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REVIEW OF PROGRAMME PLANNING AND IMPLEMENTATION

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Transboundary Air Pollution in North-East Asia

Note by the Secretariat

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I. OVERVIEW OF PROGRESS

A. Mitigation of Trans-Boundary Air Pollution from Coal-Fired Power Plants in North-East Asia

Since the establishment of NEASPEC, transboundary air pollution was identified as one of the top priorities by the member States. Increased use, in particular, of fossil fuels, without proper policy and technical responses to its environmental externalities brought about growing environmental damage due to sulfur and nitrogen oxide emissions. Responding to this challenge, NEASPEC with the support of the Asian Development Bank (ADB) initiated a project on the mitigation of transboundary air pollution from coal-fired power plants in North-East Asia, which was undertaken in three phases during 1996-2011.

1. During the same period, projects' key target countries, i.e. China and Mongolia, made significant efforts reducing sulfur dioxide (SO₂). The Government of China under the National Eleventh Five-Year Plan (2006-2010) mobilized CNY43.8 billion investment of the power sector in SO₂ emission controls, which brought about the reduction of SO₂ emissions from 13.5 million ton in 2005 to 9.26 million ton in 2010 (31.4 percent decrease) from electric power generation. In addition, in 2010 the Government committed to further reduce carbon intensity by 40-45 percent by 2020. In addition, the Chinese emission standards for coal-fired power plants that became effective in 2003 have been recently replaced by the new version released at the end of 2011. The new standards are much more stringent than the previous ones and they became effective on 1 January 2012. New standards tightened SO₂ emission limit from current 400 mg/m³ to 100 mg/m³ for new plants.

2. In Mongolia, over 90 percent of electricity is generated from coal-fired power plants, which are inefficient due to old age and lack of adequate maintenance. The Government of Mongolia plans to build a state-of-the-art combined heat and power plant (CHP) in Ulaanbaatar. Once this new plant is operational, air pollutants emissions including SO₂ will be significantly lower than those of existing CHP plants. The Government of Mongolia developed a draft energy conservation law in 2011. In the meantime, an energy efficiency and conservation action plan is being prepared. Once they are implemented, the energy consumption per unit of GDP is expected to be much lower than the current level.

3. The Joint NEASPEC/ADB Project on Mitigation of Transboundary Air Pollution from Coal-fired Power Plants (hereinafter the project) which were implemented during 2008-2012 comprised the following five components:

- (i) Component 1: Air Pollution Abatement Plans (Integrated Strategies for Mitigating Air Pollution and Greenhouse Gases);
- (ii) Component 2: SO₂ Emission Regulation and Compliance;

- (iii) Component 3: Mongolian Power Plant Emission Standards;
- (iv) Component 4: Knowledge Transfer and Dissemination;
- (v) Component 5: Demonstration Project and Management Modules

4. In this connection, the project team operated under the overall guidance of ADB and NEASPEC conducted various analytical and policy analyses including (a) analysis of international coal-fired power industry status and trend, (b) analysis of coal-fired power plants in China and Mongolia, (c) review of SO₂ emission standards, (d) assessment of flue gas desulphurization (FGD) technologies, (e) development of national emission standard in Mongolia, (f) development of national strategic plan for CO₂ reduction in Mongolia, (g) assessment of FGD technologies at Changshu power plant.

5. The project team held various national training activities for government officials, experts and technicians.

- **Training on proposed emission standards for Mongolia** in November 2010 in Ulaanbaatar to discuss the proposed emission standards for coal-fired power plants in Mongolia; and the proposed national action plan on SO₂ and CO₂ reduction in Mongolia.
- **Training on emission control in China** in November 2010 in Zhangjiagang city to discuss assessment on operation of facilities for environmental protection in coal-fired power plants, operation of limestone gypsum wet flue gas desulphurization system in coal-fired power plants; and technical regulation of bag house for flue gas of boilers.
- **Two training workshops on complex additive** in December 2011 in Harbin and Qingdao, respectively, to review the function of complex additive, and promote the application of complex additive to enhance activity of limestone slurry in the limestone gypsum wet scrubbing process of FGD.
- **Training on optimized measurement and control of pH value** in December 2011 in Changchun, Jilin Province to share the theory of measurement and control of pH value in absorbing tower, approaches and process of optimized measurement and control of pH value in absorbing tower; and measurement and control of pH value in absorbing tower.
- **Final workshop on the proposed emission standards in Mongolia** in July 2011 in Ulaanbaatar, Mongolia to share the information of coal-fired power plants in Mongolia, including their energy efficiencies, carbon intensities in Mongolia and other countries, gaps between Mongolia emission standards and international best practices; and approach and methodology used for establishing new emission standards for coal-fired power plants in Mongolia.

6. The project had also pilot activities on the technical assessment and improvement of air pollution control from a selected power plant. The China Electricity Council (CEC),

one of the implementation agencies for the project, proposed to assess air pollution emissions control from two 300 MW power generation units in Changshu Power Plant in Jiangsu Province of China. The FGD performance assessment at the pilot power plant, Changshu Power Plant, was performed from the technical, equipment, operation and adjustability aspects. After detailed technical assessment by a team of consultants, it was recommended to identify the adaptability and limitation of each piece of equipment of the FGD device against the variation of the sulfur content of coal; to take effective measures to ensure or improve the safe operation of the FGD device; and to actively optimize the operation of FGD device and conduct economic analysis to enhance the operational economy.

7. In Mongolia, an important achievement of the project was elaboration and submission for consideration of the Mongolian Government of the new air emission standards for the country's coal-fired power plants with reference to international best practices. The recommended new emission standards were adopted by the 71st decree of the National Council of Standardization and Measuring and formally published in December 2011 entitled "Maximum Acceptable Level and Measuring Method of Air Pollutants in the Exhaust Gases from Steam and Hot Water Boilers of Thermal Power Plants and Thermal Stations" (MNS6298:2011). As a result of this regulation, coal-fired power plants will need to install emission control equipment to comply with the new standards.

Table 1: Comparison of New Mongolia Standards with Other Countries' Standards

Pollutants	Mongolia	China		Japan	ROK	US
		2003Version	2012 Version			
SO ₂ (mg/m ³)	400-600*	400-1200	100-400	170-860	210	184
NO _x (mg/m ³)	450-1,100**	450-1,100	100-200	200	160	153-370
PM (mg/m ³)	50-200*	50-200	20-30	50-100	20	20-40

Note: * based on population density, ** based on volatile content in coal

8. Furthermore, the project recommended the following measures to achieve SO₂ emission reduction, which requires the installation of FGD devices in existing and new coal-fired power plants.

- By 2015, decommission CHP2 and CHP3 or install FDG control device on all units in these two CHP plants;

- By 2025, retrofit the CHP plants in Erdenet and Darkhan towns with FDG control device equipped;
- By 2030, retrofit the Dornod CHP plant with FDG control device equipped; and
- By 2035, retrofit the Umnogobi CHP plant and all other coal-fired power plants with FDG control device equipped.

9. Under this project, NEASPEC convened two subregional workshops on transboundary air pollution in North-East Asia in December 2008 in Tokyo and November 2011 in Incheon, respectively, in order to review results of ongoing research on transboundary air pollution, policy and technical approaches to mitigating air pollution from coal-fired power plants, and discuss potential areas of cooperation.

10. During the project development and implementation, the NEASPEC Secretariat was responsible for facilitating communication among national focal points, ADB and the project team, developing the overall approach and component of the project, and holding knowledge-sharing activities.

B. Review of existing and required capacities for addressing adverse environmental impact of transboundary air pollution in North-East Asia

11. As the member States achieved considerable progress with mitigating sulfur emissions from coal-fired power plants by the end of the first decade of the new millennium, other pollutants, including those from non-point sources also became an issue of concern. These include fine particulate matter (PM_{2.5}), ground-level ozone, volatile organic compounds (VOCs), etc. Especially, quantifying their adverse impacts on ecosystems and health was considered a priority. Therefore, the project proposal on the “Review of existing and required capacities for addressing adverse environmental impact of transboundary air pollution in North-East Asia” submitted by the Russian Federation and approved by the 16th Seniors Officials Meeting (SOM-16) in September 2011 was designed to further strengthen subregional cooperation on transboundary air pollution in North-East Asia.

12. The Secretariat embarked on the implementation of the project by conducting a consultation meeting on the subregional level regarding this new NEASPEC initiative during the NEASPEC Workshop on Transboundary Air Pollution in North-East Asia held in Incheon on 10-11 November 2011. During the workshop the experts from subregional member States refined the goals and objectives of the project and agreed on the action plan. The roles and responsibilities of the implementing agencies and national consultants were also defined during this meeting.

13. Subsequently, the secretariat finalized institutional arrangements with the main implementing agency - Scientific Research Institute (SRI) Atmosphere (Russia). In

addition, arrangements were made with the national consultants from China, Japan and the Republic of Korea who were nominated by their respective governments. A focal point from Mongolia was also involved in the project activities. Simultaneously, the secretariat also established close collaboration with the secretariat of the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) to facilitate exchange of experience and knowledge between European and Asian experts and draw lessons for North-East Asia from CLRTAP's institutional and scientific development.

14. At the end of June 2012, SRI Atmosphere and national consultants submitted their draft reports that served as a basis for discussion at the Expert Consultation Meeting (ECM) on Transboundary Air Pollution in North-East Asia held on 9-10 July 2012 in St. Petersburg, Russian Federation. About 20 participants, including official delegates and national experts from China, Japan, Mongolia, Republic of Korea and the Russian Federation, and a representative of the UNECE CLRTAP secretariat, attended the meeting.

15. The ECM reviewed the progress made on the NEASPEC project on transboundary air pollution since its inception and came up with some areas where further work needs to be done by NEASPEC based on the identified gaps in subregional cooperation. The Russian Federation proposed a modeling study of transboundary air pollution with inclusion of the Russian territory to complement the existing activities on modeling in the subregion and promote adoption of common methodologies and increase international cooperation in the North-East Asia. The meeting participants provided comments on the proposal and invited the Russian Federation to further elaborate it and consider submitting the official proposal to the SOM-17.

16. Noting that currently no subregional/regional framework in North-East Asia provides a holistic approach covering all components of transboundary air pollution management, the meeting recommended the development of a mechanism for international cooperation that would strengthen subregional frameworks and increase their geographic scope so that they could work closely with each other to jointly address relevant challenges related to local and regional air pollution issues in North-East Asia and beyond. In this regard, the meeting reviewed options for possible development of subregional cooperation in mid to long-term perspective with a view of establishing a policy-oriented umbrella framework in support of scientific efforts on addressing transboundary air pollution. Another possible approach that was discussed was the establishment of an Expert Working Group under NEASPEC to make further recommendations on transboundary air pollution areas of work of NEASPEC for the benefit of the whole subregion. As suggested by ECM, such options are outlined in more detail in the final project report for information of member States and possible action of NEASPEC in the future, as presented in Annex II in this document.

17. In parallel with the consultation process, the project conducted a comprehensive review of available information on existing regional and international scientific studies,

air quality monitoring and management mechanisms such as the Acid Deposition Monitoring Network in East Asia (EANET), the Joint Research Project on Long-range Transboundary Air Pollutants in North-East Asia (LTP Project) and the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP Convention) and assessed available information and data on relevant atmospheric modeling studies, national studies on environmental impacts of air pollution, and regional/subregional conferences. Based on this comprehensive review, the project identified subregional knowledge gaps, relevant needs and priorities and formulated options for a possible comprehensive subregional framework for multilateral cooperation on transboundary air pollution issues. A summary of the Annex II is as follows in paragraphs 18-21 below.

18. Among the existing mechanisms, EANET is a regional monitoring network that utilizes standardized monitoring methods and analytical techniques for observing the acid deposition in the region. LTP is a joint research project monitoring and modeling air pollutants, particularly sulfur. Model Inter-comparison Study in Asia (MICS-Asia) specifically aims to improve model inter-comparison study. Other existing mechanisms include the Project ABC (Atmospheric Brown Clouds), which is a UNEP-led project not only limited to the North-East Asia. Joint Forum on Atmospheric Environment in Asia and the Pacific is a 3-year old Forum, a network of numerous organizations including the EANET, with the main focus on knowledge sharing and technology sharing. CLRTAP is currently a 51-party Convention, which was created in 1979 as a new institutional framework for integration of science and environmental policy.

19. National plans currently consist of various regional-level activities and domestic policies to reduce air pollution. China, as the world's top coal producer and consumer, is faced with the challenges of vehicle emission, acid rain, and dust and sandstorms. The Chinese government is putting forward a new environmental standard to be adopted in 2016. The local governments are also developing a series of measures to limit coal consumption and to increase forest area, while imposing fines on heavily polluting industries. In Japan, photochemical oxidants and PM_{2.5} are emerging as key problems that necessitate a comprehensive survey on their concentration trends. The Fourth Basic Environmental Plan has introduced not only regulatory measures on pollutants but also economic measures to protect the atmospheric environment. In the Republic of Korea, increasing cars and electricity consumption is inducing NO_x, Ozone, VOC, and secondary dust pollutions, while SO₂ and primary dust have seen a general decline. An advanced environmental management system, Total Air Pollution Load Management System which manages businesses by rationing annual total allowable emissions has been implemented. In Russian Federation, the Ministry of Natural Resources and Environment (MNRE) supervises environmental monitoring. Nearly 700 monitoring stations of air pollution are operating. In 2010, emissions from stationary sources and motor transport were 18.9 million tons and 13.1 million tons respectively; however, from 1990 the total emissions have decreased by roughly 42 percent.

20. In responding to the region's transboundary air pollution problem, identified gaps and priorities include assessment of hemispheric and transboundary transport of air pollution and advanced technologies for monitoring and modeling. Another compelling priority is the need for advancing impact assessment tools. In addition, the lack of consensus among scientists and policy-makers across countries is also seen to hinder smooth translation from research to policy. It is also pointed out that existing mechanisms do not adequately deliver the necessary interaction with other regional organizations and global institutions.

21. Formulating options to address such gaps and priorities include three main aspects. First, scientific impact assessment and policy should be bridged together. Second, synergy should be maximized and redundancy should be minimized among the existing mechanisms. Third, in order to fulfill the above two, scientific tools should be enhanced as a strong scientific basis will provide concrete facts to collectively draw future plans and policies.

22. Based on the outcomes of the project outlined in the final project report (Annex II), the recommendation of the ECM and findings from the comprehensive review, the Government of Russian Federation is expected to present a new project proposal that will serve as a direct follow-up of the review.

II. ISSUES FOR CONSIDERATION

23. The Meeting may wish to acknowledge the contribution of the joint NEASPEC-ADB project on mitigation of transboundary air pollution from coal-fired plants to building capacities and knowledge on this issue in the subregion, and specifically in Mongolia, and express views and ideas regarding future possible activities of NEASPEC in this field.

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