

**Vienna Convention
for the Protection
of the Ozone Layer**

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Item 5 (b) of the provisional agenda for the preparatory segment*

**Vienna Convention issues: status of the General Trust Fund
for Financing Activities on Research and Systematic
Observations Relevant to the Vienna Convention**

General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention

Note by the Secretariat

I. Introduction

1. In decision XII(II)/2, adopted by the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer during the second part of its twelfth meeting, in 2021,¹ the Secretariat was requested to report to the Conference of the Parties at its thirteenth meeting on the operation of, contributions to and expenditure from the General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention (the “Trust Fund”) and on the activities funded from the Trust Fund since its inception, as well as on the work of the Advisory Committee supervising the activities under the Trust Fund. In accordance with that decision, the present note provides an overview of the requested information.

2. The objectives and activities of the Trust Fund are central to the work of the Ozone Research Managers of the Parties to the Vienna Convention, due not only to their mandate under the Vienna Convention but also to their national responsibilities. The status and the activities of the Trust Fund as well as the work of its Advisory Committee were reviewed by the Ozone Research Managers during their twelfth meeting, held in April 2024. On the basis of that review, the Ozone Research Managers made several recommendations, which were included in the report of their meeting² and have been reproduced in document UNEP/OzL.Conv.13/6 for the consideration of the Conference of the Parties at its thirteenth meeting.³ Other matters for the parties’ consideration relate to the continued implementation of the long-term strategy and the short-term plan of action for the Trust Fund by the Advisory Committee, also requested by the Conference of the Parties in decision XII(II)/2.

* UNEP/OzL.Conv.13/1–UNEP/OzL.Pro.36/1.

¹ The twelfth meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer was held online in two parts owing to the coronavirus disease (COVID-19) pandemic.

² To be made available on the portal of the current meeting as a background document.

³ Available at <https://ozone.unep.org/meetings/thirty-sixth-meeting-parties/pre-session-documents>.

II. Operation of the Trust Fund

3. The General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention was established in 2002 by decision VI/2. It is an extrabudgetary fund for receiving voluntary contributions from the parties and international organizations for the purpose of financing certain research and systematic observation activities related to the Convention in developing countries and countries with economies in transition.

4. The primary aim of the Trust Fund, according to decision VI/2, is to provide complementary support for the continued maintenance and calibration of the existing World Meteorological Organization (WMO) Global Atmosphere Watch (GAW) ground-based stations for monitoring column ozone, ozone profiles and ultraviolet (UV) radiation in the developing countries and in the countries with economies in transition, to address balanced global coverage. In the decision, the Conference of the Parties also recognized that consideration should be given to supporting other activities identified by the Ozone Research Managers and in consultation with the co-chairs of the Montreal Protocol's Scientific Assessment Panel and Environmental Effects Assessment Panel, for the improvement of the observation network and relevant research.

5. WMO and the United Nations Environment Programme (UNEP), represented by the Ozone Secretariat, signed a memorandum of understanding in September 2005 on the institutional arrangements for making decisions on the allocation of funds in the Trust Fund, and presented it to the Conference of the Parties at its seventh meeting, held in 2005. In decision VII/2, the Conference of the Parties requested UNEP and WMO to continue their cooperation with respect to the Trust Fund pursuant to the terms set out in that memorandum and on the understanding that the agreement could be changed as necessary to meet evolving needs and conditions.

6. The Trust Fund started its operation in February 2003 with a five-year term ending on 31 December 2007. The term of the Trust Fund has since been extended four times, three of which were in response to respective requests set out in decisions of the Conference of the Parties. The request for the third extension, set out in decision XI/2 in 2017, was approved by the United Nations Environment Assembly at its third session, held in December 2017, in its decision 3/3.⁴ The current term, approved in 2024 by the United Nations Environment Assembly in decision 6/6,⁵ will expire on 31 December 2030 unless otherwise requested by the appropriate authorities. In decision 6/6, the United Nations Environment Assembly noted that the extension of trust funds was an administrative matter that fell under the delegation of the Executive Director and hence as of the seventh session of the Environment Assembly would no longer require a decision by Member States.

III. Advisory Committee of the Trust Fund

7. Since 2015, the activities under the Trust Fund have been overseen by an advisory committee established pursuant to decision X/3, adopted by the Conference of the Parties in 2014. As provided in that decision, the Advisory Committee consists of 10 members, including two co-chairs of the Scientific Assessment Panel, the two co-chairs of the Ozone Research Managers, one representative of the Ozone Secretariat and up to five scientists and experts in ozone observations, as well as one representative of WMO as an observer, striving for equitable geographical and gender representation.⁶ The terms of reference of the Committee, developed and adopted at its second meeting, held in October 2016, are available on the Secretariat's website.⁷

8. The Committee, which meets online or in the margins of relevant meetings, has met 15 times since its establishment in 2015.

9. In accordance with decision X/3, the mandate of the Advisory Committee is:

(a) To develop a long-term strategy and implementation objectives and priorities in the light of the four overarching goals identified by the Ozone Research Managers at their ninth meeting;⁸

⁴ United Nations Environment Assembly decision 3/3, on the management of trust funds and earmarked contributions, sect. II, para. 7 F (c).

⁵ United Nations Environment Assembly decision 6/6, on the management of trust funds and earmarked contributions, sect. II, F (c).

⁶ The current composition of the Advisory Committee can be found on the Ozone Secretariat's website, at <https://ozone.unep.org/vienna-advisory>.

⁷ <https://ozone.unep.org/sites/default/files/Terms-of-reference-for-the-Advisory-Committee-of-the-Trust-Fund.pdf>.

⁸ UNEP/OzL.Conv.10/6.

(b) To develop a short-term action plan that takes into account the most urgent needs of the Global Ozone Observing System and which will make the best possible use of the resources available in the Trust Fund;

(c) To ensure quality control of the individual project proposals developed under the Trust Fund, striving for regional balance in the projects supported by the Fund and identifying possibilities for complementary funding to maximize its resources.

10. The long-term strategy and short-term plan of action for the Trust Fund, prepared by the Advisory Committee after it received feedback from the Ozone Research Managers, were presented to the Conference of the Parties at its eleventh meeting, in November 2017.⁹ The Conference of the Parties subsequently adopted decisions XI/2 and XII(II)/2, in which the Advisory Committee was requested, with the assistance of the WMO and the Ozone Secretariat, to implement its long-term strategy and short-term plan of action for the Trust Fund, paying particular attention to specific areas set out in those decisions. In response to the request for information on the activities of the Advisory Committee in paragraph 3 (b) of decision XII(II)/2, the Committee's progress on this matter is summarized in section VII below and will be presented to the Conference of the Parties for its consideration at its thirteenth meeting.

11. In accordance with its mandate, the Advisory Committee has evaluated 27 activities since the start of its work in 2015. The outcome of the Committee's evaluations is presented in section V below.

IV. Status of the Trust Fund

12. In decision XII(II)/2, the Conference of the Parties requested the Secretariat to continue to invite parties and relevant international organizations, as appropriate, to make financial and/or in-kind contributions towards well-defined and well-budgeted project proposals developed under the Trust Fund. Accordingly, the Secretariat has done so on an annual basis, the last such correspondence to parties being sent on 16 October 2023.

13. The status of the Trust Fund from its inception in 2003 until 31 July 2024 is shown in table 1. As at 31 July 2024, a total of \$943,879 had been made available to support the activities of the Trust Fund. That amount includes direct voluntary financial contributions to the Trust Fund from 15 parties, the interest income earned, the exchange gains/losses incurred by the Trust Fund and a contribution (\$35,545) by one party to WMO on the condition that the funds be used for activities under the Trust Fund. Of the total amount, \$635,426 had been disbursed or allocated for completed, ongoing or planned activities. The funds available for future activities, including administrative costs, total \$308,453.

14. At the present meeting, the parties may wish to review the status of the Trust Fund, taking into consideration the amount of funds requested in the new project proposals submitted by developing countries and countries with economies in transition in response to the Secretariat's call on 23 November 2023, and to make any voluntary contributions.

V. Activities and associated costs

15. From its inception in 2003 until 31 July 2024, the Trust Fund disbursed or allocated funds in support of 22 activities, 17 of which were approved after the establishment of the Advisory Committee of the Trust Fund in 2015 and evaluated by the Committee. All supported activities as at 31 July 2024 and associated costs are listed in table 2, covering:

- (a) Calibrations of Brewer instruments (three activities);
- (b) Intercomparisons of Dobson instruments (seven activities);
- (c) A workshop on data quality (one activity);
- (d) Training courses for Dobson and Brewer operators (two activities);
- (e) Relocations of Dobson instruments (three activities);
- (f) Launch of and training on ozonesondes (two activities);
- (g) Capacity-building on data management and instrument calibration (one activity);
- (h) Supply of a second-hand Brewer instrument (one activity);

⁹ UNEP/OzL.Conv.11/6, sect. E and annex.

- (i) Purchase of instrumentation (one activity);
- (j) Monitoring of solar ultraviolet B (UV-B) radiation (one activity).

Altogether, more than 50 developing countries and countries with economies in transition have participated as beneficiaries in the activities supported by the Trust Fund.

16. The geographical distribution and brief descriptions of the activities completed by the time of preparation of the present note can be found on the Ozone Secretariat website.¹⁰

17. On 23 November 2023, the Secretariat invited developing countries and countries with economies in transition to submit new project proposals for possible support under the Trust Fund. By the time of preparation of this note, the Secretariat had received 15 project proposals from 12 parties, as listed in table 3. All submitted proposals have been forwarded to the Advisory Committee for its consideration.

Table 1
Status of the General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention as at 31 July 2024

(United States dollars)

<i>Party</i>	<i>2003–2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>	<i>2023</i>	<i>2024</i>	<i>Total party contribution</i>
Andorra	5 573						5 573
Australia	28 011						28 011
Austria	17 773			20 576			38 349
Czechia	18 000						18 000
Estonia	2 000						2 000
Finland	66 230	3 509	8 265	8 231	5 336		91 571
France	53 620	10 689	10 626	10 040	10 549	10 834	106 358
Kazakhstan	11 361						11 361
Netherlands (Kingdom of the)				32 609	31 881	32 468	96 958
Norway	88 877	33 948			20 059		142 884
South Africa	60 000						60 000
Spain	12 341						12 341
Sweden	44 121			16 605	19 867		80 593
Switzerland	51 488		16 322	15 790		34 140	117 740
United Kingdom of Great Britain and Northern Ireland	40 987						40 987
Total contributions, including pledges	500 382	48 416	35 213	103 851	87 692	77 442	852 726
Exchange gain/(loss)	574	719	(1 801)	127	2 701		2 320
Interest income	37 416	2 315	1 365	209	11 983		53 288
Total cash	538 372	51 180	34 777	104 187	102 376	77 442	908 334
Expenditures/advances to WMO ^a	(379 151)	(33 900)	(50 850)				(463 901)
Approved activities							(154 504)
Balance available (Trust Fund)							289 929
German contribution to WMO	35 545						35 545
Expenditures ^a	(17 021)						(17 021)
Balance available (WMO)^b							18 524
Total balance available							308 453

^a Amount includes administrative costs charged by UNEP and WMO.

^b Using the United Nations exchange rate of 1 December 2017 (\$1=€0.844).

¹⁰ <https://ozone.unep.org/activities>.

Table 2

Funding of supported activities under the General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention as at 31 July 2024

(United States dollars; includes administrative costs)

<i>No.*</i>	<i>Completed activities</i>	<i>Funds disbursed</i>
1	Dobson intercomparison – <i>Dahab, Egypt, 23 February–12 March 2004</i>	16 950
2	Calibration of Brewer instrument no. 116 – <i>Bandung, Indonesia, 5–9 September 2006</i>	18 193
3	Calibration of Brewer instrument no. 176 – <i>Kathmandu, 20–26 September 2006</i>	
4	Dobson intercomparison – <i>Irene, South Africa, 12–30 October and 15–26 November 2009</i>	25 083
5	Workshop on data quality in the total ozone network – <i>Hradec Králové, Czechia, 14–18 February 2011</i>	38 227
6	Relocation of Dobson no. 14 (formerly deployed in Tromsø, Norway) to Tomsk, Russian Federation, September 2015; and Dobson training course – <i>Hradec Králové, Czechia, 7–14 April 2015^a</i>	13 593
7	Dobson training course – <i>Amberd, Armenia, 28 September–4 October 2015</i>	
8	Dobson intercomparison campaign for Asia – <i>Tsukuba, Japan, 7–25 March 2016^a</i>	27 445
9	Dobson intercomparison campaign for Australia and Oceania <i>Melbourne, Australia, 13–24 February 2017^a</i>	20 204
10	Dobson intercomparison campaign for northern Africa – <i>El Arenosillo, Spain, 4–15 September 2017^b</i>	32 654
11	Training workshop for Brewer operators – <i>Sydney, Australia, 4–9 September 2017^a</i>	20 000 ^c
12	Joint project proposal by WMO Global Atmosphere Watch and Southern Hemisphere Additional Ozonesondes: Jülich Ozone Sonde Intercomparison Experiment 2017 <i>Jülich, Germany, 9–20 October and 23 October–3 November 2017</i>	20 000
13	Kenya (part 1): Capacity-building on data management and instrument calibration <i>Hradec Králové, Czechia; and Payerne, Zürich and Dübendorf, Switzerland, 18 June–6 July 2018</i> Kenya (part 2): Capacity-building on data management and instrument calibration <i>Kenya, 18–27 March 2019</i>	42 036
14	Dobson intercomparison campaign for Latin America and the Caribbean <i>Buenos Aires, 4–22 March 2019^a</i>	40 000 ^d
15	Ecuador: The Ecuadorian Highlands Ozonesondes project <i>Cumbayá, Ecuador, 1 March 2019–30 April 2020</i>	56 274
16	Dobson intercomparison campaign for southern Africa – <i>Irene, South Africa, 7–18 October 2019^b</i>	25 513
17	Kyrgyzstan: Technical support, information exchange for atmospheric monitoring at the shore of the high mountain lake – <i>Issyk-Kul, 22 January 2020–30 June 2020^c</i>	33 900
18	Comoros: Project on the establishment of an ozone observatory in Comoros <i>Comoros, 11 May 2021–30 April 2022^f</i>	50 850 ^g
<i>No.</i>	<i>Ongoing activities</i>	<i>Funds disbursed</i>
19	Brazil: South American Brewer Spectrometer Network – <i>Santa Maria, Brazil, 23 February–8 March 2024</i>	52 804 ^h
<i>No.</i>	<i>Planned activities</i>	<i>Funds allocated</i>
20	Burkina Faso: Acquisition of a ground-based ozone column measurement instrument (<i>on hold</i>) ⁱ	22 600
21	Mexico: Monitoring of solar ultraviolet radiation band “B” in Central America and the Caribbean (<i>to be determined</i>)	56 500
22	Relocation of Dobson no. 8 (formerly deployed in Spitzbergen, Norway) to Belarus ^{a,j} (<i>on hold</i>)	22 600
Total funds disbursed and allocated		635 426

* Numbered in the order of implementation.

^a Listed for priority funding by the Ozone Research Managers at their ninth meeting, in May 2014.^b Activities 10 and 16 listed for priority funding at the ninth meeting of the Ozone Research Managers as one activity but subsequently divided into two activities, covering northern and southern Africa, respectively.^c Also supported by the Canadian Brewer Trust Fund with an additional \$20,000.^d Also supported by WMO trust fund with an additional amount of \$10,000.^e Completed on 12 July 2023 owing to project delays caused by the COVID-19 pandemic.^f Completed by 30 May 2024 owing to implementation delays caused by technical and administrative issues.^g Also supported by WMO with an additional amount of \$10,544.^h Also supported by the Canadian Brewer Trust Fund with an additional amount of \$35,480.ⁱ On hold owing to political instability in the country.^j Relocation previously destined for Sri Lanka and then Singapore. In the absence of interest from those parties, the Advisory Committee decided to lend the instrument to Belarus to assist the party in implementing its proposal entitled “Preparing for and undertaking intercomparison sessions of three instruments to monitor total ozone and ultraviolet radiation in Belarus”. The project is on hold owing to political instability in the region.

Table 3
Project proposals under consideration by the Advisory Committee
 (United States dollars)

<i>No.</i>	<i>Party</i>	<i>Project proposal</i>	<i>Funds requested</i>
1	Burundi	Systematic observations of atmospheric composition over Bujumbura using the Pandora spectrophotometer	50 000
2	Chile	Renovation and maintenance of stations of the ultraviolet radiation network in Chile	50 282
3	Comoros	Monitoring and measurement of the total ozone column in the Union of the Comoros	78 348
4	Ecuador	Advanced environmental monitoring: developing a real-time UV radiation mapping system for equatorial Andean regions	47 400
5	Indonesia	Monitoring of the dynamics of ozone, ozone-depleting substances, UV radiation and air pollutants	49 425
		Observation of vertical distribution of ozone-depleting substances and UV radiation in Indonesia by using an aerial drone as a carrier for miniaturized samplers and portable sensors	49 646
6	Morocco	Ground-based total column observation in Africa using PANDORA spectrometer	50 000
7	Mozambique	Restoration of the solar radiation and ozone measurement network in Mozambique	4 000 000
8	Nigeria	Monitoring anthropogenic contribution to total column ozone in Nigeria	49 600
9	Rwanda	Enhancing data quality in the total ozone network: a workshop initiative in Rwanda	50 000
10	Somalia	Strengthening ozone monitoring and capacity-building in Somalia	50 000
11	Uganda	Activities on research and systematic observations relevant to the Vienna Convention	50 000
12	Venezuela (Bolivarian Republic of)	Monitor column ozone and ozone profiles in the Bolivarian Republic of Venezuela	48 340
		Training plan for the internal control of refrigerant gases, aimed at officials of the Ministry of People's Power for Eco-socialism	32 808
		Plan to raise awareness of the safe handling of refrigerant gases, considered to be substances with high ozone depletion and global warming potentials, in the commercial sector (supermarkets)	29 321
Total funds requested			4 685 170

* Using the United Nations exchange rate of 15 March 2024 (\$1 = €0.914).

VI. Availability of funds for future activities versus funds requested

18. The information provided above can be summarized as follows:

(a) The total income of the Trust Fund from February 2003 to July 2024 (21 years), taking into account the interest accrued, fluctuations in exchange rates and the direct contribution by one party (Germany) to WMO for activities under the Trust Fund, was \$943,879.

(b) From February 2003 to July 2024, funds were disbursed or allocated to a total of 22 approved activities, including the activities listed for priority funding at the ninth meeting of the Ozone Research Managers, in 2014. The total cost of the 22 approved activities was \$635,426.

(c) In the light of subparagraphs (a) and (b) above, the balance available for funding activities, including administrative costs, is \$308,453.

19. At the time of preparation of the present note, 12 developing countries had submitted project proposals for support under the Trust Fund in response to the Secretariat's call of 23 November 2023. The total amount requested in these proposals is \$4,685,170,¹¹ which is far greater than the current

¹¹ The amount requested in each project proposal was in the vicinity of \$50,000, with the exception of a proposal from one party that requested funding of \$4,000,000.

balance available in the Trust Fund. The proposals are under consideration by the Advisory Committee.

20. Despite the limited resources of the Trust Fund, the activities conducted have been effective and important, yielding positive results for the continuation and enhancement of global systematic observations. The parties have on several occasions recognized the importance of the Trust Fund in their decisions.¹² Clearly, however, the balance available in the Trust Fund is insufficient to cover the costs associated with project proposals that may be submitted in the future. The parties may wish to consider the situation and make appropriate recommendations.

VII. Progress in the implementation of the long-term strategy and short-term plan of action for the Trust Fund

21. In accordance with decision XII(II)/2, the Advisory Committee has worked to implement its long-term strategy and short-term plan of action for the Trust Fund, including by identifying gaps and needs in research and monitoring; facilitating the relocation of unused Dobson and Brewer instruments and the use of ozonesondes to new observation programmes; fostering stronger relationships with related institutions and networks; and exploring opportunities to leverage and catalyse the resources of the Trust Fund to safeguard necessary research and observation activities. The outcomes of the Committee's work on these areas were presented to the Ozone Research Managers during their twelfth meeting, in April 2024, and are summarized in the following paragraphs.

A. Identification of gaps and needs in research and monitoring of ozone and related climate variables

22. To date, given its limited resources, the Advisory Committee has chosen to concentrate on funding activities designed to enhance global ozone measurements from ground-based instruments. While this approach has included activities related to balloon-borne ozonesondes measuring vertical profiles of ozone and surface UV measurements, the main focus of the funding has been on supporting the operation of Dobson and Brewer spectrophotometers, measuring total column ozone and improving the quality of the observations.

23. Two reasons underly this decision. First, the ground-based instruments have been the anchor for calibrating satellite data essential for trend analysis of total ozone. Second, this approach was deemed most suitable for capacity-building in parties to the Montreal Protocol operating under paragraph 1 of Article 5 of the Protocol (Article 5 parties) and countries with economies in transition. Additionally, supporting participation in Dobson intercomparison campaigns, in particular, has been largely effective in sustaining ozone observations in participating countries, as these campaigns provide an opportunity for training, repairs and relationship-building, in addition to their goal of calibrating the instruments.

24. Observed changes in ozone vary considerably across the globe and at different heights in the atmosphere. While satellite measurements provide wide geographic and temporal coverage, calibrating and validating satellite sensors using stable ground-based instruments is essential to correct instrument drifts after the satellite launch. The requirements for validation of satellite instruments have been refined in recent years. They include ground instruments with well-understood uncertainties and a wide geographic spread to ensure that the full range of ozone and atmospheric regimes is represented.

25. Dobson and Brewer instruments remain the cornerstone of the total ozone ground-based network. Their current distribution remains heavily concentrated in North America, Western Europe and East Asia. The tropics and sub-tropics, particularly in the southern hemisphere, are much less well represented, despite their large populations and unique atmospheric characteristics, and the focus of the Trust Fund is on supporting measurements in these under-sampled regions.

26. The Dobson spectrophotometer, although almost a century old, has proved itself to be a very robust instrument and easy to use in various environments, in both developed and developing countries. It has long since been out of production, however, and the pool of experts in its use has shrunk. The more modern Brewer instrument is also widely used and can make reference-quality measurements, but its production was recently discontinued. It is therefore clear that to ensure continued accurate monitoring of the ozone layer, newer instruments using technology of the twenty-first century must be used. To supplement and, in time, replace Dobsons and Brewers, such instruments must be capable of making very high-quality measurements while also being robust and rugged in design to enable operation in all environments with minimal intervention. The Advisory

¹² See, for example, decisions X/3, XI/2 and XII(II)/2 of the Conference of the Parties to the Vienna Convention.

Committee is keen for the Trust Fund to work towards this goal over the next five years, with encouragement and support of trials in different parts of the world and comparisons with co-located Dobsons and Brewers.

27. As interactions between climate change and the ozone layer are strongly interdependent, attention should be paid to the climate role played by the ozone layer. In particular, changes in the vertical structure of the ozone layer significantly influence climate and demand better knowledge of the vertical variations in ozone abundance in the atmosphere. Such vertical distribution measurements are also helpful in better understanding and dealing with the impact of ozone on air quality. The upper troposphere and lower stratosphere are challenging to monitor with satellites but of particular significance for climate and the potential ozone-layer impact of chlorinated very short-lived substances. One goal of the Trust Fund is thus to support the extension of the current ozonesonde network to under-sampled regions in the tropics, subtropics and Southern Hemisphere.

28. In the light of the above, the long-term plan for the Trust Fund is to continue to focus on measurements of ozone. In recent years, there has also been an emerging interest in monitoring gases controlled under the Montreal Protocol, which has been expressed by the parties to the Montreal Protocol several times in various forms. The Advisory Committee has long expressed the wish to extend the work of the Trust Fund to include the monitoring of gases controlled under the Montreal Protocol but has been prevented from doing so by a lack of resources. Therefore, any action to improve the geographic coverage of controlled-gas monitoring would be warmly welcomed. Continued efforts by the Trust Fund to sustain ozone monitoring are essential, however, providing a path for scientists from developing countries and countries with economies in transition to fully participate in the scientific community underpinning the success of the Montreal Protocol.

29. All these considerations demonstrate a need to take stock of the current status of the ozone observing system, where it needs to be in the next decade, and how to get there. The Advisory Committee therefore suggests that a virtual workshop of experts be organized with the assistance of institutions involved in the quality assessment of ozone monitoring activities (e.g. WMO, the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA)) and other agencies worldwide, with the objective to determine the optimum path for transitioning to newer instruments. Such a workshop would bring together experts in the currently used instruments (Dobson, Brewer and Differential Optical Absorption Spectroscopy spectrometers) and the new instruments (e.g. Pandora and bi-technology sensor spectrometers) and data analysis experts to assist in deciding on the number of new measurements needed, the best instruments to be used to transition from the older spectrometers to more compact, robust, easier-to-use instruments, the location of the instruments for both continuity and anchoring satellite observations, and best practices.

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

30. Numerous international networks participate in programmes monitoring the ozone layer and surface UV radiation using Dobson and Brewer instruments. To gain some insight into the availability of Dobson and Brewer instrumentation around the globe, as well as the sites conducting ozonesonde measurements, a desk review of the websites of the following entities was carried out:

- (a) Dobson Forum Web Pages of WMO GAW;
- (b) Network for the Detection of Atmospheric Composition Change (NDACC);
- (c) World Ozone and Ultraviolet Radiation Data Centre (WOUDC);
- (d) European Brewer Network (EUBREWNET);
- (e) Southern Hemisphere Additional Ozonesondes (SHADOZ) network, operated by NASA.

31. Further information was also obtained through contact with experts from monitoring sites conducting Brewer, Dobson and/or ozonesonde measurements worldwide.

32. The results of the Committee's investigation into the availability of currently active Dobson and Brewer instruments are presented in table 4. It should be noted, however, that instruments and their corresponding data may be registered with multiple networks, and while an effort was made to address any potential duplication, cross-verification of instrument location and identification is

therefore still needed. In the case of ozonesondes, there are approximately 60 active sites, available from the NDACC, WOUDC, SHADOZ or NOAA data archives.¹³

Table 4

Estimated numbers of currently active Dobson and Brewer instruments as at August 2024

<i>Instruments</i>	<i>NDACC</i>	<i>WOUDC</i>	<i>EUBREWNET</i>
Dobson	19	64	–
Brewer	8	54	76

33. To facilitate the relocation of Dobson or Brewer spectrometers, the Advisory Committee recommends the following next steps:

- (a) Identify instruments that report data to more than one network to generate a master list of all available operational instruments around the world;
- (b) Connect with each network or with the measurement site operators to identify:
 - (i) Instruments that are inactive but still functional;
 - (ii) Instruments that are inactive owing to damage or malfunction;
- (c) Once the potentially available instruments have been identified:
 - (i) Reach out to the owners of those instruments to encourage their deployment to developing countries or countries with economies in transition;
 - (ii) Compile a database of potentially available instruments and their condition;
 - (iii) Prepare letters to assist in securing funding for refurbishment and calibration of instruments available for relocation;
 - (iv) Devise a strategy for training personnel to operate the instruments.

C. Fostering stronger relationships with scientific institutions and related global networks to build capacity and increase the infusion of knowledge for the activities under the consideration of the Advisory Committee

34. Several global networks contribute to the monitoring of the ozone layer and surface UV radiation (e.g. WMO/GAW, NDACC). The involvement of members of the Advisory Committee in the governance of such networks ensures the transmission of relevant information regarding the funding of monitoring activities and corresponding capacity-building.

35. Similarly, strong connections exist between the Advisory Committee and major international organizations involved in ozone layer science – for example, through “Atmospheric Processes and Their Role in Climate”,¹⁴ a core project of the World Climate Research Programme and the International Ozone Commission. It is of utmost importance that the strong connections between these scientific bodies and the Advisory Committee be maintained in the future to ensure smooth exchange of information.

36. The Pandora spectrometer, which provides direct sun total column and multi-axis tropospheric column observations of several trace gases, including ozone, nitrogen dioxide and formaldehyde, has been selected by NASA and the European Space Agency for the validation of satellite instruments dedicated to the measurement of tropospheric composition and air quality monitoring. The Pandonia Global Network, based on this spectrometer, was established in 2018 to ensure systematic processing and dissemination of the data to the scientific community. As the use of the Pandonia Global Network is growing, particularly in developing countries and countries with economies in transition, it is necessary to establish a stronger relationship between the Trust Fund and this network to ensure that total ozone monitoring and its quality assessment is a focus of its funding institutions.

37. Ozone profile measurements are performed within NDACC, the SHADOZ network and the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN). While there are well-established relations with NDACC and the SHADOZ network, which are somewhat

¹³ R. M. Stauffer, A. M. Thompson, D. E. Kollonige, D. W. Tarasick, R. Van Malderen, H. G. J. Smit and others (2022), “An examination of the recent stability of ozonesonde global network data”, *Earth and Space Science* 9. Available at <https://doi.org/10.1029/2022EA002459>.

¹⁴ Formerly “Stratosphere-Troposphere Processes and Their Role in Climate”.

interconnected, the connection with GRUAN, one of the GCOS reference networks, is to be strengthened.

38. In addition to its role in protecting human health, fauna and flora, ozone plays an important role in the Earth's climate. It is therefore one of the 55 essential climate variables identified in the GCOS strategy. The work of the Advisory Committee for the Trust Fund thus falls within this strategy and, notably, within action B4 of the 2022 GCOS implementation plan ("expand surface and in situ monitoring of trace gas composition and aerosol properties"). Hence Trust Fund support for monitoring ozone and potentially controlled substances needs to be made more visible within GCOS (e.g. for the Atmospheric Observation Panel for Climate, established by the GCOS Steering Committee in recognition of the need for specific scientific and technical input concerning atmospheric observations for climate).

D. Exploring opportunities to leverage and catalyse the resources of the Trust Fund to safeguard necessary research and observation activities in line with its strategic plan

39. Owing to the limited resources available under the Trust Fund to date, the Advisory Committee has opted to focus its long-term strategy on measurements of ozone and surface UV. As is noted in section C above, the Committee has identified opportunities to leverage and catalyse the resources of the Trust Fund by working with other entities and programmes working with research and observation activities. These include NDACC, SHADOZ, GRUAN and WMO programmes such as GAW and the Global Greenhouse Gas Watch, which can potentially provide infrastructure- and personnel-sharing.

40. The involvement of Advisory Committee members in the governance of such programmes and networks has greatly facilitated the exchange of information on activities under the Trust Fund. The Committee will continue its work in this direction if the parties so wish.

41. Should adequate funds become available, the Committee could help in the development of controlled substance monitoring in line with its long-term strategy for the Trust Fund. The steering committee set up to implement a European Union-funded pilot project on regional quantification of emissions of substances controlled under the Montreal Protocol¹⁵ presented its approach to the Ozone Research Managers at their twelfth meeting, in April 2024, which was subsequently reflected in appropriate parts of the resulting recommendations, particularly those related to gaps in the atmospheric monitoring of controlled substances.

42. It is understood that the requirements for accurately monitoring gases controlled under the Montreal Protocol are very stringent because those chemicals are present in the atmosphere at abundances that are many thousands to millions of times lower than those of greenhouse gases and air pollutants, hence existing programmes for monitoring greenhouse gases and air pollutants need to be greatly modified to enable the monitoring of such gases. Yet it is clear that taking advantage of existing sites and projects could significantly reduce costs and allow faster action. Leveraging the resources of existing programmes, especially in-kind contributions, would be highly beneficial. Further, shared resources could help meet the data exchanging and archiving needs associated with controlled substance monitoring. In that regard, continued interactions with major networks monitoring controlled substances, such as the NOAA Halocarbons and other Atmospheric Trace Species programme and the NASA Advanced Global Atmospheric Gases Experiment programme, are essential to making meaningful measurements by placing observations on a common calibration standard, and for useful data analysis capabilities.

43. In addition to the actions mentioned above, the Committee continued to follow its guidelines for evaluation of submitted proposals, including emphasizing the need for activity cost-sharing and project sustainability guarantees on provision of seed money by the Trust Fund, which entails an ongoing commitment to submit data to WOUDC. Furthermore, the Committee tried to pair the needs of developing countries and countries with economies in transition with expertise in developed countries, and, through the Ozone Secretariat, operationalized relevant web pages on the Trust Fund and its activities.

44. The Chair of the Advisory Committee will make a presentation on the Committee's progress in implementing the relevant provisions of decision XII(II)/2 at the thirteenth meeting of the Conference of the Parties.

¹⁵ An outline of the project is available on the Ozone Secretariat website, at <https://ozone.unep.org/eu-funded-project-regional-quantification-emissions-substances-controlled-under-montreal-protocol>.

E. Expected action

45. At its thirteenth meeting, the Conference of the Parties is expected to consider the status of the Trust Fund and its activities, as well as the work of the Advisory Committee, including its implementation of the long-term strategy and short-term plan of action for the Trust Fund, and to take appropriate action.
