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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-sixth Meeting
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Item 13 of the provisional agenda¹

**OPTIONS FOR A FUNDING MODALITY AS REFERRED TO IN PARAGRAPH 4 OF
DECISION XXXVI/1 TO SUPPORT A LIMITED NUMBER OF PILOT PROJECTS TO
ENHANCE REGIONAL ATMOSPHERIC MONITORING OF SUBSTANCES CONTROLLED
BY THE MONTREAL PROTOCOL (DECISION 95/97)**

Introduction

1. At the Thirty-Sixth Meeting of the Parties, the Parties decided to inter alia request the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol to consider a funding modality to support a limited number of pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol, guided by the scientific advice of the Advisory Committee of the General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention for the Protection of the Ozone Layer in relation to the location and establishment of new monitoring facilities, and to report to the Thirty-Seventh Meeting of the Parties on work carried out to develop such a funding modality for further consideration (decision XXXVI/1(4)). In line with that decision, the Executive Committee decided to request the Secretariat to prepare a paper for the 96th meeting on options for a funding modality as referred to in paragraph 4 of decision XXXVI/1 to support a limited number of pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol, guided by the scientific advice of the Advisory Committee of the General Trust Fund in relation to the location and establishment of new monitoring facilities (decision 95/97).

2. The Secretariat has prepared the present paper in line with that decision.

Identification of regions that would benefit from an atmospheric monitoring station

3. The Parties inter alia requested the Ozone Secretariat, in consultation with the Advisory Committee of the General Trust Fund, to organize activities for the specific purpose of evaluating the suitability of potential sites for monitoring regional emissions of controlled substances; provided a budget for those activities; and requested the Ozone Secretariat to report to the Open-ended Working Group of the Parties

¹ UNEP/OzL.Pro/ExCom/96/1

to the Montreal Protocol at its forty-seventh meeting and the Thirty-Seventh Meeting of the Parties to the Montreal Protocol on progress and any outcomes of those activities for review by the Parties (decision XXXVI/1(1)). The Parties also requested the Ozone Secretariat to support the work of the Advisory Committee of the General Trust Fund in mapping possible locations for monitoring controlled substances using existing facilities that are currently being used to monitor other substances and reaching out to other organizations to determine possible interest in coordinating monitoring or sharing monitoring facilities (decision XXXVI/1(2)).

4. In line with paragraph 3 of decision XXXVI/1, the thirteenth meeting of the Conference of the Parties to the Vienna Convention *inter alia* requested the Ozone Secretariat to organize the work of the Advisory Committee in accordance with decision XXXVI/1 of the Thirty-Sixth Meeting of the Parties and allow the Committee to invite additional experts in the monitoring of Montreal Protocol-controlled substances; and requested the Advisory Committee, with the assistance of the World Meteorological Organization and the Ozone Secretariat, to *inter alia* support the work of the Ozone Secretariat to organize activities for the specific purpose of evaluating the suitability of potential sites for monitoring regional emissions of controlled substances (decision XIII/2).

5. Accordingly, the identification of regions that would benefit from an atmospheric monitoring station would be based on the consideration by the Parties of information provided by the Ozone Secretariat and the Advisory Committee of the General Trust Fund. The Executive Committee would not have a role in identifying such suitable locations.

Options for a funding modality

6. The Executive Committee could consider establishing guidelines for the preparation of proposals for establishing regional atmospheric monitoring stations² in those Article 5 countries that were in a suitable location that would benefit from an atmospheric monitoring station as identified by the Advisory Committee and agreed by the Parties, and at the same time those Parties wished to establish a regional monitoring station (i.e., there would be no obligation for Parties to submit such requests).

Characteristics and elements

7. As further described below, the Secretariat recommends that such guidelines provide for a two-stage approach: first, funding could be provided to undertake a survey based on flask sample measurements to either narrow the suitable locations as identified and/or to verify the sampling integrity of a suitable site within the locations agreed by the Parties that would benefit from an atmospheric monitoring station. Based on the results of the flask sampling survey, and further to consultations with the Advisory Committee, a detailed proposal to establish an atmospheric monitoring station at a specific location could be submitted, including the specific location and existing infrastructure of the proposed station; the nature of the monitoring that would be undertaken (i.e., flask sampling or in-situ instrumentation); a description of local partners that maintain and operate the station; costs to establish and operate the station; and how the sustainability of the station and the quality of the measurements will be ensured. Alternatively, the Executive Committee could consider requests for funding the preparation of proposals on a case-by-case basis.

8. Project preparation funding, and project funding itself, could be provided through the bilateral and implementing agencies, per the Executive Committee's usual practice. The Executive Committee could also consider identifying another specialized agency to assist Article 5 countries. In such case, the

² Throughout the present document, the phrase "establishing regional atmospheric monitoring stations" is intended to mean establishing the capability to measure atmospheric abundances of controlled substances at a location where such capability was previously lacking. Such establishment may be undertaken at a new location or an existing station that already monitors atmospheric abundances of atmospheric pollutants (e.g., nitrogen dioxide, sulfur dioxide, carbon monoxide, etc.) or other parameters (e.g., meteorological parameters, etc.)

specialized agency would first need to enter into an agreement with the Treasurer to allow the receipt of any agreed funding. The Executive Committee could also consider strengthening the possible participation of existing or new bilateral agencies by inviting those non-Article 5 countries with atmospheric monitoring stations capable of monitoring the abundances of controlled substances to assist Article 5 countries in project preparation and/or implementation. As necessary, the bilateral and implementing agencies may need to secure the assistance of consultants with sufficient expertise in atmospheric monitoring to prepare project proposals, including undertaking an analysis of the results of the survey of potential sites through flask sampling, selecting appropriate equipment for the site at which monitoring will be undertaken, and assuring that the monitoring results are based on accepted international measurement standards. The bilateral and implementing agencies could seek the advice of the Advisory Committee during that process through a channel of communication agreed by the Advisory Committee and the Ozone Secretariat.

Types of costs and identification of sites

9. The Executive Committee could consider establishing funding guidelines for pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol in regions the Parties to the Montreal Protocol had determined would benefit from an atmospheric monitoring station. Such guidelines should inter alia take into account equipment and infrastructure already existing at the monitoring site, the nature of monitoring to be undertaken, and other factors. Alternatively, the Committee could consider such pilot projects on a case-by-case basis.

10. In developing funding guidelines for pilot projects to enhance regional atmospheric monitoring, the Executive Committee may wish to consider differences in the type of costs that may be incurred in establishing a regional atmospheric monitoring station versus past projects funded by the Multilateral Fund. In general, the Executive Committee has approved funding for projects to convert an enterprise using a controlled substance in its manufacturing by providing, as necessary, agreed incremental capital costs (ICCs) and incremental operating costs (IOCs), where provision of the latter is intended to enable the sustainable conversion to the agreed alternative technology by accounting for the difference in costs between the two technologies, and where in general that difference decreases with time as the baseline technology is phased out and the alternate technology is phased in.³ In contrast, the costs to operate an atmospheric monitoring station may not decrease with time. Accordingly, rather than providing IOCs, the Executive Committee could consider providing incremental recurring costs (IRCs) when funding the establishment of regional atmospheric monitoring stations. In so doing, the Executive Committee could consider a range of options, e.g., providing IRCs for an indefinite period of time/as long as the atmospheric monitoring station was operating; providing IRCs for a period of time to be determined by the Executive Committee; providing IRCs that phase out with time as the local capacity of personnel at the atmospheric monitoring station is built and national funding processes absorb more of the station's operating costs. Irrespective of the option selected, the Executive Committee could review the duration of IRCs after an initial trial period of five years.

11. As the establishment of a new, regional atmospheric monitoring station could entail significant effort and cost, it would be a prudent use of the limited resources of the Multilateral Fund for the Executive Committee to only consider establishing such a station subject to the provision of an analysis demonstrating the suitability of the site, including identifying the nature of the monitoring that would be undertaken at the site. Accordingly, where necessary, the Executive Committee could consider providing funding to undertake a sampling survey of candidate locations identified by the Article 5 country or countries submitting the request for project preparation funding based on periodic flask sampling undertaken over the course of approximately two years. That duration would be required to allow sufficient start-up time

³ In approving the indicative list of categories of incremental costs (decision IV/18(6)), the Parties specified that evaluation of requests for financing incremental costs of a given project shall take into account a number of general principles, including inter alia that the funding of incremental costs is intended as an incentive for early adoption of ozone-protecting technologies. In this respect, the Executive Committee shall agree which time scales for payment of incremental costs are appropriate in each sector (annex VIII to the report of the Fourth Meeting of the Parties).

and give confidence in the results of the survey measurements, including by accounting for intra-annual atmospheric and source variability and excluding measurement error or sampling artifacts.⁴ Such flask sampling would also inform whether a monitoring station based on regular flask sampling or in-situ instrumentation would be more appropriate. In addition, in those cases where monitoring equipment already exists at a monitoring site, such sampling could inform on the merit of increasing sampling frequency or upgrading measurement instrumentation (from flask sampling to in-situ, for example). This latter option would allow the Executive Committee, rather than establishing a new atmospheric monitoring station, to upgrade an existing station to optimize the scientific value of the data provided by the station, noting that upgrading an existing station would likely be more cost effective than establishing a new station. The Secretariat would need to seek the advice of the Advisory Committee when considering such project preparation requests and proposals based on the results of such surveys.

12. If proposals to establish an atmospheric monitoring station are submitted from several Article 5 countries within a single region identified by the Parties, the Executive Committee should select the best proposal based on the cost, scientific expertise of the hosting organization in the country, sustainability of the monitoring, and other applicable metrics. In reviewing such proposals, the Secretariat may need to seek the advice of the Advisory Committee on advantages and disadvantages of different sites, which may range from considerations of topography and dominant wind patterns, to the availability of existing infrastructure (e.g., reliable power supply, a building or other structure within which equipment can be securely housed and operated, etc.), to the capacity of local partners to operate and maintain the equipment.

13. The agencies may need to seek the advice of the Advisory Committee on whether flask or in-situ monitoring would be more appropriate at a monitoring site during the preparation of a proposal. The Secretariat may similarly need to consult the Advisory Committee on the most appropriate monitoring suitability at a site, and other proposed technical characteristics of the site. In addition, the Secretariat may need to consult with the Advisory Committee to better understand the extent of other monitoring activities that may be undertaken in the region and support for atmospheric monitoring provided by funding organizations to ensure that any support provided by the Multilateral Fund complements and does not duplicate any existing efforts. Consultations between the implementing/bilateral agencies and the Secretariat with the Advisory Committee may take place regularly and through a channel of communication identified by the Advisory Committee and the Ozone Secretariat.

14. Decisions by the Executive Committee to approve the establishment of regional atmospheric monitoring stations should be accompanied by Agreements between the relevant Article 5 country and the Executive Committee, specifying reporting obligations and the conditions and schedule whereby funding for the continued operation of the monitoring station could be requested. In addition, the Agreement should specify the disposition of equipment procured by the Multilateral Fund in case a monitoring station ceases to operate, ceases to make data available, or if so requested by the Executive Committee.

Capacity-building

15. The ultimate goal of the Multilateral Fund supporting the establishment and operation of regional atmospheric monitoring stations in Article 5 countries is to enable the provision of high-quality data on the atmospheric abundances of controlled substances in regions where such data are lacking. To that end, the pilot projects should provide support, where necessary, to ensure that stations follow established common measurement practices, that results are linked closely to calibration scales that are well established and stable with time through appropriate standardization, and that appropriate data quality assurance/quality control and appropriate data archiving practices are followed.

⁴ This is consistent with the findings of a study carried out under the European Union-funded pilot project of the Ozone Secretariat, to be reported by the Ozone Secretariat to the 47th meeting of the Open-Ended Working Group under the agenda item on enhancing regional atmospheric monitoring of substances controlled by the Montreal Protocol.

16. Observations of atmospheric abundances over several years will more easily allow scientists to ascertain whether changes in atmospheric abundances are due to changes in emissions rather than, for example, intra-annual atmospheric and transport variability, measurement error or sampling artifacts. Moreover, given that the start-up costs associated with establishing a new atmospheric monitoring station are likely to be significant, it would be an effective use of the limited resources of the Multilateral Fund for the Executive Committee to only consider funding atmospheric monitoring stations that the Committee is confident will provide long-term, high-quality data of relevance to the Parties. To that end, the Executive Committee may wish to support capacity-building activities in those Article 5 countries that wish to or have established an atmospheric monitoring station with the support of the Multilateral Fund.

17. Accordingly, the Executive Committee may wish to provide support, when necessary, for the use of common, well-characterized calibration standards at monitoring stations supported by the Multilateral Fund. The use of well-characterized calibration standards that are closely tied to established measurement organizations is critical to allow the comparison and analysis of atmospheric abundances of controlled substances across stations. Similarly, data archiving and stewardship is critical to ensuring the availability of and accessibility to data collected at atmospheric monitoring stations. The Executive Committee should consider providing support, when necessary, to ensure atmospheric monitoring stations supported by the Multilateral Fund follow recommended data archiving and stewardship protocols, including inter alia submitting data to established databases in a timely manner;⁵ using instrument-based central processing systems, including for the storage of the raw data and metadata and calibration data; and curating data, metadata and processing algorithms.⁶

18. The Executive Committee could also consider supporting a laboratory capable of analyzing flask samples in an Article 5 country in a region identified by the Advisory Committee that would benefit from an atmospheric monitoring station. This could allow Article 5 countries in that region to send flask samples to the supported laboratory for analysis. Such a regional approach, while short of establishing an atmospheric monitoring station, would allow Article 5 countries interested in better understanding their emissions, or exploring whether they would wish to establish an atmospheric monitoring station, to do so at reduced cost. Such a regional laboratory could also support measurement campaigns undertaken in the region.

19. In addition, the Executive Committee could consider funding other capacity-building activities in those Article 5 countries that wish to strengthen their capability to monitor atmospheric abundances of controlled substances and are in a region identified as benefitting from the establishment of an atmospheric monitoring station. Examples of such capacity-building activities could range from technical assistance to set up a regional monitoring station (e.g., how to select an appropriate site, equipment, and sampling methodologies, etc.) to (possibly virtual) training on instrument maintenance, calibration and operation. Finally, the Executive Committee could consider providing support to offset a portion of the costs associated with participation of scientists from atmospheric monitoring stations supported by the Multilateral Fund in AGAGE-led or other international halocarbon scientific research meetings.

Availability and accessibility of data

20. At their 12th meeting, the Ozone Research Managers (ORMs) had recommended encouraging making data available according to FAIR data principles.⁷ Accordingly, the Executive Committee could consider providing funding to support the establishment of regional atmospheric monitoring stations on the understanding that stations supported by the Multilateral Fund would follow those principles. The meetings

⁵ See paragraph 23 for a further discussion of “established databases” and paragraphs 21 and 22 for what is intended with “a timely manner.”

⁶ For a further discussion of data archiving and stewardship, see the [recommendations](#) from the twelfth meeting of the Ozone Research Managers.

⁷ Wilkinson, M., Dumontier, M., Aalbersberg, I. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* **3**, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

of the ORMs had noted that implementation of the FAIR data principles would be supported by the assignment of a digital object identifier (DOI) and data licence to the data sets, which enables the provision of data to the scientific community while helping ensure that the scientists providing the data are recognized appropriately.

21. The Executive Committee could also consider providing funding to support the establishment of regional atmospheric monitoring stations on the understanding that the stations follow an open data policy, albeit with the requirement that users of that station's data give appropriate credit and offer co-authorship on scientific publications using that station's data to the data originator. In addition, the Executive Committee could consider explicitly specifying that scientists at regional atmospheric monitoring stations supported by the Multilateral Fund could have exclusive access to data collected at the monitoring station for a specified period of time (e.g., six months) to ensure local scientists have the possibility to author the first publication of analyses based on their data.

22. To ensure data archiving and stewardship, atmospheric monitoring stations supported by the Multilateral Fund should provide their data to established databases (e.g., the World Data Center for Greenhouse Gases⁸).

Administrative arrangements, monitoring and reporting

23. One advantage of using the Multilateral Fund to support the establishment of regional atmospheric monitoring stations is the assurance of predictable and sustainable funding.⁹ To that end, the Executive Committee should follow past practice with multi-year projects phasing out/down controlled substances and develop multi-year agreements (MYAs) that inter alia specify the project purpose, funding schedule, roles and responsibilities, reporting obligations, project milestones and conditions, if any, for the project.

24. In addition to the milestones typically used in reviewing tranche requests (e.g., level of disbursement, procurement of equipment, etc.), the Executive Committee could consider using additional milestones when considering progress reports included in tranche requests from an atmospheric monitoring station, such as the consistent availability of data from the station during the progress review period; whether data has been made freely available; the archiving of data in a central data portal; and whether scientific articles had been published in the peer-reviewed scientific literature based on data from the station. In considering such milestones, the Executive Committee should take into account the lessons from the implementation of the pilot project funded by the European Union on the regional quantification of emissions of substances controlled under the Montreal Protocol. Depending on existing infrastructure, local capacity and other factors, at least a year or more from the approval of project funding will be needed for a new regional atmospheric monitoring station to be established and operational. Accordingly, the publishing in the peer-reviewed scientific literature of articles based on data from the station can be expected to require at least two years and, depending on the circumstances, could be several more years beyond that, from the approval of project funding. The Executive Committee may therefore wish to consider other milestones related to site set-up, such as the finalization of lease agreements, completion of civil works, and purchasing of equipment, when considering milestones for the initial tranches.

25. Another advantage of using the Multilateral Fund to support the establishment of regional atmospheric monitoring stations is that such projects would follow the Executive Committee's established procedures and practices for monitoring and reporting (e.g., annual progress and financial reporting under the annual progress report, detailed progress reports as part of tranche requests, etc.). This allows the Executive Committee to have confidence that approved funds are effectively used. In addition, those procedures and practices allow Article 5 countries to identify challenges in project implementation so that the Executive Committee can develop mechanisms and policies to address those challenges. This allows

⁸ <https://gaw.kishou.go.jp/>

⁹ [Annex V](#) to document UNEP/OzL.Pro.WG.1/46/2/Add.1

the Executive Committee to learn by doing and could help the Executive Committee refine whatever option or options it selects as a funding modality for atmospheric monitoring.

Funding window for preparation and implementation activities

26. The Executive Committee could consider establishing a funding window under which project preparation and implementation activities are funded; this funding window could be augmented upon the progress in establishing and operating a limited number (nominally three) of atmospheric monitoring stations. In this manner, the Executive Committee would learn by doing, allowing it to adjust the funding modality and the necessary project preparation, review, implementation and monitoring mechanisms. Alternatively, if the Executive Committee did not wish to establish a funding window, the Executive Committee could instead consider funding monitoring stations on a case-by-case basis.

27. In addition to only considering establishing atmospheric monitoring stations in regions agreed by the Parties that would substantially enhance understanding of controlled substance emissions on regional, and perhaps also global, scales, the Executive Committee could consider prioritizing the establishment of stations where existing infrastructure already exists. Such existing facilities allow reduction in cost due to existing infrastructure and analyses of available information to fully evaluate the suitability of the site. Association of the sites with universities or national laboratories, which would be supported through the implementing agencies, would likely also help jump start the process and ensure capacity-building. This may be particularly relevant if existing laboratory or monitoring capacities undertaken by the global halocarbon research community are curtailed.

Indicative costs for a funding window

28. The Executive Committee could consider a funding window of US \$10 million for the establishment and operation of three pilot regional atmospheric monitoring stations for five years. Indicative costs are based on the following indicative estimates:

- (a) *Project preparation costs:* for each of the three monitoring sites, a two-year flask sampling survey (US \$250,000), possible travel of an Advisory Committee member (US \$10,000), and preparation of a site-specific proposal based inter alia on the results of the survey (US \$150,000), resulting in total preparation costs of US \$1,230,000;
- (b) *Establishment and operation of three stations:* The costs to establish three high-frequency monitoring stations and operate those stations for five years based on the estimates provided in table 1 of document UNEP/OzL.Pro.WG.1/46/2/Add.1, assuming two of those stations would be at sites where existing infrastructure already exists, and including annual personnel costs (including overhead) per station of US \$100,000, and 10 per cent contingency, resulting in costs of US \$4,675,000 for three stations;¹⁰
- (c) *Training and technical assistance at three stations:* annual trainings and technical assistance of US \$30,000 per station, per year, resulting in costs of US \$450,000 for three stations over five years;
- (d) *Technical assistance for data storage and data management:* US \$150,000 for each site to build capacity for data archiving and stewardship protocols, and to assist sites to make their data available according to FAIR data principle, resulting in costs of US \$450,000 for three stations;

¹⁰ These estimated costs were also discussed with experts.

- (e) *Flask sampling support to one region*: to build capacity of Article 5 countries in one region, US \$175,000 per year to support to a regional laboratory to analyze samples from countries in the region, and US \$500,000 to support periodic flask sampling in five countries in that region, resulting in costs of US \$1,375,000 for periodic flask sampling in five countries over five years;
- (f) *Support for calibration standards, measurement support software and an international conference on lessons learned*: technical assistance to support common calibration standards and support for an international conference to share lessons learned and best practices (US \$1,000,000); and
- (g) *Agency support costs*: calculated at 9 per cent of the project costs.

Recommendation

29. The Executive Committee may wish to consider:

- (a) Noting the paper on options for a funding modality as referred to in paragraph 4 of decision XXXVI/1 to support a limited number of pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol (decision 95/97), contained in document UNEP/OzL.Pro/ExCom/96/62;
- (b) Establishing a funding window for three pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol in the amount of US \$10 million with the possibility of augmenting that funding window at a future meeting;
- (c) Requesting the Secretariat, taking into account discussions on the matter during the 96th meeting, to prepare for the 98th meeting of the Executive Committee:
 - (i) Draft guidelines for the preparation of pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol in regions that the Parties to the Montreal Protocol had identified would enhance understanding of regional emissions of controlled substances;
 - (ii) Draft guidelines for the implementation of pilot projects to enhance regional atmospheric monitoring of substances controlled by the Montreal Protocol in regions that the Parties to the Montreal Protocol had determined would enhance understanding of regional emissions of controlled substances; and
 - (iii) A draft template Agreement between the Executive Committee and the Article 5 country concerned for pilot projects to establish a regional atmospheric monitoring station.