

Development and Climate Change Issues in the Post-2012 Framework: The Northeast Asian Context

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1. Introduction

Global concerns and actions to address climate change have already gone beyond the climate change issues alone and they have become a comprehensive and strategic subject of development. It was realized in the Cancun Agreements that "...addressing climate change requires a paradigm shift towards building a low-carbon society that offers substantial opportunities and ensures continued high growth and sustainable development, based on innovative technologies and more substantial production, consumption and lifestyles ..." (p.2). Therefore, developed countries are required to develop low-carbon development strategies or plans, and the developing countries shall take nationally appropriate mitigation actions in the context of sustainable development. The developing countries are also encouraged to develop low-carbon development strategies in the context of sustainable development (CP.16).

Keeping the global mean temperature raise below 2°C above pre industrial levels will require the peaking of global and national greenhouse gas (GHG) emissions as soon as possible and declining towards zero emissions in the second half of this century (IIASA, 2010/2011). Christiana Figueres, Executive Secretary of the UNFCCC in her statement at COP 16 in Cancun, Mexico, pointed out that "...we are quickly running out of time to safeguard our future" and the wake-up calls are the wildfires that gripped Russia and this year's hottest summers to date in Japan and China (Figueres, 2010). Moreover, scientists forecast that climate variability and change is expected to proceed in the coming decades irrespective of efforts to mitigate GHG emissions. Therefore, adaptation actions that reduce vulnerability to risks associated with climate change are taking increasing attention of the international community.

The Secretary-General of the United Nations established the High-level Advisory Group on Climate Change Financing in February 2010 to work around the goal of mobilizing \$100 billion a year by 2020 as long-term financing to assist developing countries to meet their mitigation and adaptation needs. This goal was originally included in the Copenhagen Accord at COP 15 last year and formally was recognized in the Cancun Agreement at COP 16. Meeting this goal is challenging, but feasible, claims the Advisory Group (AGCCF, 2010).

Based on the above background, this paper discusses some issues (energy, transportation, food security and international trade) of development and climate change that

are envisaged in the post-2012 climate change framework in the context of the Northeast Asian region.

2. Climate Change and Energy

Policies and actions aimed at significant reductions in GHG emissions by 2020 and beyond would entail drastic changes in the supply and use of energy. Globally, the energy system — supply, transformation, delivery and use — is the dominant contributor for climate change, representing around 60% of total current GHG emissions. At the same time, approximately 3 billion people worldwide rely on traditional biomass for cooking, heating, and about 1.5 billion have no access to electricity. The International Energy Agency (IEA) predicts the world energy demand to grow by more than 50% in the next 25 years. Accordingly, the world community faces dual challenge of the world's energy needs for development while contributing to GHG emissions reduction.

The United Nations Secretary-General's Advisory Group on Energy and Climate Change (AGECC)¹ calls on the United Nations system and its members to commit themselves to two new complimentary global goals:

- Ensure universal access to modern² energy services by 2030;
- Reduce global energy intensity³ by 40% by 2030 (AGECC, 2010).

At a side event held during the recent United Nations Climate Change Conference in Cancun, a representative from private sector, who works in a clean energy field, asserted that the presently available clean energy technologies are already cost-competitive with new investments in fossil-fuel based power plants if the governments would remove their massive subsidies provided to fossil fuel based energy generation.

Kyoto Parties with binding targets witnessed a collective reduction of GHG emissions from fuel combustion by 9.2% in 2008 compared to the base year 1990, while those of other countries increased by 76.1% over the same period. Japan's GHG emission from fuel combustion accounted for 1,151.1 million tonnes of CO₂ in 2008 that has increased by 8.2% from its 1990 level, whereas Japan has a binding target of 6% reduction of its economy-wide GHG emissions during the period 2008-2012. Russia's GHG emission from fuel combustion was 26.8% lower in 2008 compared to its 1990 level accounting for 1,193.8 million tonnes of CO₂. Thus, as collectively, the GHG emission from fuel combustion of Annex I countries

¹ Established in 2009 by Ban Ki-moon, Secretary-General of the United Nations and chaired by Kandeh Yumkella, Director-General of the United Nations Industrial Development Organization (UNIDO).

² Modern sources of energy include fuels such as natural gas, liquid petroleum gas (LPG), diesel and biofuels such as biodiesel and bioethanol (AGECC, 2010).

³ Energy intensity is measured by the quantity of energy per unit of economic activity or output.

in Northeast Asia was 15.4% lower in 2008 compared to its 1990 level (Table 1).

At the same time, the combined GHG emission from fuel combustion of other four countries in Northeast Asia, China, ROK, DPRK and Mongolia, who are Parties to the Kyoto Protocol, but do not have binding targets for their emission reductions, witnessed 176.2% raise in 2008 over the 1990 level. Such increases were associated with massive rises of the emissions of China and ROK during the period. China's GHG emission from fuel combustion almost tripled and those of ROK more than doubled during the period 1990-2008 accounting respectively for 6,508.2 and 501.3

million tonnes of CO₂ in 2008. However, those emissions of DPRK and Mongolia were respectively 39.2% and 9.9% lower in 2008 from their 1990 levels (Table 1).

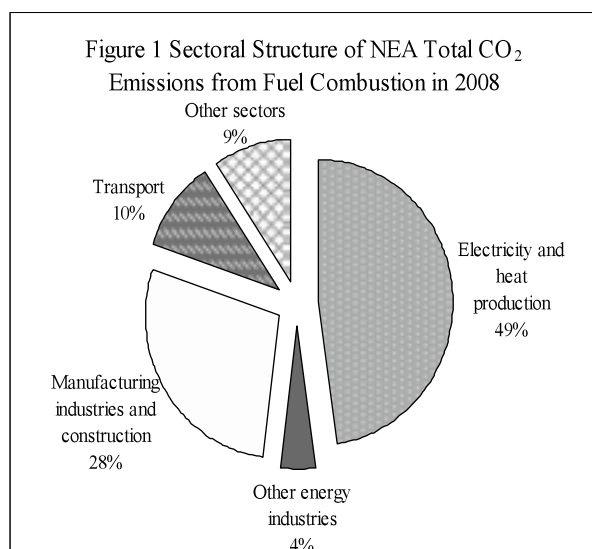
In terms of sectoral structure, electricity and heat production sector accounted for the largest share — almost half of the region's total CO₂ emissions from fuel combustion in 2008 — a similar pattern to the global structure. Transport was the second largest emitting sector globally followed by manufacturing industries and construction. However, the second largest emitting sector in Northeast Asia was manufacturing industries and construction accounting for 28% of total followed by

**Table 1 CO₂ Emissions from Fuel Combustion by Sector in 2008
(sectoral approach, million tonnes of CO₂)**

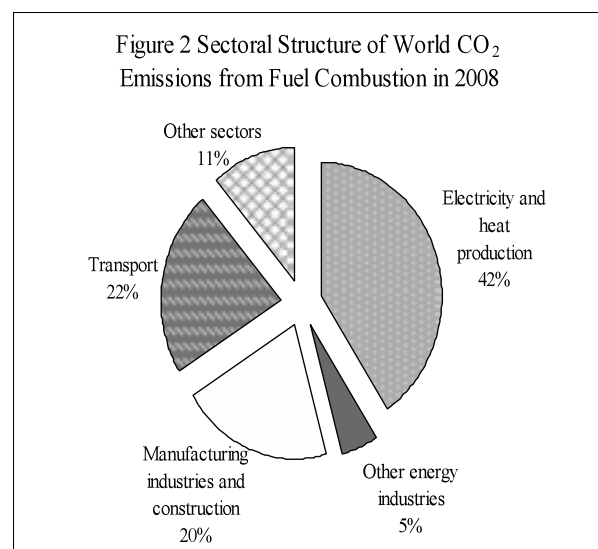
	Total		Electricity and heat production	Other energy industries	Manufacturing industries and construction	Transport	Other sectors
	2008	% change 90-08					
Japan	1,151.1	8.2%	472.2	41.2	247.5	226.2	164.1
Russia	1,593.8	-26.8%	873.9	74.1	229.5	243.3	173.0
<i>Total of Annex I Countries in NEA</i>	2,744.9	-15.4%	1,346.1	115.3	477.0	469.5	337.1
ROK	501.3	118.6%	229.6	32.9	95.9	84.2	58.6
China*	6,508.2	194.3%	3,108.1	268.6	2,167.9	452.6	511.0
Mongolia	11.4	-9.9%	7.1	-	1.5	1.6	1.2
DPRK	69.4	-39.2%	11.2	-	43.6	1.2	13.3
<i>Total of Non-Annex I Countries in NEA</i>	7,090.3	176.2%	3,356.0	301.5	2,308.9	539.6	584.1
NEA, total	9,835.2	69.3%	4,702.1	416.8	2,785.9	1,009.1	921.2
World	29,381.4	40.1%	11,987.9	1,491.9	5,943.6	6,604.7	3,353.4

Note: *Excludes Hong Kong;

Source data: IEA, 2010.



Source: Estimated from IEA, 2010.



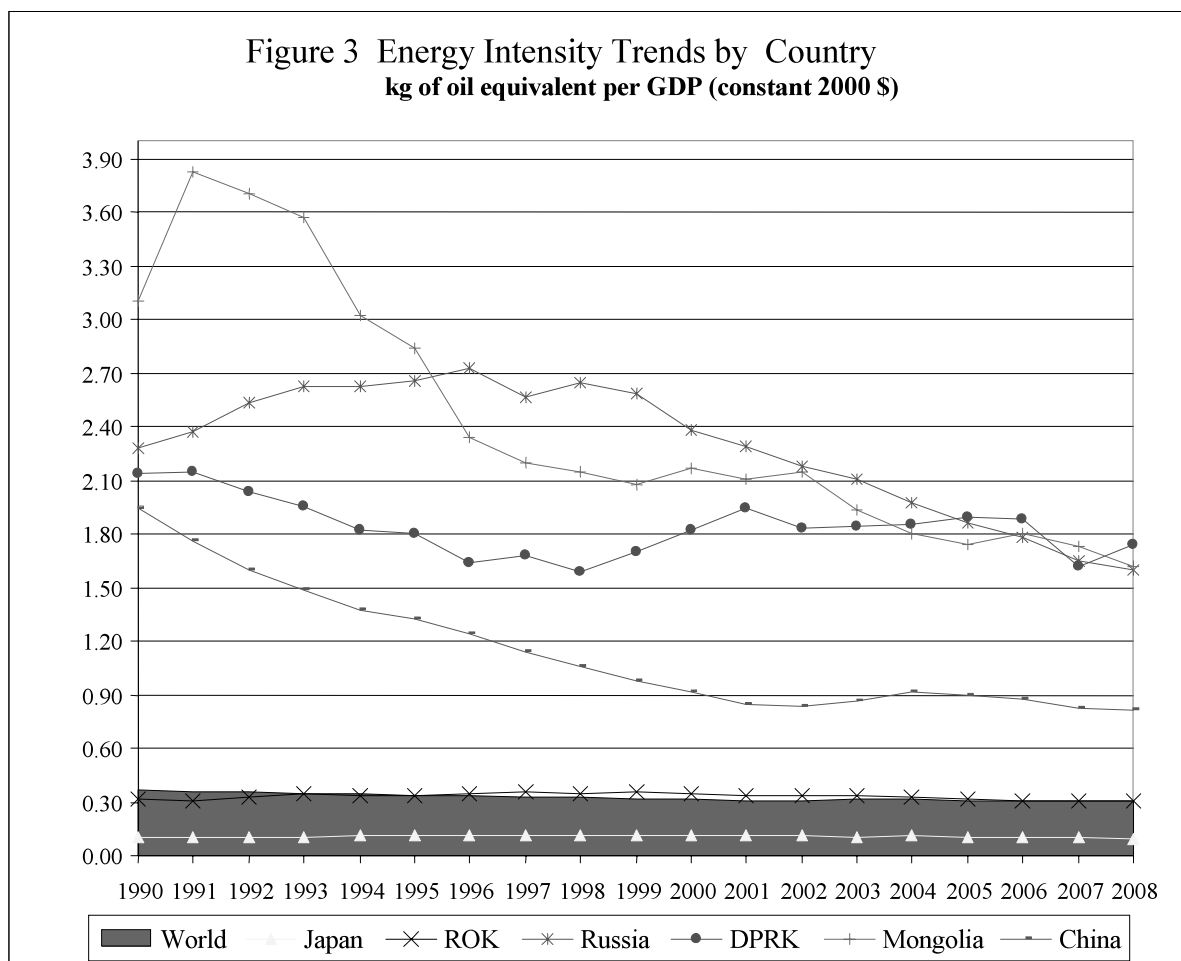
transport, which accounted for 10% of the region's total CO₂ emissions from fuel combustion in 2008. Therefore, in addition to energy industries, manufacturing industries and construction sectors could be another potential target sector for GHG emission reductions in the region (Figures 1 & 2).

Energy efficiency improvements have a big potential for GHG emission reduction in manufacturing industries and construction sectors. Studies suggest that many efficiency improvements are priced at 1-3 cents per kWh — about one-fifth the cost of electricity generated from new coal and natural gas-fired plants. Efficiency is not only cheaper than all other options, it also increases personnel income by reducing energy bills and freed money can be spent elsewhere that encourage employment. Japan's Top Runner Program has helped Japan boost the efficiency of refrigerators by 55%, air conditioners by almost 68% and computers by 99%. Japan's steel industry now uses a third less energy that it did 30 years ago. Converting China's cement industry to the most efficient dry kiln technologies, as used in Japan, could cut global energy use in the cement sector by 40% (International Rivers, 2009). According to the World Business Council for Sustainable Development (2010), buildings today account for 40% of the world's energy use and a path is available to achieve energy savings in buildings that would equal to the total energy consumed in today's transportation.

The countries in Northeast Asia vary in terms of

energy intensity of their economies. Japan is the most energy efficient economy not only in the region, but also in the world. Japan's energy intensity continued to be the lowest in the region ranging at 0.1 kg of oil equivalent per unit of GDP measured at 2000 US\$ (kgoe/2000\$) during the period 1990-2008. Energy intensity of ROK did not change much during the period and stayed at around the global average of 0.30 kgoe/2000\$. However, energy intensities of all other economies in the region are still far higher than the global average despite their overall improving trends during the past two decades. For example, China's energy intensity fell to 0.81 kgoe/2000\$ in 2008 from 1.94 kgoe/2000\$ in 1990. However, it was still 2.7 times higher than the world average. Energy intensities of the other economies, DPRK, Mongolia and Russia, were even twofold higher than those of China and ranged around 1.60 kgoe/2000\$ in 2008. It might be attributable to the climatic conditions of these countries that need more energy for heating, particularly in Russia and Mongolia, compared to other countries in the region. Nevertheless, this situation signifies that there is a considerable room for improvement of energy efficiencies in these economies and thereby substantially reduce carbon emissions (Figure 3).

The countries in the region are making certain efforts towards curbing and reducing GHG emissions. The share of clean energy in China's energy mix keeps progressing and China is leading the global development of wind energy



Source: Estimated from IEA, 2010.

with a 20 million kW annual installed capacity. Moreover, China is among the global leaders of development and utilization of solar and renewable energy. However, "China confronts the problem of optimizing its energy use structure, and in particular managing its shift away from low-efficiency, highly polluting sources (Zhou, 2010, p.31). Mongolia aims to increase share of renewable energy in its energy generation to 20-25% by 2020 from the current 4% (MNETM, 2010).

3. Climate Change and Transportation

Climate change presents a significant challenge for transportation, for both freight and passenger transport. Transport sector is the second largest GHG emitter globally and the third largest in the Northeast Asian region (Table 1). Demand for transport sector continues to grow in line with economic, trade and population growths; thus, transportation emission is projected to continue to rise even in scenarios with global GHG emissions limitation. Transport is still heavily relies on high carbon intensive fossil fuels. Moreover, transport is one of the most vulnerable sectors to adverse impacts of climate change. Recent air and road traffic disruptions in most of the Europe and the Northeastern coast of the U.S. caused by unusual heavy snow and extreme cold are the fresh examples. Therefore, along with mitigation actions, adequate adaptation measures need to be developed in transport sector. Accordingly, transport is another key sector placed at the centre of the climate change debate.

The World Conference on Transport Research Society (WCTRS) that has representatives of 67 countries calls for an urgent need to involve transport as a major sector in the post-2012 climate change negotiation. Studies suggest that emissions from vehicles by combustion of fuels account for roughly 85% of total CO₂ emissions in transport sector and the remaining 15% come from the production and refining of oil and delivery of fuels (IPIECA, 2004). According to the IEA, car ownership in China, India and other Asian developing countries is expected to increase 18 times by 2050 from the current level. Also, with over 80% of international merchandise trade is carried by sea and the projected growth in international trade, GHG emissions from shipping would continue to increase, unless effective regulatory, technical and operational measures be agreed and implemented immediately (UNECE, 2010).

WCTRS advocates "Sharp Reduction" of per capita CO₂ emissions in developed countries and "Leap-Frog" in developing countries to avoid business as usual path and shift to low-carbon transport. This conceptual framework to move towards low-carbon transport has three components: Avoid (reduce transport demand that avoids unnecessary journeys and reducing the lengths of trips), Shift (reduce emissions per unit transported via shifting transport demand to low-carbon modes) and Improve (reduce emissions per kilometer or improving the carbon intensity of all modes

of transport), so called the ASI (avoid, shift, and improve) approach. Each strategy would entail technological, regulatory, informational and economic instruments to enhance low carbon transport (WCTRS, 2010).

The Global Environment Facility (GEF), a multilateral agency acting as the operating entity of the financial mechanism of the UNFCCC, in its next funding period of GEF-5 (2010-2014) and beyond makes the ASI approach as the conceptual basis for future GEF transport operations. The Multinational Development Banks (MDBs) are also increasingly re-orienting their lending in the transport sector towards sustainable transport. Scientific and Technical Advisory Panel, administered by UNEP, suggests to define the sustainable low-carbon transport as follow: "*Sustainable low-carbon transport provides economically viable infrastructure and operation that offers safe and secure access for both persons and goods whilst reducing short and long term negative impacts on the local and global environments*" (p.13). Along with country level supports, GEF considers that a regional approach can be effective in some cases (GEF-STAP, 2010). However, a global and bilateral financial mechanism to support transition towards low-carbon transport is considered yet weak. Among the 2,645⁴ registered CDM projects up to date only four projects were in transport sector. Japan participated in one⁵ of these projects by providing a partial financing from JBIC and a Japanese private entity (Japan Carbon Finance Ltd.) is the CER (Certified Emission Reduction) buyer of this project.

Innovative initiatives and actions towards promoting low-carbon transport are kicking off in Northeast Asia as well. For example, China's Innovation Center for Energy and Transportation (iCET) is promoting research, policies and government institutions that can make low carbon fuels a reality in the country, and set a 10% reduction target in China's transport fuel carbon intensity (including electricity) by 2030 (iCET, 2010). China has developed a number of technical standards and detailed rules for transportation in recent years that are mostly related to road transportation. These include, for example, the Administrative Measures for Testing and Supervision of Fuel Consumption of Road Transportation Vehicles, Code for Inspection of Fuel Consumption Parameters and Configuration of Road Transportation Vehicles etc (NDRC, 2010).

At the regional level, cooperation in transport sector has to consider climate change issues rigorously and support transitions towards low-carbon transport systems in Northeast Asia. The ASI approach, as described earlier, can be a guiding principle for such move.

4. Climate Change and Food Security

At the UN Climate Change Conference in Copenhagen, more than 60 of the world's most prominent agricultural scientists and leaders, including two from the Northeast Asia⁶, called on negotiators to recognize

⁴ As of 21 December 2010.

⁵ CDM project name: Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system. The project host country is India.

⁶ Namely, Masaru Iwanaga, Director General, National Institute of Crop Science, Japan, who is Former Director General of the International Maize and Wheat Improvement Center (CIMMYT), and Ren Wang, Director, Consultative Group on International Agricultural Research (CGIAR), who is Former Vice President of the Chinese Academy of Agricultural Sciences (CAAS).

and address the specific threat that climate change poses to the world food security. The call underlined that the historically unprecedented adverse impacts of climate change on agriculture, and thus on food production, place at risk all other mitigation and adaptation efforts, whereas our agricultural systems are still largely unprepared to face it (Global Crop Diversity Trust, 2009). "*Global climate change projections have a solid scientific basis and there is growing certainty that extreme weather events are going to increase in frequency and intensity*" (FAO, 2008, p.12).

Despite the declining growth rate of population, the world population is expected to reach 9 billion by 2050 (UN, 2009) — up by about 35% from the current level of 6.7 billion. Food consumption pattern indicates that agricultural production will need to increase by at least 70% to meet demand at that time. However, most studies indicate that climate change is likely to reduce agricultural productivity and production stability. The IPCC⁷ Fourth Assessment Report identified agriculture, forestry and fisheries as one of the five sectors that is most likely to be affected by climate change. Therefore, it has become crucial to develop "climate-smart" agriculture for achieving future food security and climate change goals. The "climate-smart" agriculture is defined as the agriculture that sustainably increases productivity, resilience (adaptation), reduces or removes GHGs (mitigation), and enhances achievement of national food security and development goals (FAO, 2010).

A report compiled by the Food and Agriculture Organization of the United Nations (FAO, 2010) suggests achieving greater consistency between agriculture, food security and climate change policies at national, regional and international levels. Despite existing effective climate-smart practices that are applicable in agricultural systems of developing countries, the current and projected financing are substantially inefficient to meet the dual challenges of food security and climate change. Therefore, among-others, the financing mechanisms under the UNFCCC will need to take sector-specific considerations in channeling fast-track financing to agriculture.

The Northeast Asian region is also facing the food security and climate change challenges as the increasing concentration of carbon dioxide emissions is likely to harm the region's agriculture as well. A doubling of carbon dioxide levels could decrease rice yields in central and southern Japan, even in irrigated lowlands, by up to 40% (Nakagawa et al, 2003). The drought in Russia resulted in wheat yield reductions by 40% in 2010. In the past 50 years, precipitation in North China and most regions of Northeast China decreased by 10% to 30% (Zheng, 2010) that would adversely impact the agricultural production in the region. Live weight of Mongolian sheep is likely to decrease in most areas of the country due to warmer and dryer summers that would result in reduced meat productivity (MNETM, 2010). According to the Hunger and Climate Vulnerability Index, a work-in-progress index developed by the World Food Program's Office for Climate Change and Disaster Risk Reduction and the Met Office Hadley Centre (2010), China and Mongolia are highly

vulnerable to hunger and climate change. Therefore, food security and climate change issues require due attention of not only the national, but also regional proactive policies and actions within the post-2012 climate change cooperative framework in Northeast Asia.

5. Climate Change and International Trade

Trade liberalization and climate change issues are currently handled under separate international treaties negotiated at the multilateral level. Trade regime is a relatively mature one that started in 1947 with the General Agreement on Tariffs and Trade (GATT) and regulated within the mandate of the World Trade Organization (WTO). The climate regime is a more recent regime and has been developed since 1992 within the UNFCCC framework. However, the governments are facing more pressure at the national and international levels to use all tools, including trade policies, to mitigate climate change. Therefore, countries need to increasingly pursue trade policies that favor environmentally friendly goods and products, while abiding by their commitments under the WTO agreements. In fact, trade issues became to play an increasing role in climate change negotiations since the UNFCCC COP 15 in Copenhagen. A special provision on international trade has been also included in the Cancun Agreements that states: "*...the measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade*" (CP.16, 2010, p.14).

The concepts of "eco-labeling" and "carbon footprint" are expected to increasingly being used as new regulations to favor low carbon goods and services. While these measures encourage development of climate friendly goods and services, there is an increasing concern that they may result in protectionism and negatively impact international trade; in particular, imposing extra burden on developing countries' exports and could conflict with the WTO's Technical Barriers to Trade (TBT) labeling rules.

Moreover, some domestic policies on climate change, such as imposition of a carbon tax or cap and trade mechanisms on imported goods and services being proposed by the U.S. and the EU directly affects trade and have a high potential to conflict with the WTO rules of non-discrimination among nations (MFN) and non-discrimination between imported and domestic goods (NDT). Also, financial mechanisms, price and investment support measures to support specific activities, such as increased use of renewable energy, development of new technologies on energy and energy efficient goods etc. will affect costs and prices of these goods and services; thereby can conflict with the WTO rules on subsidies and investment incentives (Keane et al, 2010).

Furthermore, both the UNFCCC and the WTO have provisions for differential treatment to developing countries. This principal is preserved in the Kyoto Protocol and the developing countries do not have legally binding commitments for GHG emissions reduction. Therefore, the intention of some industrialized countries, such as Japan

⁷ Intergovernmental Panel on Climate Change

and Russia⁸, to move away from the Kyoto Protocol can be regarded as disobeying not only the principles of the UNFCCC, but also those of the WTO.

International trade plays a key role for the economies in Northeast Asia and all nations are the members of the UNFCCC and the WTO, except Russia and DPRK. Therefore, it might be desirable for the countries in Northeast Asia to extensively engage in constructive dialogues and joint researches to better understand the linkages between climate change and trade issues and implications of further international climate change and trade regimes for the regional economies.

6. Concluding remarks

The issues of climate change and development are becoming more interlinked and harmonized than ever. Both the developed and developing countries need to pursue comprehensive policies towards moving to low-carbon economies to prevent and mitigate catastrophic consequences of the changing climate. The countries in Northeast Asia are making various efforts towards this end, but there is still a lot room for tackling the issues not only at the national, but also at the regional level. Energy, transportation, food security and international trade issues could be potential areas of effective cooperation within the post-2012 climate change framework in the Northeast Asian region.

Along with shifting to more sustainable and clean energy sources, a considerable potential exists for improving energy efficiencies of the economies in Northeast Asia, and thereby reducing carbon emissions. In addition to energy industries, manufacturing industries and construction sectors represent another target sectors for GHG emission reduction potentials in the region. Regional cooperation in transport sector needs to consider climate change issues rigorously at their agenda and promote transitions towards low-carbon transport systems in the region. The ASI approach can be a guiding principle for such joint move. Furthermore, food security issues require to be addressed in the context of climate change not only at the national, but also at the regional level. Lastly, but not least, it is desirable for the countries in Northeast Asia to engage in constructive dialogues and joint researches in order to better understand the linkages between climate change and trade issues and implications of further international regimes for the regional economies.

[Original English version as written by author]

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⁸ Russia is not yet a member of the WTO, but in the process of acceding to it.

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