

Vienna Convention for the Protection of the Ozone Layer

Ozone Research Managers of the Parties to the Vienna Convention for the Protection of the Ozone Layer

Twelfth meeting

Geneva, 24–26 April 2024

Overview of issues relevant to the work of the Ozone Research Managers that have arisen since their eleventh meeting

Note by the Secretariat

I. Introduction

1. The present note provides an overview of issues that are relevant to the work of the Ozone Research Managers and have been considered by the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer since the eleventh meeting of the Ozone Research Managers, held online in July 2021. In their discussions at the present meeting, the Ozone Research Managers may wish to take into consideration these issues, which comprise:

(a) Matters related to the recommendations of the Ozone Research Managers at their eleventh meeting and on the General Trust for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention (hereinafter the “Trust Fund”), considered by the Conference of the Parties to the Vienna Convention at its twelfth meeting, held online and combined with the Thirty-Third Meeting of the Parties to the Montreal Protocol from 23 to 29 October 2021;

(b) The findings of the 2022 assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel, and their synthesis report, considered by the parties in 2023;

(c) Issues related to gaps in the global coverage of atmospheric monitoring of controlled substances and options on ways to enhance such monitoring, deliberated by the Thirty-Third and Thirty-Fifth Meetings of the Parties to the Montreal Protocol in decisions XXXIII/4 and XXXV/14, respectively.

2. The outcomes of the twelfth meeting of the Ozone Research Managers, along with the resultant recommendations will be communicated to and considered by the Conference of the Parties to the Vienna Convention at its thirteenth meeting, to be held jointly with the Thirty-Sixth Meeting of the Parties to the Montreal Protocol in Bangkok from 28 October to 1 November 2024. The Conference of the Parties may subsequently wish to adopt any relevant decisions.

3. The present meeting will be attended by members of the Bureau of the twelfth meeting of the Conference of the Parties to the Vienna Convention, in accordance with decision VC I/6, on subsidiary bodies, subparagraph (a) (i). The Bureau will hold its third meeting in the margins of the present meeting.

II. Matters related to the work of the Ozone Research Managers and the Trust Fund considered by the Conference of the Parties to the Vienna Convention at its twelfth meeting

4. Owing to the coronavirus disease (COVID-19) pandemic, the eleventh meeting of the Ozone Research Managers could not be held in person in April 2020, as had originally been planned, and was instead held online in two parts. The first part of the meeting, held online on 7 and 8 October 2020, considered solely issues related to gaps in the global coverage of atmospheric monitoring of controlled substances. The second part of the meeting, held online from 19 to 23 October 2021, considered all of the items in the agenda and adopted five sets of recommendations on:

- (a) Research needs;
- (b) Systematic observations;
- (c) Gaps in the global coverage of atmospheric monitoring of controlled substances and options to enhance such monitoring;
- (d) Data archiving and stewardship;
- (e) Capacity-building.

5. The above recommendations, along with the status of the Trust Fund, activities supported by the Trust Fund and the work of its Advisory Committee, were recorded in the report of that meeting¹ and were reproduced in a separate working document² for the consideration of the Conference of the Parties at the second part of its twelfth meeting in October 2021 (part II).³ Two of the four decisions adopted at that meeting, decisions XII(II)/1 and XII(II)/2, are of relevance to the present meeting, and their key provisions are outlined below.

A. Decision XII(II)/1: Recommendations of the Ozone Research Managers of the Parties to the Vienna Convention at their eleventh meeting

6. Recognizing the importance of the recommendations arising from the eleventh meeting of the Ozone Research Managers, the Conference of the Parties adopted decision XII(II)/1 in which parties were encouraged to adopt and implement them, as appropriate, and to accord priority to:

- (a) Research and systematic observation activities, including monitoring of the ozone layer using ground, satellite, aircraft and balloon profiles, to analyse processes influencing the evolution of the ozone layer and its links to climate change;
- (b) Maintaining, augmenting, restoring and, where feasible, establishing new long-term capacity and infrastructure for the atmospheric monitoring and observation of substances controlled by the Montreal Protocol in order to enhance the estimates of regional emissions, including in currently unmonitored and under-monitored regions;
- (c) Improved management and analysis of observation data, including for international open-access and collaborative research activities, long-term curation and storage, standardization and intercomparability, to support modelling and near real-time assessments;
- (d) Support for capacity-building activities in developing countries and countries with economies in transition through the continuation and expansion of regular calibration and intercomparison campaigns and through the provision of training and assistance to enable those parties to expand their scientific capacity and participate in ozone research activities, including assessment activities under the Montreal Protocol.

7. In addition, the Ozone Research Managers were requested to continue to review at their twelfth meeting the situation of atmospheric measurements and monitoring of substances controlled by

¹ https://ozone.unep.org/system/files/documents/ORM11_Report_GAW_271_en.pdf.

² <https://ozone.unep.org/system/files/documents/COP-12-II-7E.pdf>.

³ Owing to COVID-19, the twelfth meeting of the Conference of the Parties to the Vienna Convention was also held online in two parts. The first part, held combined with the Thirty-Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer from 23 to 27 November 2020, considered solely financial matters. The second part, held combined with the Thirty-Third Meeting of the Parties to the Montreal Protocol from 23 to 29 October 2021, addressed all issues including the outcomes of the eleventh meeting of the Ozone Research Managers of the parties to the Vienna Convention.

the Montreal Protocol, and to make specific recommendations for further strengthening such atmospheric monitoring.

8. It is expected that the various presentations to be delivered at the present meeting will reflect the progress that has been made in implementing the recommendations adopted by the Ozone Research Managers at their eleventh meeting and the relevant decisions adopted by the Conference of the Parties at its twelfth meeting. Moreover, the parties are expected to address those issues in their national reports, submitted for consideration by the Ozone Research Managers at their twelfth meeting.

B. Decision XII(II)/2: General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention

9. As is indicated in the note by the Secretariat on the General Trust Fund for Financing Activities on Research and Systematic Observations relevant to the Vienna Convention (UNEP/OzL/Conv.ResMgr/12/2), in accordance with its mandate, set out in decision VC X/3 of the Conference of the Parties to the Vienna Convention,⁴ the Advisory Committee of the Trust Fund developed its long-term strategy and short-term plan of action for the Trust Fund and presented them to the Conference of the Parties at its eleventh meeting, in November 2017, after receiving feedback from the Ozone Research Managers at their tenth meeting in March 2017.⁵ The long-term strategy for the Trust Fund is available as a background document for the consideration of the Ozone Research Managers at their twelfth meeting.⁶

10. In the light of the work of the Advisory Committee, the Conference of the Parties adopted decision XII(II)/2, in which it requested the Committee, with the assistance of the World Meteorological Organization (WMO) and the Secretariat, to continue to implement its long-term strategy and short-term plan of action for the Trust Fund, paying particular attention to:

- (a) Identifying gaps and needs in research and monitoring of ozone and related climate variables and parameters, complementing the ongoing efforts of the Ozone Research Managers of the Parties to the Vienna Convention and other relevant programmes such as the World Meteorological Organization Global Atmosphere Watch programme;
- (b) Facilitating the relocation of unused Dobson and Brewer instruments and the use of ozonesondes to new observation programmes when requested and in line with global and regional observation priorities;
- (c) Fostering stronger relationships with scientific institutions and related global networks to build capacity and increase the infusion of knowledge for the activities under its consideration;
- (d) Exploring opportunities to leverage and catalyse its resources to safeguard necessary research and observation activities in line with its strategic plan.

11. An update on the work of the Advisory Committee on the implementation of the long-term strategy for the Trust Fund will be presented by the Chair of the Committee to the Ozone Research Managers at their twelfth meeting, and a full report will be submitted to the Conference of the Parties at its thirteenth meeting.

III. Main findings of the 2022 assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel

12. In 2023, the parties to the Montreal Protocol considered the findings of the following three 2022 quadrennial assessment reports:

- (a) *Scientific Assessment of Ozone Depletion: 2022*, prepared by the Scientific Assessment Panel;⁷

⁴ <https://ozone.unep.org/treaties/vienna-convention/meetings/tenth-conference-parties/decisions/decision-vc-x3-general-trust-fund-financing-activities-research-and-systematic-observations-relevant>.

⁵ <https://ozone.unep.org/system/files/documents/COP-11-6E.pdf> – section E and annex.

⁶ <https://ozone.unep.org/meetings/12th-meeting-ozone-research-managers/pre-session-documents>.

⁷ Available at <https://ozone.unep.org/science/assessment/sap>.

- (b) *Environmental Effects of Stratospheric Ozone Depletion, UV Radiation, and Interactions with Climate Change: 2022 Assessment Report*, prepared by the Environmental Effects Assessment Panel;⁸
- (c) *Technology and Economic Assessment Panel: 2022 Assessment Report*, prepared by the Technology and Economic Assessment Panel.⁹

13. In addition, the parties considered a synthesis report that highlighted the main findings of the above-mentioned reports. The individual assessment reports are available on the web pages of the respective panels on the website of the Ozone Secretariat.¹⁰ The synthesis report, prepared by the co-chairs of the assessment panels, is available on the meeting portal as a background document for the present meeting of the Ozone Research Managers.¹¹ Upon considering the findings of those reports, the Thirty-Fifth Meeting of the Parties, held from 23 to 27 October 2023, adopted decision XXXV/3 on the potential areas of focus for the 2026 quadrennial reports of the three Montreal Protocol assessment panels.¹²

14. The main findings of the 2022 quadrennial assessment reports, summarized in the synthesis report, are outlined below:

- (a) Action taken under the Montreal Protocol has continued to decrease atmospheric abundances of controlled ozone-depleting substances and advance the recovery of the stratospheric ozone layer. The Protocol contributes to environmental sustainability and human health and well-being, in line with many Sustainable Development Goals;
- (b) The significant decreases in projected hydrofluorocarbon (HFC) emissions from the provisions of the Kigali Amendment to the Montreal Protocol will significantly protect future climate. Improvements in energy efficiency during the HFC phase-down have the potential to accelerate and further increase the climate benefits from the Kigali Amendment;
- (c) Successful actions by the parties have reversed the upward trend of unexpected global CFC-11 emissions observed between 2013 and 2017. Carbon tetrachloride abundances continue to decline at a slower rate than expected based on previous trends. While halon atmospheric abundances are declining slowly, there remains a demand for halon-1301 which may not be met in the future without new production. Atmospheric concentrations of methyl bromide have not declined since 2016. The atmospheric abundances of a number of minor ozone-depleting substances have been increasing; cumulatively, those substances may eventually have an impact on stratospheric ozone;
- (d) The current combined global warming potential weighted emissions of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) are comparable to those of HFCs. Reductions in future emissions of these substances would require addressing emissions from banks and from production, by-production and feedstock use. Global emissions of long-lived HFC-23, largely a by-product of HCFC-22 production, are likely to grow unless abatement increases or feedstock use of HCFC-22 decreases;
- (e) Quantifying banks of ozone-depleting substances and HFCs and the time-course of their continued emissions is important in determining the pace of ozone layer recovery and potential impacts on climate;
- (f) Stratospheric ozone depletion and climate change are linked because ozone-depleting substances are powerful greenhouse gases and climate change modifies stratospheric ozone. Ozone itself is also a greenhouse gas and its changes impact the climate. In the future, increasing greenhouse gases and the effects of ozone recovery would have opposing effects on stratospheric temperature and circulation;
- (g) Compliance with provisions of the Montreal Protocol ensures the protection of stratospheric ozone and climate. The timing and extent of the recovery of stratospheric ozone depends on future concentrations of ozone-depleting substances and greenhouse gases;
- (h) Scientific, technical, and environmental policy considerations relate to several issues including:

⁸ Available at <https://ozone.unep.org/science/assessment/eeap>.

⁹ Available at: <https://ozone.unep.org/science/assessment/teap>.

¹⁰ <https://ozone.unep.org/science/overview>.

¹¹ <https://ozone.unep.org/sites/default/files/2023-08/MOP-35-8E.pdf>.

¹² <https://ozone.unep.org/treaties/montreal-protocol/meetings/thirty-fifth-meeting-parties/decisions/decision-xxxv3-potential-areas-focus-2026-quadrennial-reports-environmental-effects-assessment-panel>.

- (i) The impact of eliminating emissions from banks or the use of feedstocks, methyl bromide for quarantine and pre-shipment uses, very short-lived substances and nitrous oxide (N₂O);
- (ii) Challenges in employing low-global-warming-potential alternatives and higher efficiency equipment in various sectors and applications, considering factors such as flammability, toxicity, availability, cost, accessibility, and equipment and system operating conditions;
- (iii) Gaps in regional atmospheric monitoring, limiting the scientific community's ability to identify and quantify emissions of controlled substances from many source regions;
- (iv) The planned retirement within a few years of several space-borne instruments providing vertically resolved global measurements of ozone-related atmospheric constituents, which is expected to impede the ability to monitor and explain changes in the stratospheric ozone layer in the future;
- (v) The impact on the ozone layer of stratospheric aerosol injection, which has been proposed as a possible option to offset global warming, and associated knowledge gaps and uncertainties preventing a more robust evaluation at this time;
- (vi) Heightened concerns about the evolution of the ozone layer in the twenty-first century, including the impact of further increases in N₂O, CH₄ and CO₂ concentrations; rapidly expanding feedstock use and emissions of controlled substances; continued and even increased use of methyl bromide for quarantine and pre-shipment use; climate change on total column ozone in the tropics; extraordinary wildfires and volcanic eruptions; and increased frequency of civilian rocket launches and the emissions of a proposed new fleet of supersonic commercial aircraft.

IV. Gaps in the global coverage of atmospheric monitoring of controlled substances and options on ways to enhance such monitoring

15. Following the 2018 scientific findings on the unexpected global emissions of CFC-11, the consumption and production of which was phased out globally in 2010, extensive consideration of this and related matters by the parties led to the adoption of several decisions under the Montreal Protocol, as well as collective and individual actions by the parties and other stakeholders in subsequent years. In 2021, the Scientific Assessment Panel reported to the parties on its findings which showed that the unexpected emissions had dropped sharply in 2018 and 2019, and that the recovery of the ozone layer would not be substantially delayed as a result of the increased emissions that had occurred.

16. Elements of the aforementioned decisions that are of key relevance to the work of the Ozone Research Managers and the follow-up actions that have been taken are outlined below:

- Decision XXX/3, on unexpected emissions of trichlorofluoromethane (CFC-11), adopted by the Thirtieth Meeting of the Parties in 2018, requested the Scientific Assessment Panel and the Technology and Economic Assessment Panel to prepare relevant reports which informed the parties' discussions in the following years;¹³
- Decision XXXI/3, on unexpected emissions of CFC-11 and effective implementation and enforcement of the Protocol, adopted by the Thirty-First Meeting of the Parties in 2019, requested the Scientific Assessment Panel to work with the Ozone Research Managers at their meeting in 2020 to identify gaps in the global coverage of atmospheric monitoring of controlled substances and to provide options on ways to enhance such monitoring. This led the Ozone Research Managers, at their eleventh meeting in 2021, to adopt a set of recommendations on gaps in the global coverage of atmospheric monitoring of controlled substances and options to enhance such monitoring (as noted in paragraph 4 above), based

¹³ https://ozone.unep.org/sites/default/files/2020-07/TEAP_Task_Force_Dec_XXX-3_on_Unexpected_CFC-11_Emissions_May_2019.pdf;

https://ozone.unep.org/system/files/documents/SAP-2021-report-on-the-unexpected-emissions-of-CFC-11-1268_en.pdf.

on a white paper prepared by the Scientific Assessment Panel and experts in atmospheric monitoring of controlled substances.¹⁴

- Decision XXXIII/4, on enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol, adopted by the Thirty-Third Meeting of the Parties in 2022, requested the Secretariat, in consultation with relevant experts from the Scientific Assessment Panel, the Technology and Economic Assessment Panel and the Ozone Research Managers, to provide to the parties to the Montreal Protocol, at the forty-fifth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol in 2023, information on options for enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol. The response of the Secretariat to the provisions of that decision, prepared in consultation with relevant experts from the aforementioned bodies, was set out in the addendum to the note by the Secretariat, along with updated information on the implementation of a pilot project funded by the European Union, entitled “Regional quantification of emissions of substances controlled under the Montreal Protocol” (UNEP/OzL.Pro.WG.1/45/2/Add.2, paras. 23–37).
- Decision XXXV/14, on enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol, adopted by the Thirty-Fifth Meeting of the Parties in 2023, requested the Secretariat, in consultation with the Multilateral Fund secretariat for the Implementation of the Montreal Protocol and relevant experts from the Ozone Research Managers, the Scientific Assessment Panel and the Technology and Economic Assessment Panel, to provide to the Open-ended Working Group at its forty-sixth meeting, to be held from 8 to 12 July 2024:
 - (a) An update of the information provided under decision XXXIII/4, including refining, to the extent possible, the cost estimates associated with enhancing atmospheric monitoring presented in the decision XXXIII/4 report, and providing a list of potential monitoring station locations;
 - (b) Options for sustainable funding to establish new regional monitoring capacities, including an assessment of their advantages and disadvantages of potential implementation options, and a description of the administrative processes required to operationalize any potential funding options considered, taking into account the discussion at the Thirty-Fifth Meeting of the Parties to the Montreal Protocol.

The Secretariat is currently working on its response to the requests of the parties. In order to tackle the issue of refining the cost estimates, as requested in paragraph (a) of decision XXXV/14, an online workshop of relevant experts was convened on 23 February 2024 to discuss the matter. The outcomes of that workshop will be presented to the Ozone Research Managers at their twelfth meeting for their input and recommendations, if any.

17. The issue of gaps in the global coverage of atmospheric monitoring of controlled substances and options on ways to enhance such monitoring will be discussed under session 5 of the current meeting, as well as in a breakout group to frame any follow-up recommendations. Relevant information provided by the Ozone Research Managers in their national reports, available on the portal of the meeting, is also expected to inform those discussions.

¹⁴ <https://ozone.unep.org/system/files/documents/ORM11-II-4E.pdf>.