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North-East Asia Clean Air Partnership

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Virtual meeting

Background Paper on the Policy and Technology Cooperation

Note by the Secretariat

I. Background

1. The 24th Senior Officials Meeting (SOM-24) of NEASPEC adopted the NEACAP Work Plan 2021-2025 as recommended by the 2nd meeting of Science and Policy Committee (SPC), and requested the timely implementation of the Work Plan. The Work Plan identifies "policy and technology cooperation (PTC)" as the priority area, Category I, and suggests five indicative activities comprising (a) proposing potential technical and policy measures; (b) organizing policy dialogue; (c) conducting policy analysis; (d) supporting voluntary collaboration on the Best Available Techniques; and (e) supporting technology forum. As defined in the Work Plan, this priority area is intended to facilitate NEACAP member States sharing information on policies, technologies and best practices, and undertake technological cooperation, which requires close consultation with member States on the topic and modality of policy analysis and dialogue in collaboration with existing mechanisms and platforms.

2. As most NEACAP member States face significant challenges to achieving national targets of air quality, the policy and technological interventions required to meet these targets vary considerably due to the differences between countries in terms of the level, trend, and sources of air pollution. Member Governments engaged in various bilateral and multilateral cooperation on policy and technology, and with other stakeholders, particularly scientific community and industry sector, which could serve as key catalysts for diffusing and adopting new knowledge and technology through international cooperation.

3. Thus, the work on PTC needs to well reflect the different conditions and interests of each member State to make NEACAP effectively serve its purpose. In this connection, this secretariat paper aims to provide key points of discussion and consideration to facilitate the SPC identifying the topic and modality of the five indicative activities.

II. Identifying Topics of the PTC: taking into account common but different challenges

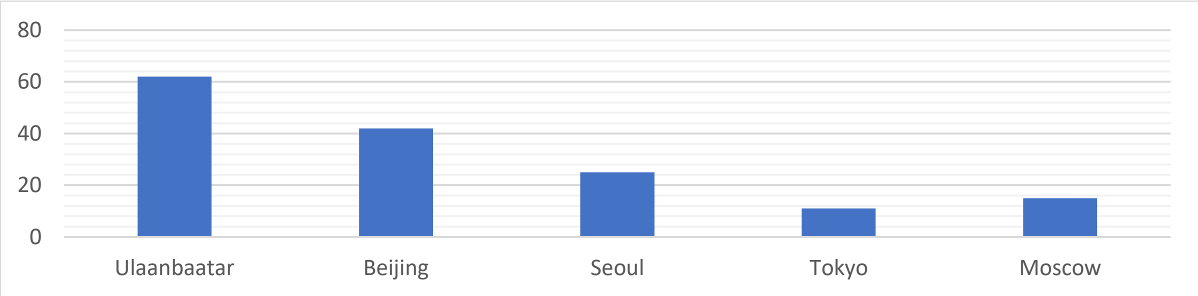
4. North-East Asia has exhibited a decreasing trend of fine particulate matter ($PM_{2.5}$) over the last decade. The progress has been made with intensified national actions, such as the Air Pollution Prevention and Control Action Plan (2013-2017) and Three-year Action Plan for Winning the Blue-Sky War (2018-2020) of China; Comprehensive Measures on $PM_{2.5}$ (2013) of Japan; National Programme for Reducing Air and Environmental Pollution (2017-2025) of Mongolia; the Comprehensive Plan for the Management of the Particulate Matter (2020-2024) of the Republic of Korea (ROK), and the Clean Air Initiative as part of the national project "Ecology" of the Russian Federation.

5. China, during the first Action Plan, brought down the annual average of $PM_{2.5}$ concentration by 42 percent in 74 pilot cities, including 43 percent in Beijing, and 25 percent in 28 cities in the Beijing-Tianjin-Hebei and surrounding areas, which were identified as one of the major air pollution transportation corridors to curb domestic air pollutions.[1] The implementation of the Three-year

[1] Ministry of Ecology and Environment of China, 2019. Chia Air Quality Improvement Report (2013-2018)

Action Plan for Winning the Blue-Sky War further brought down the national annual average $PM_{2.5}$ concentration to 33μg/m³ by end of 2020.[2] Mongolia decreased the level of $PM_{2.5}$ in Ulaanbaatar by 56 percent during 2016-2019 to 113μg/m³, particularly, by cleaner fuel substitutions.[3] While the level of $PM_{2.5}$ was comparatively lower, Japan and the ROK have also made significant progress. In Japan, the rate of achieving the annual $PM_{2.5}$ standard (15μg/m³) increased from 37.8 percent in 2014 to 93.5 percent in 2018. The ROK during 2015-2018 also reduced the level of $PM_{2.5}$ by 11 percent.[4] The Russian Federation aims to achieve the overall reduction of emissions from transport, heat and power plants and industrial processes by 22 percent during 2018-2024, and expand the current efforts covering 12 cities under the federal project "Ecology" to nationwide with a goal of reducing air pollutants by 50 percent by 2030.

Figure 1. Annual concentration of $PM_{2.5}$ in capital cities, 2019 (Unit: μg/m³)



(Source: Secretariat complied from the official data of each country)

6. While all countries have initiated comprehensive actions on air pollution, each country faces rather distinctive situation and thereby priority action. Almost two decades ahead of other countries and achieved national standard since 2010, Japan first established an environmental quality standard for suspended particulate matter (SPM) in 1973 and the national standards for $PM_{2.5}$ in 2009.[5] Since then, Japan has seen the continuous improvement and reached the lowest annual level in 2019. This experience could offer lessons for other countries. Thus, the paper provides a brief overview of the air pollution policies of Japan.

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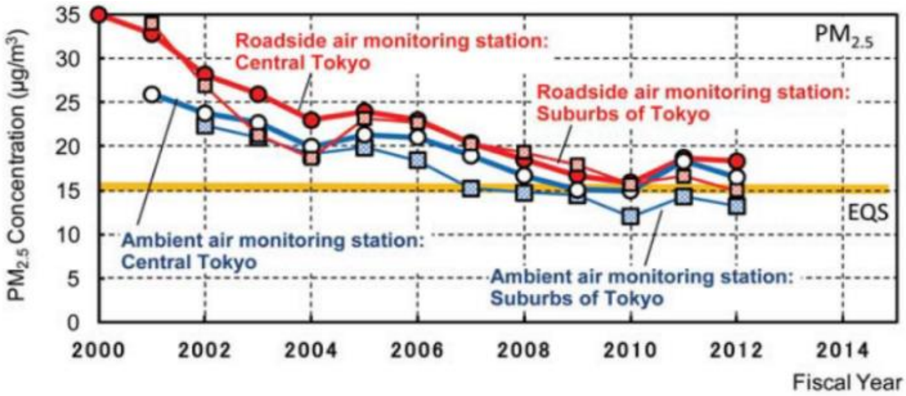
[2] China MEE press release, 25 February 2021, http://www.mee.gov.cn/xxgk2018/xxgk/xxgk15/202102/t20210225_822424.html

[3] Review of the implementation of the National Programme for Reducing Air and Environmental Pollution (2017-2025) of Mongolia, Ministry of Environment and Tourism

[4] Ministry of Environment, ROK, 2019. Comprehensive Plan for the Management of the Particulate Matter (2020-2024)

[5] JAMA, 2011. PM2.5/PM in Ambient Air and Related Activities in Japan.

Figure 2. $PM_{2.5}$ Trend in Japan between 2000 and 2012 (EQS: Environmental Quality Standard)



(Source: Wakamatsu et al., 2013)

7. Japan started lowering the $PM_{2.5}$ concentration at a much lower level 35μg/m³ when the government had initiated measures to strengthen air pollution control targeting $PM_{2.5}$. In China, tackling primary sources was an effective means to reduce the $PM_{2.5}$ concentration, whereas tackling secondary sources of $PM_{2.5}$ was the key to success for Japan. A drop of 20μg/m³ within ten years was possible by controlling automobile and volatile organic compounds (VOCs) emission through regulations. The actions taken by Japan could be categorized into (a) the first phase of $PM_{2.5}$ control from 2000 to 2004, characterized by a drop of 10μg/m³ and (b) the second phase from 2006 to 2010 with an additional $PM_{2.5}$ reduction of 10μg/m³. Both stages had controlling precursors like nitrogen oxides (NOx) and VOCs in common, which are the sources of secondary formation of $PM_{2.5}$. The first stage attempted to control NOx through automobile regulations such as the "Say No to Diesel Vehicles" campaign, and the second stage reduced VOC emission.[6]

8. As the amended Automotive NOx and PM Law became effective in 2002 Japan began enforcing tightened emission standard of NOx and adding PM control provisions to control air pollution from in-use vehicles. The vehicles that did not meet the standard had to undergo either the installment of reduction devices for NOx and PM control or scrappage. Moreover, VOC emission reduction came up as a critical factor for reducing PM. Before 2006, the government only controlled VOC emission from cars. In 2006, the amended the Air Pollution Control Law took effect incorporating both legal and voluntary actions for VOC control in key sectors/ processes such as painting, dry and cleaning. Due to these measures, by 2010, VOC emissions reduced by 44.3 percent compared to that of 2000[7]. Also, as predicted with simulation, by 2010, the national annual mean concentration of $PM_{2.5}$ met the national standard of 15μg/m³.

9. In contrast to Japan, the drastic reduction of $PM_{2.5}$ in China required the development and implementation of comprehensive measures in the following areas, (a) rule of law: improvement of legal framework, combining administrative and judicial efforts, and strengthened law enforcement; (b) science and technology support: revising air quality standard, improving air quality monitoring network, improving pollution source inventory and analysis, and identifying causes of severe air

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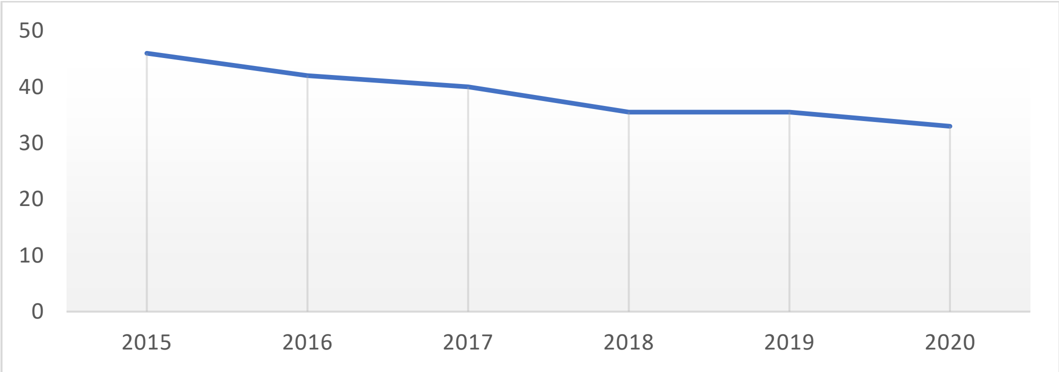
[6] Saigusa, 2011. Tokyo Metropolitan Government's Efforts to Control Diesel Vehicle Emissions. JFS Newsletter.

[7] Matsumoto et al., 2015. Japan's policy to reduce emissions of volatile organic compounds: Factors that facilitate industry participation in voluntary actions. Journal of Cleaner Production, 108, 931–943

pollution and solutions in each city; (c) comprehensive emission cuts: upgrading industrial standards and industrial restructuring, optimizing energy structure, pollution control of "fuel, road, vehicle," and treatment of non-point source pollution; (d) management innovation: management system reform, innovative enforcement methods, carrying through responsibilities by provincial, city and county governments, response to severe pollution by forecasting and emergency response, improved economic policies, and environmental information disclosure; and (e) social participation: easing information access, public interest litigation, raising public awareness, reporting environmental complaints, and engaging public in decision making[8]. Such comprehensive measures resulted 28.3 percent reduction of $PM_{2.5}$ from 46µg/m^3 in 2015 to 33µg/m^3 in 2020 in 337 cities.[9]

Figure 3. Average concentration of $PM_{2.5}$ in 337 Chinese Cities (Unit: µg/m^3)



(Source: Complied based on data from Ministry of Ecology and Environment, China, 2019)

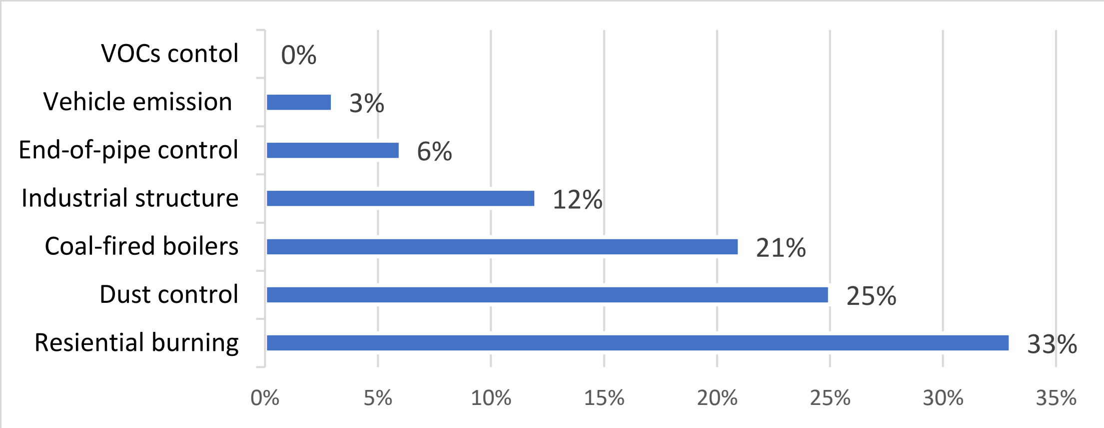
10. It is also noteworthy to review the progress achieved in Beijing which decreased the $PM_{2.5}$ concentration by 35.6 percent with the reduction of SO_2, NOx, VOCs and $PM_{2.5}$ by 83 percent, 43 percent, 42 percent and 55 percent, respectively, during 2013-2017. These reductions were largely resulted from the control of residential burning, dust, coal-fired boilers, etc., while the government has continuously strengthened control measures for the vehicle emissions through tightening emission standards, promoting new energy vehicles, and improving traffic management. Figure 4 presents the contributions of each sector to the $PM_{2.5}$ reductions in Beijing. Vehicles amongst local sources were estimated to be accountable for 45 percent of $PM_{2.5}$ in Beijing in 2017, which indicates the imperativeness to reduce emissions from transport sector.[10] Also this analysis shows that the contribution of VOCs was minimal despite its significant reduction (42%).

[8] Ministry of Ecology and Environment, China, 2019. China Air Quality Improvement Report (2013-3018)

[9] Ministry of Ecology and Environment, China and Ministry of Environment, ROK. 2021, Joint Press Release on responding to particulate matter, dated 10 February 2021

[10] UNEP, 2019. A review of 20 years' air pollution control in Beijing.

Figure 4. Contributions of control measures to the reduction of major pollutants in Beijing during 2013-2017



(Source: UNEP 2019)

11. In the case of Mongolia, major sources of $PM_{2.5}$ emissions are vegetation fires and household, which accounted for 66 percent and 29 percent, respectively, in 2017.[11] However, at the city-level, particularly in Ulaanbaatar, household (mostly ger district) is the dominant source of emissions. Hence, the primary measures for PM reductions focused on regulating the quality of coal combustion in domestic stoves used for heating during winter, when the use of raw coal was prohibited and replaced with briquette fuel, and on supplying more efficient stove. The stringent enforcement of the measures resulted in drastic reductions in PM particularly during the cold season which often associates with high level of PM concentration. The average concentration of $PM_{2.5}$ and PM_{10} levels in Ulaanbaatar in the cold season of 2019-2020 decreased 40 percent and 39 percent respectively, compared with the previous season when the $PM_{2.5}$ level in the peak months (December 2019-January 2020) was 2 times higher than the air quality standard. While such measures reduced the PM concentration, the concentration of SO_2 and NO_2 levels increased 80 percent and 21 percent, respectively.

Table 1. Air pollution in cold season, Ulaanbaatar

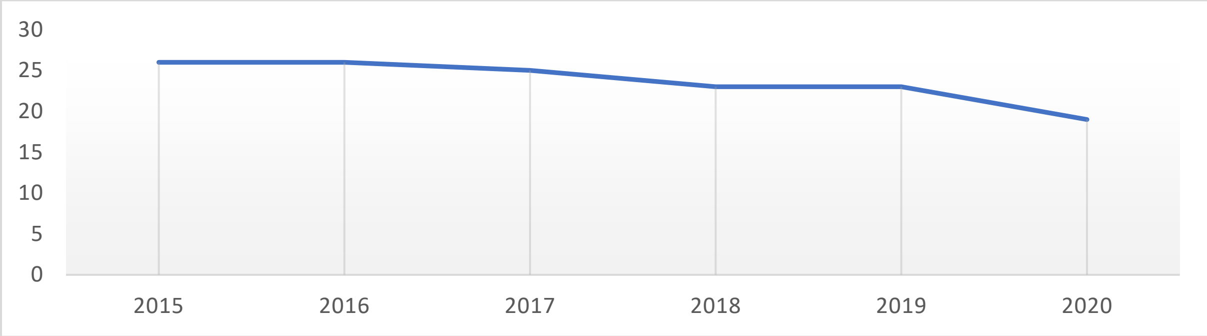
Pollutant	Air quality standards, (μg/m^3)	Average concentration, μg/m^3	
		October 2018– April 2019	October 2019 – April 2020
$PM_{2.5}$	50	107	64 (40%↓)
PM_{10}	100	184	112 (39%↓)
SO_2	50	36	65 (80%↑)
NO_2	50	43	52 (21%↑)

(Source: Review of the implementation of the National Programme for Reducing Air and Environmental Pollution (2017-2025) of Mongolia, Ministry of Environment and Tourism)

12. The Republic of Korea decreased the $PM_{2.5}$ concentration by 26.9 percent from 26μg/m^3 in 2015 to 19μg/m^3 in 2020. The major emission reductions were made in improving monitoring and regulation enforcement in large industrial facilities; phasing out or improving old coal-fired power plants and adjusting their operation during the high-concentration season of air pollution; and reducing the number and operation of high-emission vehicles.

[11] MET and CCAC, 2020. Opportunities from taking integrated actions on air pollution and climate change in Mongolia

Figure 5. Annual average of $PM_{2.5}$ in the Republic of Korea (Unit: μg/m³)

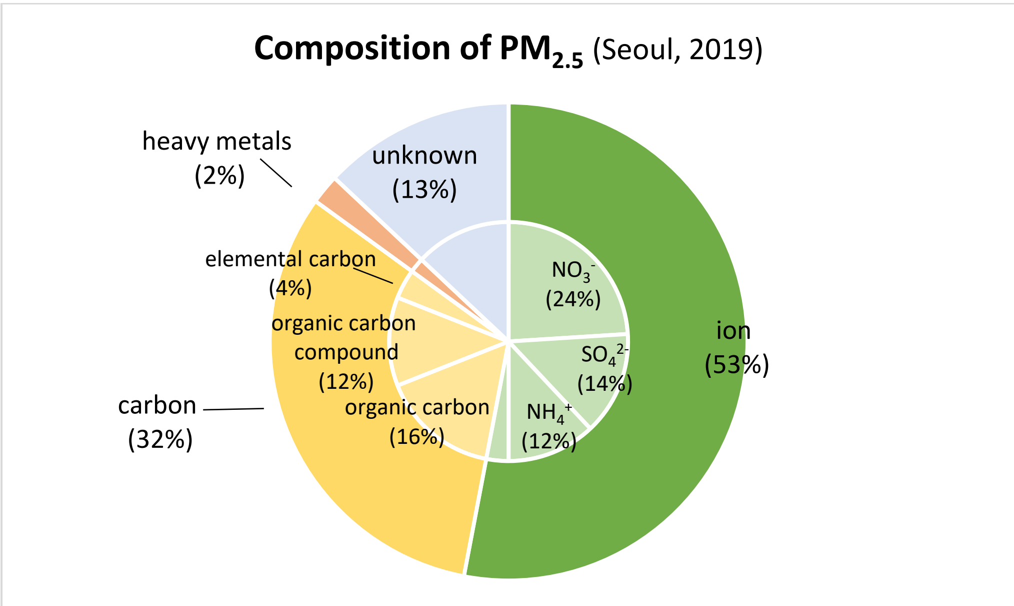


(Source: Ministry of Environment, ROK)

13. This brief review indicates significantly different situation and major policy measures between NEACAP member States. Meanwhile, it also indicates that regulating **secondary PM** is a common challenge for all countries. The secondary aerosol formation begins with the presence of precursor gas-phase compounds such as VOCs, NO_2, and SO_2 emitted from various sources like vegetation, traffic, and combustion processes. When the gas-phase precursor exists in the atmosphere, oxidants/reacting compounds such as ozone, hydroxyl radical (OH), or nitrate (NO_3) reacts with the precursor and oxidizes the compound. Once the precursor compounds are oxidized, they undergo nucleation or gas-to-particle conversion (heterogeneous reactions) and become an aerosol.

14. Understanding such chemical processes and the magnitude of secondary aerosols in PM formation is essential to improve air quality as a significant amount of precursor compounds exist in the region. Especially, inorganic compounds like nitrate, sulfate, and ammonium as the secondary PM play an essential role in the composition of PM and thus should be part of the control strategy of PM in North-East Asia. The following figure presents the significant share of nitrate (24%), sulfate (14%) and ammonium (12%) in the composition of $PM_{2.5}$ in Seoul in 2019, as an example.

Figure 6. Composition of $PM_{2.5}$ in Seoul, 2019



(Source: Seoul Research Institute of Public Health and Environment)

15. Secondary PM also worsens the air quality during the polluting days. For example, it is found that polluted winter days in China are generally characterized by enhanced secondary aerosol formation. Compared with normal days, polluting days have the increased ratio of the sulfate/PM mass (27%), nitrate/PM (10%) and ammonium/PM (10%). The same study also found the absolute dominance of secondary sulfate in the total sulfate in polluted winter days in northern China by accounting for 66–97 percent total sulfate dominated by the secondary sulfate.[12] Another comprehensive study on haze episodes in Beijing over one year from January 2018 found that about 65–80 percent of the accumulation mode particles originate from secondary formation, heavily dominated by secondary inorganic matter aerosols (mostly, ammonium nitrate (NH_4NO_3) and ammonium sulfate ($(NH_4)_2SO_4$).[13]

16. In this connection, managing **ammonia (NH_3)** emissions and its sources is an important area for policy and technical interventions as ammonia plays the role as a major neutralizer to form secondary inorganic aerosols (SIA). For example, SO_2 can eventually become sulfuric acid (H_2SO_4), ammonium sulfate ($(NH_4)_2SO_4$) and NO_2 can react with oxidant and nitric acid (HNO_3) to form the ammonium nitrate (NH_4NO_3), which are the major secondary PM in North-East Asia. The composition of sulfate, nitrate, and ammonia in Figure 6 shows that it is enough to neutralize the sulfate and nitrate in the atmosphere. With the projected increase in NH_3 in the atmosphere, control of PM in the ambient air will be difficult. For instance, China experienced an increase in NH_3 at a rate of 2.27 percent per year from 2002 to 2016[14] due to the rise in usage of fertilizer, temperature, and agricultural activity.[15] Even in Japan, sulfate, nitrate and ammonium are essential components of $PM_{2.5.}$[16] Thus, in addition to controlling precursors like SO_2, NO_2, and VOCs, reducing NH_3 concentration in the atmosphere is critical to combat PM in North-East Asia.

17. Besides PM and its precursors, **ground-level ozone (O_3)** is another national and subregional concern as identified in the NEACAP Terms of Reference.[17] Tropospheric O_3 is a secondary air pollutant, and its concentration is driven nonlinearly by the ratio between its two major precursors which are VOCs and NOx (VOC/NOx). Since O_3 has a complex nonlinear relationship with its precursors, the best strategy to control O_3 differs for each country and even within the country (urban vs. rural). For instance, despite a sharp decreasing trend of NO_2, a major precursor of O_3, there is increasing concentration of O_3 in North-East Asia. Japan is no exception despite improvement in the concentration of precursors with stringent regulation for mobile sources. Despite its decrease in the emissions of main precursors, the concentration of O_3 in Japan remains well above the domestic air quality standards.[18]

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[12] Yichen Wang, et. al., 2019. Increased secondary aerosol contribution and possible processing on polluted winter days in China, Environment International, 127 (78-84)

[13] Kulmala, et.al. 2020, Is reducing new particle formation a plausible solution to mitigate particulate air pollution in Beijing and other Chinese megacities?, Faraday Discussions, the Royal Society of Chemistry

[14] Warner et al., 2017. Increased atmospheric ammonia over the world's major agricultural areas detected from space. Geophysical Research Letters, 44(6), 2875–2884.

[15] Meng et al., 2018. Role of ambient ammonia in particulate ammonium formation at a rural site in the North China Plain. Atmospheric Chemistry and Physics, 18(1), 167–184.

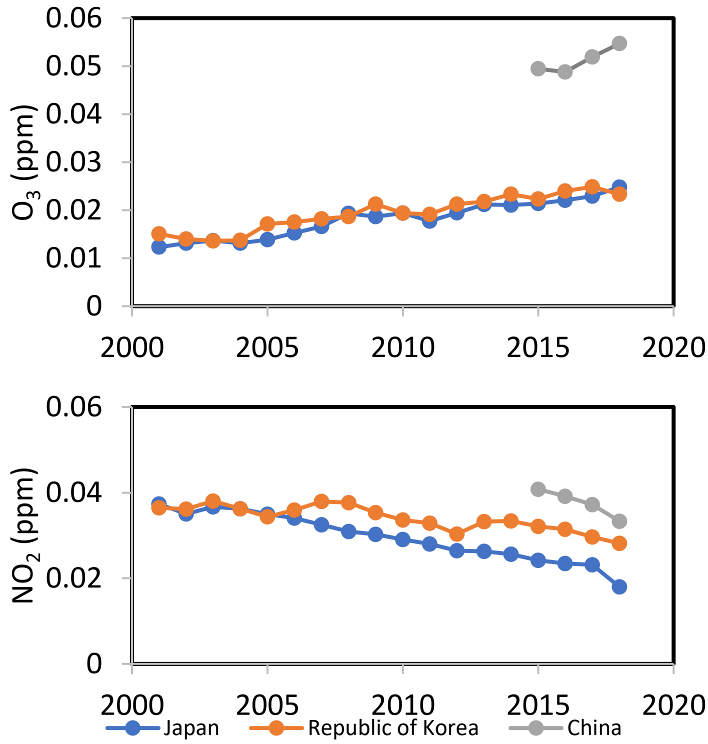
[16] Shimadera et al., 2016. Evaluation of Air Quality Model Performance for Simulating Long-Range Transport and Local Pollution of PM2.5 in Japan. Advances in Meteorology

[17] http://www.neaspec.org/sites/default/files//NEACAP%20TOR_adopted%20in%20the%20SOM-22_0.pdf

[18] OECD, 2020. Policies, regulatory framework and enforcement for air quality management: the case of Japan –

18. An increase in the O_3 trend in North-East Asia is evident in Figure 7 and is consistent with results from Tropospheric Ozone Assessment Report which indicates increasing surface O_3 concentration in the majority of observational evidence in North-East Asia.[19] This trend exhibits that the decrease in NOx concentration can paradoxically lead to an increase in ozone concentration in these countries. Due to such complexity on O_3 behavior, more research is needed to determine the generation mechanisms and VOC/NOx ratio in various regions of North-East Asia to design appropriate policies for controlling surface O_3 concentration better.

Figure 7. Long term trend of O3 and NO2 in the capital cities of China, Japan and the ROK



(Source: Compiled from national data)

19. On the policy and technology cooperation to address air pollution, NEACAP member States have established various levels of dialogues and cooperation. For example, the Tripartite Environment Ministers Meeting (TEMM) of China, Japan and the Republic of Korea has operated the Tripartite Policy Dialogue on Air Pollution (TPDAP) since 2014 and held annual meetings of two Working Groups under the phase I (2015-2019). The phase II (2021-2025) cooperation is expected to focus on information sharing of high $PM_{2.5}$ and O_3 concentration episodes, and the exchange of policy and technology for controlling $PM_{2.5}$ and O_3.

environment working paper n°156, ENV/WKP(2020)3

[19] Gaudel, A, et al. 2018. Tropospheric Ozone Assessment Report: Present-day distribution and trends of tropospheric ozone relevant to climate and global atmospheric chemistry model evaluation. Elem Sci Anth, 6: 39. DOI: https://doi.org/10.1525/elementa.291

Table 2. Annual meetings and topics of TPDAP

	WGI (Scientific Research on Prevention and Control)	**WGII (Technology/Policy on Air Quality Monitoring and Prediction)**
February 2017 The 4th TPADP	• Economic methods to control VOCs (incentives and penalties) • Experiences of VOCs control in petrochemical industry	• Measuring process for air pollutants (O_3, $PM_{2.5}$) and QA/QC system • Development of air quality forecast models
February 2018 The 5th TPDAP	• Effective experience of control VOCs pollution in printing and coating industries • Research and application of VOCs emission inventories	• Data management and publication of $PM_{2.5}$ and O_3 monitoring results • Emission inventory development methods for mobile sources other than vehicles (non-road sources, etc.)
February 2019 The 6th TPDAP	• Effective experiences of controlling emissions from vehicles including emission standards, fuels standards, etc. • Development of vehicle emissions inventories	• Monitoring results of $PM_{2.5}$ species and modeling from certain air pollution episodes • Issues towards developing a real-time monitoring data sharing among three countries

(Source: Tripartite Policy Dialogue on Air Pollution, Air Quality Policy Report, 2019)

20. NEACAP member States have also initiated various bilateral cooperation. For instance, China and the Republic of Korea in 2019 signed a new cooperation framework, the "Blue Sky Plan", which covers (a) Policy and technology exchange on air pollution prevention policy and technical exchange, and vehicle emission regulation policy; (b) Joint research on sharing of forecast information, and the exchange of technology for forecasting and simulation application; (c) Technology industrialization with focus on sharing information on environmental industry markets, technologies and companies, and demonstration of air pollution prevention technology.[20] The two countries also recently initiated holding various industry and technology exhibitions or exchange meetings at the national and provincial levels.

21. China and Japan have undertaken "Japan-China Inter-city cooperation project" since 2014. To utilize the knowledge and experiences of local governments in Japan to address air pollution, the initial phase of the project focused on cooperation and exchanges between cities on measures to tackle air pollution involving 13 cities in China and 11 cities in Japan. Aiming for human resources development and capacity building in major cities across China, the project facilitated the cooperation activities including dispatching experts, joint seminar, training activities, monitoring reports, on such areas as VOC control measures, and analysis on $PM_{2.5}$ emission sources. The cooperation was followed by "Cooperation on research and model projects to improve air quality in China" under the "Agreement on cooperation to conduct research and implement model projects to improve air quality" signed between Ministry of Environment of Japan and Ministry of Ecology and Environment of China in 2018. The topics of model projects include the reduction of air pollutant emissions by introducing new technology to recover and reuse exhaust heat; reduction of particular matters by integrated use

[20] Ministry of Environment, ROK, 2019. Press release on Korea-China Environment Minister make joint efforts to create blue sky, dated 4 November 2019

of residual stems from crops; measures for small-scale distributed sources of air pollution in restaurant industry and textile dyeing industry; reduction of VOC emissions from manufacturers; measures for wide-area ozone pollution in priority areas, etc.[21]

22. Since 2015, Japan and the ROK have held policy dialogues, joint modelling and emission inventory research on a number of key issues, such as the evaluation of equivalence between automatic and manual standard methods on $PM_{2.5}$ mass concentration monitoring; improvement of $PM_{2.5}$ forecasting accuracy; sharing of real-time monitoring data of $PM_{2.5}$; joint research on emission inventory and transboundary pollution of $PM_{2.5}$; and countermeasures toward achieving environmental standards of $PM_{2.5}$. The joint research has been conducted by two research groups on $PM_{2.5}$ forecasting model and $PM_{2.5}$ emission inventory, respectively. The work in the phase II (2020-2022) is expected to continue the collaboration on improving accuracy of the forecasting models, and sharing the latest scientific information and technologies related to emission inventory, particularly, including the detailed understanding on the vehicle emissions and the VOCs emissions from point sources. On policy sharing, the two countries will focus on the $PM_{2.5}$ management and control methods, countermeasure technologies, etc., including the responses to high concentration episodes, the application of Best Available Techniques (BATs) in the management of emissions, VOC control, etc.[22]

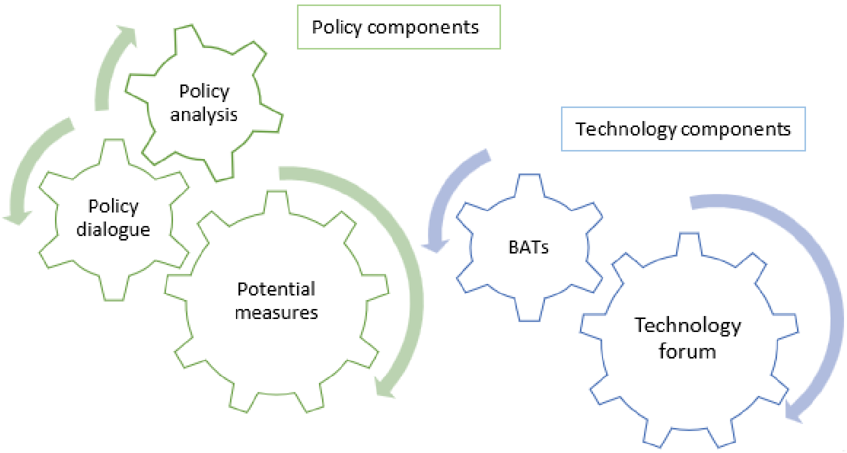
23. As briefly reviewed, NEACAP member States face considerably different situations in terms of the level, trend and sources of air pollution, and have varying conditions and degrees of required policy and technological interventions. In addition to NEACAP, member States have established trilateral and bilateral cooperation channels and increased the depth of technical cooperation while the current cooperation is mostly limited to China, Japan and the ROK. Thus, identifying the specific areas of NEACAP policy and technology cooperation should take account of different conditions and needs of each country and the ongoing cooperation at bilateral and trilateral levels, and design the NEACAP work in a way to further progress and complement the processes and outcomes from the current cooperation.

III. Modalities of Cooperation

24. **Clustering and sequencing relevant activities:** The five indicative activities under the "policy and technology cooperation (PTC)" as the priority area for NEACAP Work Plan 2021-2025[23] can be clustered into two groups, one focused on policy the other on technology. The policy component (Group I) includes activities on (a) conducting policy analysis on air pollution management, (b) proposing potential technical and policy measures, (c) organizing policy dialogue for exchanging information and policy experience, and the technology component (Group II) includes activities on (a) supporting voluntary collaboration on the Best Available Techniques, and (b) supporting technology forum on emerging technologies and development.

[21] IGES, 2020. Cooperation on research and model projects to improve air quality in China, https://www.iges.or.jp/jp/china-city/phase2/outline_e.html
[22] MOE, Japan and MOE, ROK, 2019. 2016-2018 Bilateral Cooperation on PM2.5 Between Japan and the Republic of Korea
[23] https://www.neaspec.org/sites/default/files//NEACAP%20Work%20Plan%202021-2025_0.pdf

Figure 8. Grouping of indicative activities on PTC for implementation



25. Amongst the Group I activities, the policy analysis could be initiated as a first activity to provide reference for other activities (in support of policy dialogue and technology cooperation). The key elements and processes of the activities could be as follows.

- **Policy analysis:** The Work Plan proposes conducting policy analysis on air pollution management in support of policy dialogue and technology cooperation. Thus, the policy analysis on air pollution management would provide a key reference for the other activities, and could focus the effects of major policy measures, the current national process of new policy interventions, and the potential areas of policy and technology cooperation. Meanwhile, the policy analysis would utilize policy dialogue in 2021 to receive information and view from governments in order to better serve its purpose. Furthermore, the policy analysis could utilize existing studies conducted at national and multilateral levels, such as the TPDAP Air Quality Policy Report, UNEP Report - Air Pollution in Asia and the Pacific: Science-based Solutions, China Ministry of Ecology and Environment's Report on China Air Quality Improvement Report (2013-2018), UNEP Repot - A Review of 20 Years': Air Pollution Control in Beijing, etc., as well as academic papers.

- **Policy dialogues:** The Work Plan proposes organizing policy dialogue for exchanging information and policy experience in collaboration with the relevant processes. As shown in Table 2, TPDAP has organized its annual policy dialogue, and is expected to continue from 2021. In addition, there are various policy dialogues being held at the bilateral levels and city-to-city levels. For example, ICLEI holds annual forum on air pollution policies by municipal governments under the initiative "East Asia Clean Air Cities (EACAC)". NEACAP policy dialogue could complement the existing processes by, for example, being inclusive for all NEA countries, incorporating in-depth workshop or field visits, connecting policy dialogues with technical cooperation, etc.

- **Potential technical and policy measures:** The Work Plan suggests proposing potential technical and policy measures through sharing information and lessons learnt on relevant good environmental practices applied nationally. Proposing potential measures could be initially made by policy analysis in 2021-2022 and continued through policy dialogues. The outcomes of applying the measures will be further shared with other member States through subsequent policy dialogues.

26. The detailed scope and modality of Group II activities could be developed and implemented as follows.

- **Voluntary collaboration among member States on the Best Available Techniques (BAT)**: Unlike other activities, the Work Plan puts an emphasis on the voluntary nature of the collaboration. The BAT concept has been utilized as a key approach in the EU for setting emission limit values and permit conditions in preventing and controlling industrial emissions. The EU Directive (2010/75/EU) defines BAT as "the most effective and advanced stage in the development of activities and their methods of operation, which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions". Several NEACAP member States have recently started national guidelines similar to BAT. For example, China has formulated a series of non-binding Guidelines on Available Technologies of Pollution Prevention and Control (GATPPCs/ HJ 2300-2018), and enacted the Development Guideline for GATPPCs in 2018.[24] The Republic of Korea enacted the Act on the Integrated Control of Pollutant-Discharging Facilities (the IPCC Act) in 2017, which provides a BAT-based policy to prevent and control industrial emissions. The Russian Federation introduced a BAT-based policy to prevent and control industrial emissions with the amended Federal law on Environmental Protection in 2014, which introduces a gradual transition to a technological regulation system based on the BAT, using the EU experience and specifics of the domestic economy in the Russia Federation. The enactment of such normative frameworks indicates that NEACAP member States have begun applying the BAT concept into technology-based regulations for industrial pollution control. In this regard, areas of potential voluntary cooperation on BAT could include (a) exchange of information on policies and practices that embody BAT (or similar concepts); (b) exchange of information on the process of specifying advanced techniques and establishing BAT (or similar concepts); and (c) exchange of information on evaluating the effectiveness of policies and practices that embody BAT (or similar concepts); etc.[25]
- **Technology forum**: The Work Plan proposes holding technology forum on emerging technologies and deployment in priority areas such as transport, industry and residential sectors. As mentioned earlier on existing collaboration, governments and industries in NEACAP member States have held various technology forums and exhibitions, and mostly at the bilateral levels with limited interface between policy and technology. Thus, technology forum under NEACAP could complement the existing processes by involving most NEACAP member States, connecting technology exchange and policy cooperation and analyzing and showcasing best practices.

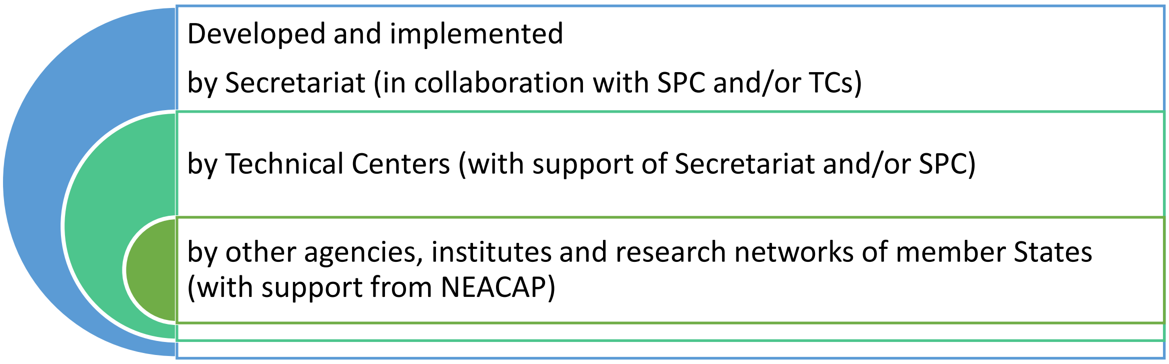
27. In terms of carrying out the activities, it is necessary to diversify implementation modalities to enhance the efficiency and effectiveness of NEACAP work by involving diverse stakeholders in three types of activities, including those developed and implemented: (a) directly by the secretariat in collaboration with SPC and/or TCs, (b) by TCs with the support from the secretariat and/or SPC,

[24] http://english.mee.gov.cn/Resources/standards/others1/AvailTech/201803/t20180314_432480.shtml

[25] OECD, 2017. Report on OECD project on best available techniques for preventing and controlling industrial chemical pollution, ENV/JM/MONO(2017)12

and (c) by government agencies, research institutions and academic networks of the member States with the support from NEACAP.

Figure 9. Implementation modalities of NEACAP Work Plan



28. In this regard, as the substantive activities in 2021 which will be implemented by the secretariat, it is proposed to (a) conduct policy analysis of air pollution management and formulate potential policy and technical measures, including topics of policy dialogues and technical cooperation, and (b) organize policy dialogue, possibly, in conjunction with the annual TPDAP. Regarding TCs' activities, each TC is invited to lead and/or participate in the development and implementation of the Work Plan, taking into account their respective interest and capacity. For example, the National Institute of Environmental Research of the ROK (NIER) has already initiated a Technical and Training (TNT) Program on Air Quality Management, and invited member Governments to nominate candidates for the programme in 2021 taking account of necessary arrangements under the COVID-19 pandemic. Other Technical Centers are encouraged to initiate a programme and closely cooperate with the SPC, with supports from the Secretariat for implementation. The third type of activities could be identified by collecting proposals from other stakeholders through the call for proposals, initial review by secretariat and recommendation by the SPC. In this connection, Annex 1 on provisional activities 2021-2022 and Annex 2 on the call for proposals are presented to the SPC for its discussion and decision.

29. In terms of the budget, NEASPEC has allocated USD266,000 for NEACAP activities during 2021-2025 with following indicative budget lines. The budget can be adjusted in accordance with the planned activities. Furthermore, scaling up the overall budget could be possible if required.

Table 3. Indicative budget of NEACAP 2021-2025

Category	Item	2021-2025
Personnel costs	International consultants	50,000
Contractual services	Publications	5,000
Travel	Travel of staff and consultants	25,000
	Workshops and seminars	136,000
Grants	Letter of Agreements (LOA)	50,000
	TOTAL	**266,000**

IV. ISSUES FOR CONSIDERATION

30. The Meeting may wish to recommend the topic and modality of the PTC activities in 2021-2022 for the Secretariat to initiate the timely implementation of the current Work Plan as requested by SOM-24. In this regard, SPC members may share their views on the activities proposed in the paragraph 28.

31. The Meeting may wish to invite representatives of Technical Centers to indicate or submit their proposed PTC activities for SPC's consideration and support.

32. The Meeting may wish to decide on the plan of next SPC meeting and any follow-up process if deemed necessary.

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Annex 1

Provisional Activity Plan 2021-2022

No.	Topics	Key activities	Indicative budget
Implemented by Secretariat			
1	**Policy analysis**	• Build a study team based on the nominated national experts by the SPC and recommended experts • Organize the inception meeting/ expert workshop(s) • Make administrative arrangements and facilitate the study	
2	**Policy dialogue**	• Identify relevant processes and communicate with the organizers, particularly, the focal point of TPDAP • Hold policy dialogue • Present the outcome for the policy analysis team	
3	**Voluntary BAT collaboration**	• Develop a review paper on BAT policies and similar measures • Communicate with member States to identify interests in collaboration	
4	**Technology forum**	• Review the existing technology forums and exhibitions • Further consult with member States on the modality and topic	
Implemented by TCs			
1	NIER		
2	CRAES		
3	SRI		
Implemented by partners			
	...		

Annex 2

North-East Asia Clean Air Partnership

(Draft) Call for Proposals

Organization	
Name of Organization	
Brief Description of Organization	
Contact information	
Proposed Activities	
Activity Title	
Time period	
Goals/ Objectives	
Key Activities	
Budget	
Partner(s)	
Required support from NEACAP	
Brief Description	
Other information	