the Academy of Sciences. Following a proposal by President Putin, this regular gathering was chaired by the President of the Academy Sciences, Professor Yuri Osipov. Several international experts on climate change were invited to participate in the seminar scheduled for July 7-8, 2004. Reportedly, prior to the opening of the meeting, David King, who came to Moscow in his capacity as the scientific advisor to the British Prime Minister, demanded that the chairman of the meeting amend the agenda in order to reduce the number of speakers, presumably with the aim of cutting out those who were the opponents of the Protocol.

Among the conclusions reached by the academics was a warning that the Protocol would impose significant limits on economic growth. Average annual GDP growth of 7.2% would consume the emissions available over the 1990 level by 2009, while average growth of 6.2% would extend the "grace period" only by another year.

Economists, by and large, indicated that the ambitious target of doubling GDP in the space of a decade would require investment in new, more efficient energy technologies and efforts to conserve energy. They evaluated the Protocol from the standpoint of fairness and effectiveness, emphasizing that the agreement is not a panacea, but is rather an attempt to tackle the complex problem of emissions collectively. After all, this is the first international agreement based on "economic mechanisms" and private sector participation.

Experts indicated that the low price level currently set for emissions trading reflects, among other constraints, the quality of data employed by the vendor. As the potential to export natural gas depends on proven reserves and effective transport infrastructure, the potential to sell emissions will remain only "potential" without "delivery infrastructure." In this context, the system of national inventories of GHG emissions, as well as their verification and registration is the first step for entering the emissions market.[8]

There were also extremely critical assessments of the Protocol, including those made by experts advising the President. Their arguments were based on the fact that the country belongs to a group of the most energy-intensive economies. In order to produce $1 of GDP, Russia consumes several times more energy than advanced economies. These critics insisted that doubling the GDP in

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[5] See http://mig.mecom.ru/Archive/2002/Annot/11ann1r.shtml
The Kyoto Protocol: The Problems of Ratification, co-authored by Yu. A. Izrael, I. M. Nazarov, M. L. Gitarskiy, A. I. Nakhutin, and A. F. Yakovlev, November 2002, no. 12, p.2

[6] Forests located in Russia account for 24% of total land space covered by forests worldwide. According to estimates, Russian forests absorb about 900 million tons of CO_2 annually.

[7] *The Kyoto Protocol*, op. cit., pp.5-6

[8] See http://www.cenef.ru/info/booksKyoto_r.htm
I. Bashmakov, "Russia and the Ratification of the Kyoto Protocol," p.2

ten years would force the country to buy emissions in order to fulfill its obligations. Andrei Illarionov, economic advisor to President, insisted that only growth of no more than 4% would allow Russia to comply with the emission limits set in Kyoto.

At times, the debate entered the realm of geo-politics. On May 19, 2004, *Russia and the Kyoto Protocol Group* presented a report focusing on the country's position *vis-à-vis* the Protocol. One of the assumptions made in the report was that the EU's strategy is aimed at controlling a large share of world carbon emissions trading, although other observers indicated that ratification would symbolize an independent stance with regard to the United States.

Interestingly, Washington's decision to withdraw from the Protocol was interpreted by some experts as a chance to bargain for better participating conditions and benefits, using their influence over the Protocol's future. Among the key recommendations made by *Russia and the Kyoto Protocol Group* were the following conditions:

1. Nationalization of the accumulation of CO_2 emissions from 1990 onwards in order to channel the proceeds from quota trading into financing environmental and social adjustment programs, modernizing technology and improving communal services
2. A clearly defined share of the carbon emissions market (100-130 Million tons a year) to have a minimum price established at the $40 per ton level to allow the implementation of investment programs
3. "Cold climate" and "forest sink capacity" compensation to be provided by the EU and Japan
4. Revisions to the Protocol in order to prevent discrimination and ensure transparency.

According to the report, the financial benefits that should forthcoming in exchange for ratifying the Protocol should be stretched over a period of 10-12 years, reaching about $50-60 billion in total. However, Professor Yuri Izrael of the Institute of Global Climate and Environment estimated that IET could generate only between 200 million and 400 million euros over a period of several years, with emissions traded for $4-5 per ton of carbon dioxide.

On the other hand, industrialists and entrepreneurs interested in selling emission quotas and attracting investment in the modernization of their facilities appeared mostly positive about the agreement. In July 2003, a non-profit National Carbon Agreement was created with the participation of the United Energy Systems "Rossiya", EurasiaHolding, Rusal, Finaco-group, Rusecotrans, CentroCredit Bank and the Bank for Project Financing. However, this organization maintains the view that better terms could be negotiated before ratification, proposing, for example, to integrate Russia's carbon emissions trading with that of the EU.[9]

In March 2004, the participants in an international conference organized by the Union of Industrialists and Entrepreneurs adopted a declaration, urging President Putin to expedite the ratification of the Protocol. At the same time, in September 2003, another conference, organized by the Chamber of Trade and Industry, focused on the economic implications of the Protocol and questioned its merits.

In general, the economics of the Protocol have yet to be clarified and the national policy position will probably be better understood and defined in the context of such clarifications. Theoretically, the commercial reassignment of emission quotas could help to attract investment to reduce Russia's energy requirements. Alternatively, the EU and Japan may invest in projects in Russia, which could allow them to fulfill their emissions obligations under the Protocol. Either way, ratification was a necessary step in order to test the economic merits of the agreement.

The Road to Ratification

Russia's intentions with regard to the agreement clearly stated in October should not be treated as a sudden change in policy. Its approach to the climate change issue has gradually been evolving since the mid-1990s onwards. In this process, public and scientific debate has served a very important, but nonetheless merely complementary role.

The Interagency Commission on Climate Change was established in 1994. It became responsible for coordinating measures on anthropogenic GHG emissions and sinks. The First (1995), Second (1998) and Third (2002) National Communications submitted to the UNFCCC were prepared under the supervision of this commission. Roshydromet and the Ministry of Natural Resources were the principle contributors to this work.

Furthermore, the implementation of the UNFCCC was the focus of the Federal Program on the Prevention of Dangerous Climate Changes and Their Negative Consequences, which was adopted on October 19, 1996.

Formally speaking, the government, as well as the State Duma, had already made a number of steps towards ratification. For example, government resolution No. 163, dated February 11, 1999, authorized the signing of the Protocol.

On July 11, 2001, the State Duma adopted a declaration in support of the UNFCCC and the Kyoto Protocol. Prior to this step, on June 18, 2001, it formally adopted the recommendations of hearings relating to the issue of global climate change.

Government resolutions No. 796, dated November 17, 2001, and No. 923, dated December 29, 2001, launched the Federal Program on Energy Efficiency for 2002-2005, with an extension to 2010. The Program basically outlines the strategy for carbon emission reductions and energy conservation.

At a meeting on April 11, 2002, the government adopted yet another, more direct resolution, entitled On Preparing for the Ratification of the Kyoto Protocol to the UNFCCC, which identified the following potential benefits of ratification:

1. Market-oriented transformation of the economy and additional reductions in GHG emissions
2. Intensified energy-saving efforts through the

[9] The proposed EU-wide emissions trading system is internally focused, although it does not preclude EU governments from purchasing emission units externally.

application of JI and emissions trading mechanisms
3. Early participation in all appropriate flexibility mechanisms.

On June 26, 2003, the participants of the round table organized by the Environmental Committee of the State Duma adopted an appeal to President Putin to expedite the ratification of the Protocol. During the same month, the working group of the Presidium of the State Council chaired by President also recommended the ratification of the Protocol.

In September 2003, Putin, speaking at the Climate Change Conference[10] announced a time-out to evaluate the consequences of ratification. On October 19, 2003, he again spoke about his intention to ratify the Protocol, at the Asia-Pacific Economic Cooperation Economic Leaders summit in Bangkok. A similar position was stated by the Chairman of the Government at the UN World Summit on Sustainable Development "Rio+10" held in Johannesburg, in September 2003.

In October 2003, Minister of Natural Resources Viktor Artyukhov initiated pilot projects in three regions. These projects were organized in line with eligibility criteria set out in the Protocol. A month earlier, the Inter-Agency Committee on Climate Change approved the draft concept for the national legislation framework designed for implementing the Protocol and approaches to the JI mechanism, which was prepared by the Ministry of Economic Development and Trade.

Finally, from January 2004, following instructions from the President, advisory academic seminars took place at the Academy of Sciences, involving leading scientists, advisors to the president, government officials and international experts.

Last but not least, the government views the Protocol as a "pilot agreement" designed to launch and fine-tune innovative economic mechanisms aimed at reducing emissions. If this process works well as a whole, responding to economic, foreign policy and environmental interests, it will be fine. If it does not, then even under the worst-case scenario, it would take only four years from the date of ratification to withdraw from the agreement.

Implications

As of October 5, 2004, countries that had ratified the Protocol accounted for 44.2% of GHG emissions. With Russia, this share increases to 61.2%; in 1990, its emissions amounted to 3,039 million metric tons (Mt) of GHG measured in carbon dioxide equivalent, including 2,372 Mt of CO2. The share of CO2 in the total volume of emissions is 78%. The share of the power sector in industrial emissions is about 45%.

Under the Protocol, the emissions volume in 1990 became the "base" level for Russia, as well as for many other countries involved in the agreement. However, unlike other countries included in Annex B to the Protocol, there was no obligation to reduce emissions in 2008-2012 compared with the 1990 base level. Therefore, the reduction was set at 100%, similar to Ukraine and New Zealand. Only Poland, Australia and Iceland were able to negotiate better no-reduction terms.

Russia's total five-year emission "budget" for 2008-2012 is 15,800 Mt of CO_2 equivalent, including 605 Mt granted because of the sink capacity of its forests. The difference between the "budget" and actual emission volumes during these five years can be (1) saved for the second period to be negotiated; (2) traded with those countries that need to import emissions in order to fulfill their obligations; and/or (3) used for joint implementation projects.

It will be recalled that, for many experts and commentators, the main justification for joining the protocol was to sell emissions. However, projections concerning emission levels in Russia and the estimates of the volume available for sale were rather uncertain, meaning that it was hard to expect tangible benefits from joining the agreement. At the same time, the country's capacity to reduce the energy intensity of economic growth and promote energy conservation were questioned. Critics of the Protocol grounded their skepticism mostly in the fact that faster than initially anticipated economic growth could be threatened by the agreement. In this situation, it would be forced to buy credits from other countries.

It seems that the decision to join the agreement became the hostage of the econometric modeling and mass media campaign. A detailed analysis, however, demonstrates that the issue is rather complex.

The Second National Communication, submitted to the UNFCCC Secretariat in 1998, assumed that annual GDP growth would be in the range of 4% and 4.4%, with the annual reduction in GDP-related energy intensity estimated as being between 0.5% (base case scenario) and 2% (optimistic scenario). In reality, emissions from 1998 onwards were much lower than projected.

In the model used for the Second National Communication, emission levels were made just a linear function of GDP and the annual reduction in emission intensity became a key variable. Structural shifts in the economy, improvements in the energy sector, the introduction of more efficient technologies, and energy savings in response to increased energy prices were ignored. As a result, the projected emission volumes were overstated.

More accurately, the Third National Communication confirmed that under no circumstances will Russia exceed its emissions quota in 2008-2012. A model that accounted for technological improvements prioritized the following trends:

1. Higher energy prices and environmental costs will drive outdated machines away
2. The industrial structure will shift closer to that of an advanced country
3. New technologies will consume fewer resources and less energy

Similarly, the *Energy Strategy* 2020, adopted in 2003,

[10] The World Climate Change Conference was held in Moscow from September 29 - October 3, 2003.

envisages two possible economic development trajectories. The "high case" scenario is based on the assumption that, by 2020, per capita energy consumption will increase by 40% over the 2000 level, while still remaining close to the 1990 per capita energy consumption level.

Also, according to this scenario, new equipment for generating 15 million kWh a year will have to be introduced annually between 2011-2015, with further additions to increase capacity to 20 million kWh being required in 2016-2020. In general, energy use relative to the size of GDP will decline, to a degree similar to that achieved in Japan in 1960-1995.

The Energy Strategy envisions the tripling of GDP by 2020, accompanied by a 1.5% annual increase in CO_2 emissions. As a result of these shifts, the estimated average emission level in 2008-2012 could be as low as 77% of the 1990 level.

The bottom line here is that, *vis-à-vis* the Kyoto process, the effective reform, economic growth and technological modernization that bring about improved energy efficiency will improve the situation as far as its competitiveness and energy exports are concerned. In addition, the country could export about 10-20% of its 2008-2012 emission quota.[11]

National Inventories

The initial task, however, is to establish a national system of inventories for emissions, as well as verification and certification mechanisms. In March 2004, the first bilateral meeting on GHG inventories took place in Moscow under the auspices of the Japanese Ministry of Environment and Roshydromet.[12]

At the workshop, participants discussed the complexities of GHG inventories and the need for capacity building and institutional arrangements. In Japan, national GHG inventories are now prepared annually, based on established methodologies and a system for reporting. In Russia, this work has mainly been conducted by the State Statistical Committee (Goscomstat) and the Institute for Global Climate and Ecology (IGCE). The central problem is the state of the system for collecting and processing data for inventories, as well as the limited number of experts involved.

The workshop also focused on technical issues relating to inventories in agriculture and forestry, as well as carbon sinks in currently unused agricultural and forest land. According to some estimates, the net stock of CO_2 in the forestry sector for the period 1990-2002 could be close to 4.5 billion tons. However, one serious problem is that the margin of error here could be as high as 30%. In addition, emissions from forest fires in Russia are among the largest sources of CO_2.

In Japan also, there is a need for improvements in the sink measurement system, as well as emission estimates for different types of soil, in order to reduce the discrepancy in estimates from the current 17-18%. For example, Japan's emissions from fuel combustion in 2001 increased by 9.5% on 1990 levels, but emissions from vehicles fueled by natural gas are yet to be measured and accounted for.

The energy sector's role in emissions and the specifics of inventories was discussed during the workshop, including regional programs and measures aimed at reducing emissions at the regional level, as well as guidelines for inventories by local governments and energy companies. Representatives of Gazprom and Unified Energy System shared their experiences in developing their respective corporate inventories.

The bottom line is that the further improvements that could be made both in national inventories and the verification process will require time, effort and funding in order to tackle the following issues:

1. Data collection, data management and exchange
2. Making methodologies for various categories of inventory more advanced
3. Compiling manuals for inventories (corporate, regional, other)
4. Enhancing regional and corporate participation in exchanges
5. Technical exchanges and research in specific sectors.

Prospects for Cooperation

Debates focusing on the economics of the Protocol have mostly been confined to the "growth-prices" dilemma. The first part of this dilemma is the potential conflict between economic growth and the "tight emission budget" set for 2008-2012. The second part of it is the carbon pricing issue, if the emission quota is available for export.[13] It seems, however, that this approach is rather simplistic. Major quota buying and selling may not begin until the 2012 deadline looms. On the other hand, improved energy efficiency and investment in the power sector should be seen as true priorities, including renewables and thermo-power, "top-level energy efficiency" standards for specific industrial sectors, and the development of innovative technology through international cooperation.[14]

Joint research into the prospects for utilizing renewable energy sources could constitute a separate line

[11] See *A New Environmental Policy and the Realization of the Kyoto Protocol*, co-authored by E. B. Strukova, A. A. Golub, V. I. Daniliov-Daniliyan, S. N. Kuraev (Moscow: IEPP, 2004), pp.28-37

[12] Japan-Russia Workshop on Greenhouse Gas Emission Inventories, March 16-17, 2004, Moscow. See *ERINA Report*, vol. 58, July 2004, pp.80-82. This workshop was organized with the direct participation of ERINA. These exchanges will continue with the second workshop, to be held in Niigata in 2005.

[13] According to the *World Energy Outlook* (2002), Russia's emissions of CO_2 in 2010 will be some 400 Mt (17%) below its commitment. This would allow active participation in the emissions trading market and bilateral cooperation with Japan.

[14] See *A Sustainable Future Framework on Climate Change*, a draft interim report by the Special Committee on a Future Framework for Addressing Climate Change Global Environmental Sub-Committee, Industrial Structure Council, Japan, October 2004, p.40
http://www.meti.go.jp/english/policy/c_main_environment.html#2

of cooperation. Investment in renewable energy in eastern regions of the country could generate large economic returns. The economic potential of renewable energy is estimated at 270 Mt of coal equivalent per year (Mtce), or about a quarter of the total primary energy supply (TPES). For comparison, the economic potential of small hydroelectric power projects is estimated at 65 Mtce. The estimate for biomass energy is 35 Mtce. Currently, only about 1% of the TPES originates from non-hydro renewable energy sources and the Kyoto process could stimulate these and other renewable energy projects.

There may be other benefits. According to some estimates, the launch of the Kyoto process will increase the value of natural gas, expanding the range of benefits. In Europe, the strategy of expanded reliance on natural gas is one of a very few viable options to fulfill Kyoto obligations in that region. The trading of emissions quotas within the EU would make the less carbon intensive natural gas a "quota saving" fuel.[15] The increased demand is likely to result in higher gas prices.

If Russia pursues a comprehensive, well-balanced strategy in exporting natural gas to Europe, it could anticipate a close link between the price of carbon traded in a closed EU market and the natural gas price. Therefore, caution should be exercised with regard to exporting its emissions because this would substitute for "quota saving" through the imports of natural gas.

Similarly, a comprehensive strategy will be needed to facilitate investment inflow. Global environmental issues, including climate change and emission reductions are part of the bilateral Japan-Russia Action Plan. The two countries may review the possibilities for specific joint implementation projects aimed at the reduction of emissions. A number of feasibility studies for JI projects have already been funded by Japan.[16]

Although JI projects could serve as vehicle for attracting investment, private sector cooperation could provide an alternative. In the initial phase of the Kyoto process, emissions imports are likely to be dominated by corporate actors. The government could establish a competitive mechanism for companies, allocating portions of national quota to applicants with the most appropriate project proposals.

Towards Green Energy Trade

In Northeast Asia, there are many opportunities to benefit from the Kyoto process. One option for managing international emissions trading, while ensuring 'environmental integrity', would be through a *Green Investment Scheme* (GIS). This concept is designed to channel proceeds from IET trading into environmentally efficient projects. Energy efficiency improvements, renewable energy development and bio-fuels could be priority directions for a GIS.[17]

Russia is home to more than 20% of the world's forests and three-quarters of these are located in the eastern regions of the country. With two million rivers, it has the second highest level of river runoff after Brazil. More than three-quarters of these water resources are in its eastern regions. The country's economic hydro-energy potential is in excess of 850 billion kWh/year, including 350 billion kWh/year concentrated in Eastern Siberia and 294 billion kWh/year in the Far Eastern region. It is worth noting that total CO_2 emissions over the life cycle of the projects, based on hydro-energy and wood, match those of wind-powered projects and are the lowest among the renewables.

With 98 large hydropower stations (HPS) with installed capacity of 44 gigawatts (GW), hydroelectric power accounts for 18% of total power generation. These stations generate approximately 170 billion kWh of electricity per year. Unlike in Canada and the United States, which have developed more than half of their economic hydroelectric power potential, Russia currently utilizes only 23% of its nationwide potential, using only 33% of the economic potential in Eastern Siberia and 6% of that in the Far Eastern region.

In these two regions, 16 HPS with installed capacity of 9GW are under construction, including the largest project, the Bureiskaya HPS in Amurskaya Oblast.

In order to serve customers beyond its national boundaries, Russia's HPS projects would require the cross-border interconnection of power grids. The construction of a high-voltage transmission grid in the country's eastern regions is underway. In the future, this grid could be connected to the west-east power grid that is due to be completed in China. This could potentially allow a "seasonal diversity exchange" between the two west-east systems. Spare transmission capacity in the north could help transmit Chinese hydropower earlier in the spring. Spare transmission capacity in the south could help transmit Russian hydropower later in the spring, lowering costs.

Furthermore, north-south inter-connectors would allow the flow of hydropower from Eastern Russia to China in the same fashion as between southwestern Canada and northwestern United States. The Pacific Intertie has displaced fossil-fuelled power plants in California, reducing emissions. In 1986-2000, the net displacement of CO_2 amounted to 173 Mt. If these emissions were valued at $20 per ton of carbon dioxide, the total saving would be about $3.5 billion.[18]

Small hydroelectric power station (SHPS) projects are a very promising source of renewable energy. With 89

[15] Conservatively estimated, one ton of carbon emissions could cost $50.
[16] The list of 30 projects in Russia was assessed by Japanese experts, half of them located in Eastern Russia.
[17] Unlike JI, GIS is not bound by criteria relating to additional emission reductions in 2008-2012. Reductions before 2008 could be credited and transferred to investors as a forward trade of emission units. GIS is based on the income from the sale of surplus units, whereas JI involves the transfer of units obtained from the implementation of a project. This means that a GIS project will have a source of finance from the very start.
See: *A Russian Green Investment Scheme: Securing Environmental Benefits from International Emissions Trading* (Climate Strategies Network, 2003), p.30, 65
[18] *Electric Power Grid Interconnections in the APEC Region* (Tokyo: APERC, 2004), p.49

SHPS in operation, the country is using only about 1% of its small hydro potential. SHPS can help provide power supply at the local level, in remote regions in particular. According to the International Energy Agency (IEA), the best near-term option could be to modernize and rehabilitate existing stations, including those that have been abandoned. In addition, small stations could be constructed in the Far Eastern region in about one-and-half year's time, with a payback period of up to five years.

However, regulatory provisions are needed in order to allow regional and local administrations to invest in renewable energy systems, especially in cases where such projects reduce fuel subsidies and reduce the costs of fuel transportation. Legal measures could ensure that environmentally friendly energy projects such as small and micro hydroelectric stations have priority access to transmission grids. Transmission rate structures should favor cleaner and renewable energy. Government authorities could adopt standard power purchase agreements (PPAs) that provide incentives for renewable energy technologies, thus enhancing the position *vis-à-vis* the benefits under the Protocol.[19]

As far as biomass energy is concerned, Finland offers an example to follow. The share of wood fuels in its TPES is 20% and is 9% in electricity generation. In Russia, the pulp and paper industry relies on bio-fuels to meet 20-30% of its energy needs, while in Europe this share is above 50%. Forestry is Finland's largest industry. Pulp, paper and wood products account for about one-third of export revenue. Fluidized bed boilers allow the use of waste wood with a high moisture content, co-generating electricity and heat for industrial purposes and municipalities. Such co-generation plants are normally built in cooperation with local authorities and power utilities. They are connected to local district heating systems and local power grids.[20]

Given the extremely rich renewable energy resources in Russia's eastern regions and the very large markets for cleaner energy in neighboring countries, China in particular, growth in renewable energy production could be significant. This can only be achieved if the policies and regulations in both countries support renewable projects as part of their long-term energy strategies and economic development plans.

Conclusions

In Northeast Asia, energy security has already been identified as a priority sector for developing regional cooperation. Defining the links between climate change, economic development and energy security would help to enrich the regional agenda further. The countries of Northeast Asia and the region as a whole could benefit from an institutional mechanism that integrates economic development, efficient energy use and environmental conservation.

It seems that the regional application of the Protocol could be possible. The agreement could help regional actors to promote cleaner, greener sources of energy. Moreover, subregional cooperation could help green energy trade to contribute to the Kyoto process. Over time, a subregional market for renewable energy could complement a market for carbon emissions.

For that matter, the Far Eastern region needs a comprehensive and long-term development strategy for renewable energy. This strategy should support both tiny and sizeable ventures. On one hand, the country possesses massive renewable resources within reach of Northeast Asian markets. In this context, there are many investment opportunities. Among the cross-border projects are various options for power grid interconnection, natural gas pipelines, hydroelectric power and biomass energy. By investing in these environment-friendly ventures, Annex II countries would increase the range of options available to them for meeting their Kyoto targets. However, in order to justify investment in large-capacity projects, these ventures must be assured of market access.

On the other hand, Russia's eastern regions need to make vast improvements in energy efficiency, as well as investing anew in the modernization and construction of small, local energy facilities. In some cases, renewable energy could replace obsolete thermal capacity and these green projects could be feasible because of their scale and modular nature, which allows capacity to expand as demand grows.[21]

Furthermore, the integration of "big" and "small" at the national and bilateral levels is needed. Japan is the world's leading nation in terms of energy efficiency. It faces immense challenges in meeting its Kyoto targets. It is conceivable that the Kyoto process will require active participation at the prefectural level. Russia, on the other hand, is one of the world's largest energy producers and exporters, but its eastern provinces need both large export-oriented energy projects and energy improvements at the micro-level.

The geographic and economic characteristics of this area allow both countries to cooperate in tailoring their Kyoto implementation strategies. Moreover, not only bilateral, but also multilateral initiatives within the context of the Protocol may become possible. This entire process, however, will succeed only if industries, as well as national, provincial and local governments, assert themselves and take a proactive role at the heart of these activities, favoring a project-based approach.

[19] *Renewables in Russia: From Opportunity to Reality* (Paris: International Energy Agency, 2004), p.91
[20] Ibid., p.56
[21] Ibid., p.97