The Japan Committee for International Institute for Applied Systems Analysis (IIASA)
International Workshop

The Atmospheric Pollution, Climate Change Nexus in Asia:

Implications for a New Development Agenda

Proceedings

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Ministry of the Environment

IIASA

The Japan Committee for International Institute for Applied Systems Analysis (IIASA)
Proceedings of International Workshop – The Atmospheric Pollution, Climate Change Nexus in Asia: Implications for a New Development Agenda

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Acknowledgements:
This international workshop (The Atmospheric Pollution, Climate Change Nexus in Asia: Implications for a New Development Agenda) was supported by the Ministry of the Environment, Japan (MOEJ).

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The Atmospheric Pollution, Climate Change Nexus in Asia:

Implications for a New Development Agenda

Institute for Global Environmental Strategies (IGES)
as the Japan Committee for IIASA Secretariat

1. Introduction

The Japan Committee for International Institute for Applied Systems Analysis (IIASA) was established in 1972 to facilitate collaboration between researchers in IIASA and Japan. Since 2012, part of this collaboration has been in the form of a workshop aimed at strengthening policy research on co-benefits in Asia. Several key development have followed last year's workshop in Asia and beyond. In Asia, the launching of Asian Pacific Clean Air Partnership (APCAP) led to the creation of science panel that is tasked with synthesising and communicating the latest research on atmospheric pollution to policymakers. At the international level, the approval of a the sustainable development goals (SDGs) have given policymakers incentives to understand interrelationships between air pollution, climate change and numerous other targets under a new 2030 Development Agenda.

As countries are already taking actions to achieve the SDGs, more integrated approach to development planning are becoming increasingly important. The integrated approach to SDGs and the co-benefits approach overlap in many respects. IIASA's knowledge of co-benefits could therefore be very useful for the Japanese research community. It is also potentially beneficial to policymakers in Japan. But it is necessary to identify how to build linkages across IIASA and Japanese researchers as well as relevant policymakers to maximize the results of this collaboration. Therefore this workshop will offer an opportunity to discuss how to move collaboration on co-benefits in the era of an increasingly integrated 2030 Development Agenda.

2. Objectives

This workshop will be designed to achieve the following objectives:

1) update the status and clarify contributions on the APCAP science panel regional assessment in Asia;
2) identify how research on nexus issues can help policymakers working on air pollution, climate change, and the SDGs in Asia;
3) advance collaboration between Japanese and foreign researchers on the APCAP science panel region assessments specifically and nexus approaches to SDGs generally.

3. Schedule

Date & Time	February 23, 2016
Venue	Institute for Global Environmental Strategies (IGES), Hayama, Japan
Organisers	Ministry of the Environment, Japan Institute for Global Environmental Strategies (IGES)
Collaborator	The Japan Committee for the International Institute for Applied Systems Analysis (IIASA)

The Atmospheric Pollution, Climate Change Nexus in Asia: Implications for a New Development Agenda

23 February 2016 at IGES, Hayama, Japan

Organised by
Ministry of the Environment, Japan and Institute for Global Environmental Strategies (IGES), Japan
Collaborated with
The Japan Committee for International Institute for Applied Systems Analysis (IIASA)

- Agenda -

23 February 2016	
09:30 –09:50	**Registration**
09:50 – 10:00 (5 min x 2)	**Welcome Remarks from JAPAN-IIASA Committee** - *Mikiko Kainuma, NIES* **Openning Remarks** - *Kazumi Yoshikawa, MOEJ*
Session 1: Status Report: Regional Assessment on Air Pollution in Asia	
10:00-12:00	***Chair: Maria Katherina Patdu***
	• Hajime Akimoto, NIES, Update on First Meeting of APCAP Science Panel • Iyngararasan Mylvakanam, UNEP-ROAP, Status of APCAP • Markus Amann, IIASA, Modelling Scenarios for the APCAP Regional Assessment Report • Ken Yamashita, ACAP, Science of Atmospheric Pollution in East Asia
12:00-13:15	**Lunch Reception**
Session 2: Cooperation with Researchers in Japan/Asia on the Regional Assessments and Nexus Issues	
13:15-15:15	***Chair: Katsunori Suzuki***
	• Toshihiko Masui, NIES, Research on GHG and SLCP emission scenario using AIM and progress of S-12 ERTDF of MOEJ • Katsumasa Tanaka, NIES, Do We Need Regional Emission Metrics in Asia? • Zig Klimont, IIASA, Benefits of Diesel Vehicle Regulation: IIASA-IGES Collaboration • Sudarmanto Budi Nugroho, IGES, The Co-benefits Action Plan for Bandung, Indonesia
15:15-15:30	**Tea/Coffee Break**
Session 3: Nexus Issues under the SDGs in Asia	
15:30-17:30	***Chair: Eric Zusman***
	• Mark Elder, IGES, Application of SDGs to Air Pollution • Kenichi Wada, RITE, Japan, Co-benefits Policy and Research beyond Paris • Yasuko Kameyama, NIES, Interrelationships across Multiple SDG Indicators • Xin Zhou, IGES, SDG Indicators and Analysis: From Systemic Perspective
17:30-17:40	**Closing Remarks** - *Hideyuki Mori, IGES*

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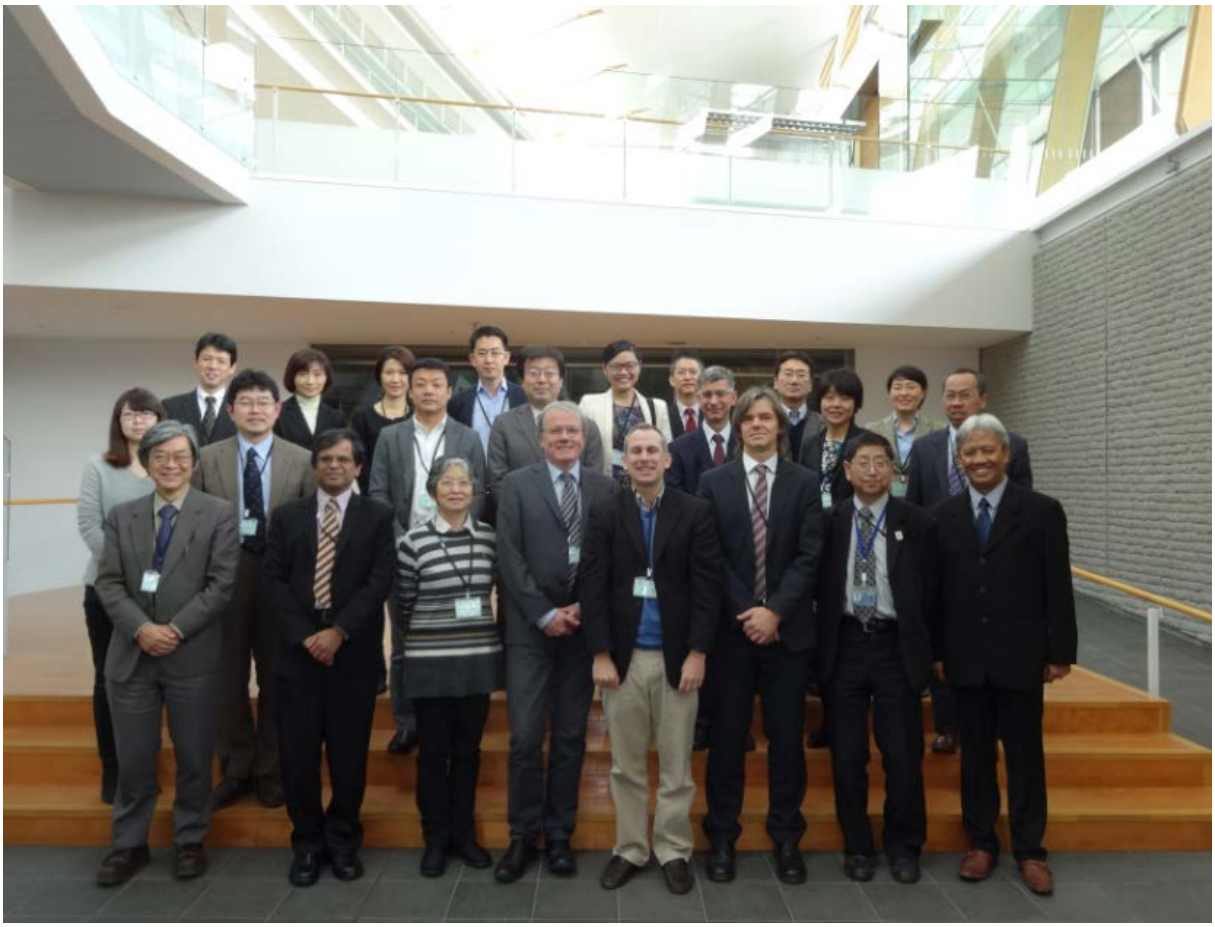

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- Summary -

■ **Welcome Remarks: Dr. Mikiko Kainuma, Japan-IIASA Committee, NIES, Japan**

Dr. Kainuma welcomed all participants and provided some remarks on behalf of the Japan Committee for IIASA. Dr. Kainuma started by recalling the 1970s when IIASA and Japan's Environmental Agency were established due to heavy air pollution problems. She then fast forwarded to the current day where the world approved the Paris Agreement and Sustainable Development Goals (SDGs) to improve the environment. Dr. Kainuma expressed her interest in discussing atmospheric pollution and climate change to identify ways to apply an integrated approach to SDGs and the co-benefit in Asia.

■ **Opening Remarks: Mr. Kazumi Yoshikawa, Ministry of the Environment, Japan**

After welcoming all participants, Mr. Yoshikawa shared his thoughts on an integrated approach to co-benefits in Asia. To strengthen an integrated approach, he noted the importance of effective enforcement of regulations for climate mitigation as well as quantifying social and environmental benefits. He also highlighted IIASA collaborative research on GAINS model application in Asia as a way to increasing the visibility of co-benefits. Mr. Yoshikawa closed by asking participants actively discuss efforts to promote further collaboration on co-benefits.

Session 1: Status Report: Regional Assessment on Air Pollution in Asia

■ **Update on First Meeting of APCAP Science Panel: Dr. Hajime Akimoto, NIES**

Dr. Akimoto made a presentation on the brief history of establishment of APCAP. Starting from S-7 project in 2009, there has been efforts of both natural scientists and social scientists working together to tackle "science and policy" on air pollution. Experts involved in S-7 project were trying to establish a scientific epistemic community for atmospheric environment as a requisite condition to achieve an international framework of atmospheric management. Then the UNEP ROAP established APCAP with support from the MOEJ. Dr. Akimoto touched upon APCAP's three pillars: APCAP Science Panel, APCAP Joint Forum and Regional Assessment, and spoke about Science Panel's TOR. He pointed to duties and responsibilities, operating structure and composition and selection of panel members. He described the Science Panel as a comprising of interdisciplinary experts from atmospheric, health, ecological, economic, social sciences to keep the APCAP partners and countries well informed of latest scientific findings on air pollution in the context of sustainable development. Dr. Akimoto set the stage for the next presenter, Mr. Iyngararasan Mylvakanam from UNEP-ROAP, to speak about APCAP in more detail.

■ **Status of APCAP: Mr. Iyngararasan Mylvakanam, UNEP-ROAP**

Mr. Mylvakanam presented on APCAP Joint Forum and Regional Assessment. He began by noting that air pollution issue used to be a local problem where causes and effects could be found rather easily, but currently the issue has become a regional and global matter. Mr. Mylvakanam said that we are now working as "the second generation" of air pollution community which focuses on integration across mitigation activities. He then moved on to APCAP Joint Forum held in last November in Bangkok. The Joint Forum has

been established as a platform for bringing together regional air pollution initiatives to share science-policy dialogue on air pollution control and prevention. Last year 23 Asia Pacific countries, 4 ministers and 5 regional initiatives attended the last Joint Forum. Mr. Mylvakanam also provided some updates on the Regional Assessment. The assessment consists of three parts: Part 1. Sustainable development requires managing atmospheric pollution; Part 2. Mapping scenarios for SDGs and identifying solutions; and Part 3. Strengthening implementation and scaling action. Next steps will be to identify contributing authors for each part; to elaborate the outlines for each chapter in each part; and to organize a second authors meeting in May.

■ **Modelling Scenarios for the APCAP Regional Assessment Report: Markus Amann, IIASA**

Dr. Amann proposed some overreaching questions for the APCAP Regional Assessment. The questions concentrated on how clean air policies in Asia could enhance human wellbeing such as secure food production and biodiversity; support social and economic development; slow down temperature increase; adapt to climate change; and contribute to global climate targets. He pointed out while there is not a single SDG focused on air quality, it is a critically important "means of implementation" for achieving other SDGs—although there are scientific challenges to address some of the important features in Asia, and to characterize the contributions to the SDG targets. The regional assessment should focus on a limited set of promising measures with multiple benefits for the SDGs, and embed air quality management into a wider development context. The advances that atmospheric scientists have made in quantifying air pollution impacts may also provide an input to those interested in achieving the SDGs in Asia.

■ **Science of Atmospheric Pollution in East Asia: Ken Yamashita, ACAP**

Dr. Ken Yamashita introduced EANET publications: *Periodic Report on State of Acid Deposition(PRSAD) in East Asia* which was published two times for a past decade and are under development for the latest five years; *Review on the State of Air Pollution in East Asia*; and some main activities of ACAP. He presented data on PM and haze, tropospheric ozone, acidification and eutrophication, air toxics, and emission inventories. He also touched upon study results done by Japan Automobile Manufacturers Association (JAMA) on $PM_{2.5}$ observation and yearly variations of chemical components in $PM_{2.5.}$ in Japanese cities. He moved on to work on the wet/dry deposition monitoring, the ecosystem effect monitoring and the risk assessment of air pollutants in East Asia. ACAP will continue working in these areas, and utilize their knowledge and data for the regional assessment.

■ **Discussions**

- The goal of APCAP is to promote better air quality management in Asia Pacific and thereby reduce air pollution and mortality, improve agricultural productivity, and contribute to other co-benefits such as conservation of biodiversity and local and global climate change. The discussions for this session focused on the APCAP Science Panel and Regional Assessment. The science panel will initially focus on the regional assessment report. In addition to the regional assessment, the science panel will also conduct some other activities such as publishing policy briefs and reporting on emerging issues for policymakers.
- The discussions also covered the roles of the science community. Compared with what existed 20 years ago, today we have more advanced methodologies for data collection and other relevant technologies to measure and quantify air pollutants such as PM and ozone, and conduct cost-benefit analysis. What science community should do is convince policymakers with the latest scientific research and modelling data to take concrete actions to improve air quality. The meeting also recognized the importance of the independence of the science community and the need to promote coordination among the existing networks.

Session 2: Cooperation with Researchers in Japan/Asia on the Regional Assessments and Nexus Issues

■ **Research on GHG and SLCP emission scenario using AIM (Asia - Pacific Integrated Model) and progress of S-12 ERTDF of MOEJ: Toshihiko Masui, NIES**

Dr. Masui presented on the progress of research on GHG and SLCP emission scenario using AIM; this research is supported by the Environment Research and Technology Development Fund (S-12-2) of the

MOEJ. He began by introducing the overall framework of the S-12 project, and goals and expected results of its Theme 2. He then explained the structure, target gases and sectors of the AIM/Enduse [Global] model, and presented the estimates drawn by applying the model for emissions of GHG and SLCP in Asia and China for four shared socio-economic pathways (SSPs) (scenarios). He also reported on the progress of the efforts to downscale SSPs to provincial levels in China. He then outlined the structure of AIM/Enduse [China] and emission estimate results, focusing on the residential sector. He concluded with the following summary points: (1) GHG and SLCP emissions in the future depend on the socioeconomic conditions and available technologies; (2) scenarios for achieving both low carbon and low air pollution society can be identified; and (3) there are big gaps between national average and regional scenarios. Based on these points, he underlined the need to provide information to various stakeholders and to apply countermeasures taking into account local contexts.

- **Do We Need Regional Emission Metrics in Asia?: Katsumasa Tanaka, NIES**

Dr. Tanaka presented on emission metrics for air pollution and climate change in Asia. He opened the presentation by introducing the concepts of emission metrics and associated issues including regional dimensions. He emphasized that regional emission metrics allow a more realistic comparison between the emissions of long-lived climate forcers and those of air pollutants, compared to the global metrics such as global warming potential (GWP). He then presented a Life Cycle Assessment (LCA) for coal power production in China, Germany and the United States, to investigate how the metric choice influences the CO_2 equivalent emissions. He further noted that the study illustrated the potential importance of address air pollutants by using regional emission metrics. However, he noted that there are large uncertainties in emission metrics for air pollutants (even more so for regional ones), hampering practical applications. He concluded that more research is necessary to establish a set of regional emission metrics for air pollutants.

- **Benefits of Diesel Vehicle Regulation: IIASA-IGES Collaboration: Dr. Zbigniew Klimont, IIASA**

Dr. Klimont presented on research on the multiple benefits of diesel vehicle regulation, focusing on regulation introduced by the Tokyo Metropolitan Government (TMG). The project is conducted in collaboration with IGES and funded by the MOEJ. He first presented the background of the research, including the importance of control of diesel emissions from transport in Asia and decreasing trends of $PM_{2.5}$ ambient concentrations in Tokyo. He highlighted the simulation results using the GAINS model for four policy scenario cases: namely, national policy only case; national and TMG policy case; delayed TMR regulation case; and accelerated TMG regulation case. The results showed significant changes in fleet turnover, average emission factors of BC and NOx from trucks, and emissions of PM_{10} and BC. A comparison between the first two scenarios indicates that TMG policy led to steep reductions in BC in 2005 and 2010 (by 30-50%); a faster than expected achievement of compliance with PM2.5 standards; and “visible” effect on air quality. Comparing the latter two scenarios, it can be inferred that five-year earlier introduction would have provided only small additional benefits and a five-year delay would have resulted in half of the benefits before 2010. He added that this analyses on costs and implication to other Asian countries are underway. Finally, he suggested the possibility of extending the research to analyse health impacts to make the case for early and effective diesel controls even more compelling in Asia.

- **The Co-benefits Action Plan for Bandung, Indonesia: Sudarmanto Budi Nugroho, IGES**

Dr. Nugroho made a presentation on lessons drawn from co-benefits action plan in Bandung. He first presented that though there have been an increasing number of publications on co-benefits, actual applications of a co-benefits approach remain limited. Second, he introduced the research framework of the co-benefits action plan, and explained the overview of the International Vehicle Emissions, with some examples of data collection for baseline emission development. Third, he presented how the scenarios are developed using the analytical hierarchy process (AHP). Fourth, he showed emission reduction estimates of both PM and CO_2 for three selected priority policies, indicating that eco-driving has higher emission reduction potential than the other two scenarios (pedestrian and non-motorized program and paratransit revitalization program). He concluded that, in the future, programs focusing on private vehicle, such as eco-driving and pedestrianization, should be prioritized to reduce CO_2 reduction in Bandung city.

- **Discussions**

- The discussions for this session focused on how to further strengthen research cooperation with IIASA.

It was noted that each presentation represents different modalities of possible collaboration: including traditional collaboration through inter-comparisons of models; academic information exchange; specific collaboration on a specific case study; and application of models to non-technical policy options suiting Asian context.

Session 3: Nexus Issues under the SDGs in Asia

- **Application of SDGs to Air Pollution: Mark Elder, IGES**

Dr. Elder began with a basic overview of the 2030 Development Agenda and pointed out that, while the SDGs and targets have been agreed, the selection of underlying indicators is still ongoing. He stated that air pollution is not a dedicated SDG and only mentioned in two SDG targets and two proposed indicators (in SDG3 on health and SDG11 on cities). Conceptually, Dr. Elder saw indirect linkages to a number of the SDGs: for instance, with air quality impacting water and ecosystems. Furthermore, progress on sectoral targets on energy, industry and transport can alleviate air pollution. Using a diagram that clusters SDGs into categories, he illustrated how air pollution is integrated into many SDGs. Dr. Elder summarized possible channels through which the air pollution community may influence the SDGs, namely: (1) the global indicator development process; (2) national and local SDG implementation processes; and (3) the agenda of upcoming major policy processes to put air pollution on the global agenda. Lastly, he suggested that an alternative way forward could be to simply continue work on air pollution via existing frameworks and not the SDGs.

- **Co-benefits Policy and Research beyond Paris: Kenichi Wada, RITE**

Mr. Kenichi Wada addressed research questions of the implications of Paris Agreement in the context of sustainable development as well as the agenda for the post-Paris climate regime. Mr. Wada highlighted key provisions that were related to co-benefits in the Paris agreement. He further noted that co-benefits offer an opportunity to align national interests with an international process beyond Paris—for instance, by strengthening climate actions identified in NDCs. Regarding air pollution and climate change, Mr. Wada shared his optimistic view that technologies and policies can be readily deployed to achieve deep cuts in CO_2 and non-CO_2 pollutants. He then highlighted selected challenges in achieving ambitious mitigation such as the (1) need for bioenergy with carbon dioxide capture and storage (BECCS) as well as afforestation; (2) risk of food-price increases, resulting from bioenergy production and afforestation; (3) energy security implications for Asian countries that are required to switch from domestic coal to imported gas. Mr. Wada required further research for integrated knowledge is required to understand climate policies in the context of a broader set of sustainable goals, and to exploit as well as seek to balance possible trade-offs among the multiple objectives.

- **Interrelationships across Multiple SDG Indicators: Yasuko Kameyama, NIES**

Dr. Kameyama introduced her research on the interrelationship across different dimensions of sustainable development and sustainability indicators in Japan. For the work on interrelationships, she conducted survey research on the ordering of public's priorities in Japan, Korea, Thailand and Vietnam for key elements in six goal areas – health, nature, food, economy, education, and energy. Analysis of the data revealed that security, efficiency and capability were the most important elements of energy across all countries while convenience and diversity were generally deemed to be least important. Dr. Kameyama also introduced the framework employed to determine the structure of indicators to measures Japan's sustainability: applying the framework, which maps indicators and interlinkages in terms of goals and capital, around twelve indicators were identified for Japan. On the basis of the findings, Dr. Kameyama developed two types of visions for a sustainable society in Japan: (1) Abundant "water fountain" society that results from high efficiency producing economic growth that consequently trickles down to lead to an equitable accumulation of capital and (2) "Rainbow-colored" shower society that begins with achieving more than economic goals, consequently strengthens networks and leads to a fair distribution of capitals.

- **SDG Indicators and Analysis: From Systemic Perspective: Xin Zhou, IGES**

Introducing the IGES-funded project on SDG indicators, Dr. Zhou highlighted SDG target overlaps, dependencies and trade-offs and emphasised the need to incorporate a systems perspective to know how

targets interact in a network and how they contribute to holistic sustainability. Using Social Network Analysis, her research team sought to answer (1) how the 169 targets and associated indicators are interlinked?; (2) how linkages are structured?; (3) whether particular targets/indicators play critical roles?; (4) what critical targets should be pursued to achieve sustainability from systems perspective? Dr. Zhou shared the findings of the research that the 9 key indicators have direct linkages to 89 of the 100 indicators. To illustrate, she raised the example of indicator 51 'Share of the population using reliable electricity, by urban/rural' in Indonesia, and showed how interlinkages could be quantified. Concluding the presentation, she touched upon the implications of the research on national implementation, monitoring and reporting and highlighted a smaller selection of indicators can address all 17 SDGs and be more easily communicated and implemented given capacity and resource constraints.

■ **Discussions**

- The discussions for this session mainly focused on the suggestions for the air pollution community in relation to SDGs. Air pollution could be highlighted as areas with considerable experience quantifying the sources and impacts as will be needed in the 2030 Agenda Development targets; at the same time, it is important not to forget the challenges of integrating across sectors or pillars. Also it is recommended that the research result on how countries could adapt SDGs approach to national circumstances should be shared with the public. Technical aspects related to quantifying interlinkages were also touched upon and the need for policy relevance was highlighted.

■ **Closing Remarks: Mr. Hideyuki Mori, IGES**

Mr. Hideyuki Mori expressed his appreciation to all participants for their presentations and active discussion in the workshop. He noted the importance of air pollution issues in Japan as well as other developing countries. Mr. Mori highlighted the needs for the development of linkages between air pollution and SDGs as well as climate change issues. He underlined the important role of research community in connecting with policy makers: one good sign is the launching of APCAP and the other is developing regional assessment by the Science Panel. He concluded by remarking that he expects further progress and development of cooperation among participants in future.

■ **Summary of Key Messages**

- The workshop achieved the following objectives: (1) updated participants on the APCAP and CCAC Regional Assessment on Atmospheric Pollution that started earlier this year; (2) shared the most recent research on co-benefits in Asia; and (3) initiated thinking on how research on co-benefits applies to the Sustainable Development Goals (SDGs).

- The Regional Assessment on Atmospheric Pollution is making solid progress. The outline for the Regional Assessment report has been finalized. The author teams are now being organized. Modelling scenarios, which will be the core of the report, are being considered. There is ample new atmospheric science that will inform the assessment.

- There are many new areas of research being conducted on co-benefits in Asia. Researchers under the S-12 project are bringing together a variety of models to estimate the impacts of co-benefits scenarios. Some studies are looking at new metrics to better characterize the impacts of GHGs and short-lived climate pollutants (SLCPs). Other studies are examining the co-benefits from existing policy changes (such as Tokyo's diesel regulation) or proposed programs (eco-driving in Bandung).

- There may be important relationships between co-benefits and the SDGs (as well as the Paris Agreement). The relationships across SDGs are especially important for so-called nexus issues such as water, climate change, and food. New tools are being developed that show policymakers how to take advantage of these interrelationships (i.e. achieving some SDG targets can help achieve others).

- Moving forward, three areas for collaborative research seem particularly promising:

1) Further development of the APCAP and CCAC Regional Assessment with possible contributions from presenters;
2) Continued work on co-benefits in key countries in Asia with special emphasis on how policymakers can use quantified estimates of co-benefits in varying contexts;
3) Continued consideration of the linkages between the SDGs and co-benefits with a focus on how tools and models can help policymakers solve two or more environmental problems at the same time.

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