

The Twenty-first Session of the Scientific Advisory Committee
on the Acid Deposition Monitoring Network in East Asia
26-28 October 2021, Virtual Meeting

THE EANET EMISSION INVENTORY WORKSHOP (DRAFT)

I. Objectives of the Workshop

1. To tackle atmospheric environment problems, it is essential to understand the current status of air pollutants' emissions and consider mitigation measures' effectiveness. The emission inventory is an essential tool to obtain such information and to build appropriate atmospheric environmental policies.
2. The objectives of the EANET Emission Inventory Workshop, held on 18 October 2021 virtually, were to understand the role of an emission inventory in air quality management, obtain general information on an emission inventory, and learn basic knowledge on the development and application of an emission inventory. For this purpose, invited experts provided five lecture presentations on developing and applying an emission inventory. Furthermore, the participants selected by the National Focal Points (NFPs) of each EANET Participating Country delivered short presentations about issues related to national emission inventories in their country. Through discussions among lecturers and participants, the event aimed to enhance participants' knowledge and encourage the development of national emission inventories.

II. Workshop Participants

3. The invitation letter to the workshop was sent to NFPs, SAC members, National Centers, and QA/QC managers, inviting Participating Countries' representatives to nominate participants. Participants in the workshop were technical officers involved in air quality management administration, in charge of, or interested in developing a national emission inventory. Because the workshop was held virtually, there was no limitation on the number of participants. As of the end of September, the number of registered participants was 46 from 9 countries. Participants mainly came from environmental ministries and national research institutes in charge of issues related to air quality management.
4. The information on the workshop was shared with relevant organizations and initiatives, such as with the UN Environment Programme (UNEP), Asia Pacific Clean Air Partnership (APCAP), Clean Air Asia (CAA), and many more. A link with information on the workshop was shared to increase the number of participants.

III. Content of the Workshop

5. The date and venue of the workshop were as follows:

- Date: 18 October 2021 (UTC 05:30-09:30)
- Venue: Virtual workshop

The workshop was organized by the Asia Center for Air Pollution Research (ACAP), the Network Center (NC) for the EANET.

6. Lectures from experts included:

- Roles of emission inventory in air quality management
- General knowledge of emission inventory
- Development of national emission inventory
- Development of biomass burning emission inventory
- Application of emission inventory

7. Short presentations from participants nominated by the NFPs and following discussions with experts covered the following topics:

- Introduction of air quality management activities in each country.
- Current status and/or plans of the national emission inventory. (Alternatively, it focused on major emission sources needing to be reduced in each country.)
- Perspective regarding critical roles and required activities related to emission inventories within the EANET.

8. The EANET Emission Inventory Workshop program is provided in Table 1, and the list of lecturers and presenters from participants is provided in Table 2.

Table 1. Program of the EANET Emission Inventory Workshop

Monday, October 18, 2021 UTC 5:30-9:30		
05:30-05:35	Opening remarks	Shiro Hatakeyama (NC/Director General of ACAP)
05:35-05:40	Introduction of the workshop	Jun-ichi Kurokawa (NC/ACAP)
	Lecture presentations from experts	
05:40-06:00	Roles of emission inventory in air quality management	Toshimasa Ohara
06:00-06:30	Emission estimation for air pollutants emission inventory	Tazuko Morikawa

06:30-07:00	Japan's National GHG Inventory	Elsa Hatanaka
07:00-07:30	Development of biomass open burning emission inventory for air quality management at national and regional levels in Thailand	Savitri Garivait
07:30-08:00	Application of emission inventory to air quality simulation	Satoru Chatani
	Presentations from participants nominated by the NFPs	
08:00-08:05	Cambodia	Chandath Him
08:05-08:10	Lao PDR	Bounmany Soulideth
08:10-08:15	Malaysia	Farah Diyana Rusli
08:15-08:20	Mongolia	Bayarmagnai Jambaldorj
08:20-08:25	Myanmar	Kyu Kyu Sein
08:25-08:30	Philippines	Paul Nathan Vallar
08:30-08:35	Russia	Alisa Trifonova-Yakovleva
08:35-08:40	Thailand	Naboon Riddhiraksa
08:40-08:45	Viet Nam	Van Sy Pham
08:45-08:55	Q & A for the presentations from participants	
08:55-09:25	General discussion among participants and experts	
	Closing	
09:25-09:30	Announcement and closing	

Table 2. List of lecturers and presenting participants

Lecturers	
Name	Affiliation
Toshimasa Ohara	Research director, Center for Environmental Science in Saitama, Japan
Tazuko Morikawa	Senior Chief Researcher, Environment Protection Research Group, Environment Research Division, Japan Automobile Research Institute, Japan
Elsa Hatanaka	Manager, Greenhouse Gas Inventory Office of Japan (GIO), National Institute for Environmental Studies (NIES), Japan
Savitri Garivait	Associate Professor, Chairperson of Environmental Division, The Joint Graduate School of Energy and Environment (JGSEE) - Center of Excellence on Energy Technology and Environment (CEE), King Mongkut's University of Technology Thonburi (KMUTT), Thailand
Satoru Chatani	Chief Senior Researcher, Regional Environment Conservation Division (Regional Atmospheric Modeling Section), National Institute for Environmental Studies (NIES), Japan
Presenting Participants	
Name	Affiliation
Chandath Him	Air Quality and Noise Management, Ministry of Environment, Cambodia
Bounmany Soulideth	Natural Resources and Environmental Research and Statistic Institute, Ministry of Natural Resources and Environment, Lao PDR
Farah Diyana Rusli	Air Division, Department of Environment, Putrajaya, Malaysia
Bayarmagnai Jambaldori	Environmental Monitoring Division of National Agency for Meteorology and Environmental Monitoring, Mongolia

Kyu Sein	Kyu Sein	Hydrological Division, Department of Meteorology and Hydrology, Myanmar
Paul Vallar	Nathan	Environmental Quality Management Division, Air Quality Management Section. Philippines
Alisa Trifonova-Yakovleva		Institute of Geography, Russian Academy of Sciences, Russia
Naboon Riddhiraksa		Planning and Evaluation Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Van Sy Pham		Environmental Forecast and Technology department, Center For Environmental Research, Vietnam Institute of Meteorology Hydrology and Climate Change, Vietnam

IV. Summary of the Workshop

9. The EANET Emission Inventory Workshop in 2021 was held successfully on 18th OCT in virtual. Number of participants accessed to the web meeting system was around 50 (the final number of registered participants was 56). The participant list of the workshop is shown in Appendix.
10. In the opening session, first, Dr. Shiro Hatakeyama, Director General of ACAP, delivered opening remarks. In the remarks, the importance of learning emission inventory was emphasized because that is base data to consider mitigation measures as well as essential input data for air quality models. Furthermore, it was addressed that five lectures from experts were prepared for participants in East Asia and that is the advantage of training workshop in virtual form. After brief introduction of the program of the EANET Emission Inventory Workshop was provided by the moderator of the workshop, group photo was taken by screen shot.
11. The first lecture titled “Roles of emission inventory in air quality management” was provided by Dr. Toshimasa Ohara, Research director of Center for Environmental Science in Saitama, Japan as a keynote presentation of the workshop. In the presentation, basic idea of air quality management, definition of emission inventory, how it is utilized, basic methodology of development of emission inventory, what can be obtained from emission inventory were introduced. In addition, adverse effects of air pollutants were explained not only on human health but also on climate change as short-lived climate forcers (SLCFs). Finally, the importance of development of national emission inventory was emphasized.
12. The second lecture titled “Emission estimation for air pollutants emission inventory” was presented by Dr. Tazuko Morikawa, Senior Chief Researcher of Japan Automobile Research Institute, Japan. In the lecture, after introduction of objectives of emission inventory and what can be examined using emission inventory, how to estimate emissions both from stationary sources and mobile sources were explained in detail. Furthermore, currently available regional and global emission inventories were introduced as alternative way to understand current status of emissions in each country and Asian region.

13. The third lecture titled “Japan’s National GHG Inventory” was presented by Ms. Elsa Hatanaka, Manager of Greenhouse Gas Inventory Office (GIO) of Japan, National Institute for Environmental Studies, Japan. In this lecture, how to develop and maintain the national emission inventory in Japan is explained from perspectives of legal arrangement, institutional arrangement, and procedural arrangement. For example, relationships GIO with related Ministries and Agencies in addition to Ministry of the Environment and how necessary data are collected from the Ministries and other organizations were introduced. Furthermore, documentation and archiving system in GIO were introduced.
14. The fourth lecture titled “Development of biomass open burning emission inventory for air quality management at national and regional levels in Thailand” was presented by Dr. Savitri Garivait, The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi (KMUTT), Thailand. In the lecture, methodology to estimate open biomass burning emissions using satellite data, land use data, and field survey was explained. Furthermore, how to evaluate the estimated open biomass burning emissions were introduced based on results of case study in Thailand, especially Bangkok Metropolitan Area.
15. The fifth lecture titled “Application of emission inventory to air quality simulation” was presented by Dr. Satoru Chatani, Chief Senior Researcher of National Institute for Environmental Studies, Japan. In the lecture, how effective and powerful to utilize emission inventory in air quality model are introduced by following case studies: Identifying key process and sources for ambient pollutant concentrations, evaluating source sensitivities of ambient pollutant concentrations to emissions, and predicting future ambient pollutant concentrations based on emission scenarios. Furthermore, importance of validation of air quality simulation including accuracy of emission inventory using monitoring data was emphasized.
16. In the session of presentation from participants, one participant from each country made a short presentation about introduction of air quality management activities, current status and/or plans of the national emission inventory or major emission sources need to be reduced in each country. In addition, based on the situation of each country, opinions for necessary roles of and required activities in EANET related to emission inventory were pointed out.
17. Major opinions from participants for EANET related to emission inventory issues were as follows:
 - Most countries emphasized necessity of capacity building although required contents depend on countries.
 - Supports from both technical (such as providing guideline) and financial aspects are necessary for conducting activities of emission inventory.
 - Sharing emission inventories in participating countries in EANET is useful for understanding atmospheric environment issues as well as comparing methodologies including emission factors.

18. Dr. Toshimasa Ohara provided summary comments for the EANET Emission Inventory Workshop. It was pointed out that there are many barriers for development of national emission inventory and roles and supports from EANET are important such as for information exchange, technical training, cooperative researches, emission inventory guidelines, etc. It is expected that such activities encourage development of national emission inventory.

19. The conclusion of the EANET Emission Inventory Workshop in 2021 was declared by the moderator of the workshop from NC.

Appendix. Participant list of the EANET Emission Inventory Workshop in 2021

Participants¹	
Name	Affiliation
Chandath HIM	Air Quality and Noise Management, Ministry of Environment, Cambodia
Vannly PAK	Air Quality and Noise Management, Ministry of Environment, Cambodia
Virasith PHOMSOUVANH	Remote Sensing and Mapping Division, Natural Resources and Environment Research Institute, the Ministry of Natural Resources and Environment, Lao PDR
Bounmany SOULIDETH	Natural Resources and Environment Research Institute, the Ministry of Natural Resources and Environment, Lao PDR
Hernifita ABD GHANI	Department of Environment, Malaysia
Subashini ARICHANDRAN	Air Division, Department of Environment, Malaysia
Ahmad MADZHAR	Department of Environment, Malaysia
Nur Syafiqa Natrah MOHMAD JOHAR	Atmospheric Science and Cloud Seeding, Malaysian Meteorological Department, Malaysia
Farah Diyana RUSLI	Department of Environment, Malaysia
Jeyanny VIJAYANATHAN	Biotechnology/Forest Research Institute, Malaysia
Altantuya BOLD	Central Laboratory of Environment and Metrology, Mongolia
Amarzaya ENKHBAYAR	National Agency for Meteorology and Environmental Monitoring, Mongolia
Bayarmagnai JAMBALDORJ	Environmental Monitoring Division of National Agency for Meteorology and Environmental Monitoring, Mongolia
Kyu Kyu SEIN	Hydrological Division, Department of Meteorology and Hydrology, Myanmar
Thinzar NEW	Hydrological Division, Department of Meteorology and Hydrology, Myanmar
Win Win PHYO	Hydrological Division, Department of Meteorology and Hydrology, Myanmar
Khaing YAMIN	Water Quality Division, Department of Meteorology and Hydrology, Myanmar
Jundy	Environmental Quality Management Division, Air Quality Management

DEL SOCORRO	Section, Philippines
Wilhelmina O. LAGUNILLA	Environmental Monitoring and Enforcement Division, Department of Environment and Natural Resources, Environmental Management Bureau, Philippines
Wyona Kay RATIVO	Environmental Quality Management Division, Air Quality Management Section, Philippines
Joel TUGANO	Environmental Quality Management Division, Air Quality Management Section, Philippines
Paul Nathan VALLAR	Environmental Quality Management Division, Air Quality Management Section, Philippines
Sergey GROMOV	Yu.A. Izrael Institute of Global Climate and Ecology, Russia
Alisa TRIFONOVA- YAKOVLEVA	Institute of Geography, Russian Academy of Sciences, Russia
Pichaid ATIPAKYA	Transboundary Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Amnuay APAI	Pollution Control Department, Thailand
Penwadee CHEEWAPHONGPHAN	The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Thailand
Sirijit JITSIRI	Planning and Evaluation Subdivision, Air quality and Noise Management Division, Pollution Control Department, Thailand
Orachom KAMNOET	The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Thailand
Sirisak KUMKONG	Industrial Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Wanna LAOWAGUL	Environmental Research and Training Center, Department of Environmental Quality Promotion, Thailand
Orrawan MANOONWONG	Industrial Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Thanpicha MEESUK	Industrial Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Sitthipong PENGJAN	The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Thailand
Naboon RIDDHIRAKSA	Planning and Evaluation Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Kanjana SUAYSOM	Industrial Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Chanthiraporn TANGSUWAN	Environmental Research and Training Center, Department of Environmental Quality Promotion, Pollution Control Department, Thailand
Chanatorm TEMDUEAN	Environmental Research and Training Center, Department of Environmental Quality Promotion, Pollution Control Department, Thailand
Pham THAO	The Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Thailand
Sirirat YENSONG	Pollution Control Department, Thailand
Alada YU-JUI	Industrial Air Pollution Subdivision, Air Quality and Noise Management Division, Pollution Control Department, Thailand
Trong Hoang MAI	Environmental Forecast and Technology department, Center For

	Environmental Research, Vietnam Institute of Meteorology Hydrology and Climate change, Vietnam
Van Sy PHAM	Environmental Forecast and Technology department, Center For Environmental Research, Vietnam Institute of Meteorology Hydrology and Climate change, Vietnam
Kaye PATDU	UNEP Asia Pacific Office
Lecturers	
Name	Affiliation
Toshimasa OHARA	Research director, Center for Environmental Science in Saitama, Japan
Tazuko MORIKAWA	Environment Protection Research Group, Environment Research Division, Japan Automobile Research Institute, Japan
Elsa HATANAKA	Greenhouse Gas Inventory Office of Japan (GIO), National Institute for Environmental Studies, Japan
Savitri GARIVAIT	The Joint Graduate School of Energy and Environment - Center of Excellence on Energy Technology and Environment, King Mongkut's University of Technology Thonburi, Thailand
Satoru CHATANI	Regional Environment Conservation Division (Regional Atmospheric Modeling Section), National Institute for Environmental Studies (NIES), Japan
Network Center for the EANET	
Name	Affiliation
Shiro HATAKEYAMA (Director General)	Asia Center for Air Pollution Research, Japan
Ken YAMASHITA (PIC)	
Jun-ichi KUROKAWA (PIC)	

¹ Persons accessed to the web system used for this workshop are listed. Some more registered participants might attend the workshop with the same PC of participants accessed to the web system.