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Montreal Protocol on Substances that Deplete the Ozone Layer

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Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Forty-eighth meeting
Bangkok, 13–17 July 2026

Draft report of the forty-eighth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

I. Opening of the meeting

1. The forty-eighth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer was held at the United Nations Conference Centre, Bangkok, from 13 to 17 July 2026. The meeting was co-chaired by Annie Gabriel (Australia) and Igobe Mbuluwa (Botswana).

2. Ms. Mbuluwa opened the meeting at 10 a.m. on Monday, 13 July 2026. Opening statements were delivered by Dechen Tsering, Director, Regional Office for Asia and the Pacific, United Nations Environment Programme (UNEP), and Megumi Seki, Executive Secretary, Ozone Secretariat.

3. Welcoming participants, Ms. Tsering said that the Montreal Protocol remained one of the most successful multilateral environmental agreements in history. Through science-based policy-making, international solidarity and sustained financial and technical support, the parties had achieved extraordinary results in protecting the ozone layer while delivering significant climate benefits. The Protocol continued to demonstrate that multilateral cooperation could produce measurable and lasting outcomes for people and the planet.

4. She observed that several of the issues due for consideration would help to shape the future direction of the Protocol, displaying a parallel with the broader reform efforts currently under way across the United Nations system to strengthen the effectiveness, efficiency and impact of the organization. Both processes were guided by the common aim to preserve and strengthen successful institutions while adapting them to new realities. Although the Protocol faced many challenges, she was confident that the spirit of cooperation that had characterized the instrument throughout its history would continue to guide parties' deliberations during the current meeting.

5. In her statement, Ms. Seki recalled that, as previously notified, Leila Akello Gonasa of Uganda, who had been elected as Co-Chair of the Open-Ended Working Group, had been unable to attend the current meeting owing to travel restrictions. Following consultations with the group of African States and other parties operating under paragraph 1 of Article 5 (Article 5 parties), Uganda had nominated Ms. Mbulawa of Botswana to replace her.

6. Summarizing the items for discussion at the current meeting, she said that the meeting would be suspended on Tuesday, 14 July, to enable the Sixth Extraordinary Meeting of the Parties to convene in order to decide on the membership of the Implementation Committee. Given that two nominations had been received from among the Eastern European States, a vote might be necessary to decide which member was to be elected. Such a vote would represent the first time in the 40-year history of the Montreal Protocol that consensus among the parties could not be found. She expressed the hope that parties would continue to engage in informal consultations to seek compromise.

7. She drew attention to the report of the Technology and Economic Assessment Panel on the 2027–2029 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol, for which estimates ranged from $1.2 billion to $1.7 billion. She expressed the hope that the calculation tool developed by the Panel's task force, with support from the Secretariat, to facilitate the calculation of the replenishment based on various scenarios and assumptions would prove helpful in making the process more transparent and accessible to the parties.

8. On atmospheric monitoring, the Advisory Committee of the Vienna Convention Trust Fund for Research and Systematic Observation and the Secretariat had made progress in identifying suitable sites for the establishment of monitoring stations and had initiated informal consultations with the relevant parties. The Executive Committee of the Multilateral Fund and the Fund secretariat had advanced preparations for the implementation of pilot monitoring projects. To further support parties' efforts, the Ozone Secretariat was developing a practical cost estimation tool reflecting national circumstances, local market conditions, existing infrastructure and operational requirements, to generate more accurate and country-specific estimates.

9. On the viability of Montreal Protocol operations, as requested by the parties, the Secretariat had prepared a document on the options for making effective and efficient changes, with associated cost estimates. She highlighted the finding that if business continued as usual with an expenditure rate of 85 per cent, and if 75 per cent of contributions to the Montreal Protocol Trust Fund were received, cash balances would drop below the required level of the cash reserves by 2031, and the Secretariat would be unable to operate in support of the parties and the Montreal Protocol. It was to be hoped that parties would find ways to safeguard the operation and effectiveness of the ozone treaties.

10. Other issues on the agenda included the progress reports of the Technology and Economic Assessment Panel and its technical options committees, and an update from Rwanda on the status of preparations, their plans and vision for the Thirty-Eighth Meeting of the Parties, which would include a celebration of the tenth anniversary of the Kigali Amendment. She encouraged the remaining 25 parties which had not yet ratified the Kigali Amendment to do so to enable the anniversary to be celebrated with full global unity.

11. Subsequently, one representative, noting that he had asked for the floor on the issue of the appointment of Ms. Mbulawa to replace Ms. Gonasa, sought clarification of the appointment process. He observed that, in accordance with rule 26 of the rules of procedure, the Open-ended Working Group appointed its co-chairs; neither the Secretariat nor the individual originally elected could decide on a replacement. He said that, while he had no objection to Ms. Mbulawa's appointment, clarification of the procedure was important for the future.

12. Accordingly, the Open-ended Working Group elected Ms. Mbulawa to the position of Co-Chair of the Working Group.

II. Organizational matters

A. Attendance

13. The following parties to the Montreal Protocol were represented: [to be completed]

14. The following United Nations entities, organizations and specialized agencies were represented: [to be completed]

15. The following intergovernmental, non-governmental, industry, academic and other bodies were represented as observers: [to be completed]

B. Adoption of the agenda

16. Introducing the provisional agenda contained in document UNEP/OzL.Pro.WG.1/48/1, the Co-Chair invited representatives to propose any additional matters they might wish to discuss at the current meeting under sub-item 4 (e) "Any other issues" for those specific to the Technology and Economic Assessment Panel, or item 9, "Other matters".

17. One representative proposed the addition to item 4 (e) of discussion of the evaluation of a destruction technology his party had submitted to the Technology and Economic Assessment Panel.

18. A number of representatives requested the inclusion of an item to discuss the composition of the group of Eastern European States under item 9, observing that a conference room paper with a draft proposal would be submitted. Another representative, speaking on behalf of a group of parties,

expressed the view that the current meeting was not a suitable forum to discuss the issue and said that he would make that point when the topic was discussed later in the meeting.

19. Another representative requested the addition of an item to discuss the impact of nitrous oxide on the ozone layer, given that emissions of the substance were now equivalent to emissions of all controlled ozone-depleting substances put together. Although nitrous oxide had been listed in Annex I of the Vienna Convention, it was still not controlled under the Montreal Protocol. He said that he would be submitting a conference room paper containing a draft proposal requesting more information from the Scientific Assessment Panel and the Technology and Economic Assessment Panel to facilitate understanding of emissions and mitigation options.

20. Another representative requested the addition of an item on the implementation of paragraphs 2 and 4 of Article 2J of the Montreal Protocol in respect of Azerbaijan. An informal note prepared by Azerbaijan that was aimed at facilitating understanding of the proposal was set out in the annex to document UNEP/OzL.Pro.WG.1/48/2/Add.2.

21. The Working Group adopted the following agenda on the basis of the provisional agenda set out in document UNEP/OzL.Pro.WG.1/48/1:

1. Opening of the meeting.
2. Organizational matters:
    (a) Adoption of the agenda;
    (b) Organization of work.
3. Report of the Technology and Economic Assessment Panel on the 2027–2029 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol (decision XXXVII/6).
4. Presentations by the Technology and Economic Assessment Panel on its 2026 progress report and discussions on:
    (a) Halon 1301 and its continuing use in the aviation industry; management of other controlled substances used for fire suppression (decision XXXVII/4);
    (b) Metered-dose inhalers with low-global-warming-potential propellants (decision XXXVI/6);
    (c) Options for the organization of the Panel and its technical options committees (decision XXXV/20);
    (d) Changes in the membership of the Panel;
    (e) Any other issues.
5. Enhancing regional atmospheric monitoring of substances controlled by the Montreal Protocol (decision XXXVII/1).
6. Ensuring the viability of Montreal Protocol operations (decision XXXVII/7).
7. Further strengthening Montreal Protocol institutions (UNEP/OzL.Pro.37/9, para. 166).
8. Status of preparations for the Thirty-Eighth Meeting of the Parties, to be held in Kigali.
9. Other matters.
10. Adoption of the report of the meeting.
11. Closure of the meeting.

22. Under agenda sub-item 4 (e), “Any other issues”, the Working Group agreed to consider the evaluation of a destruction technology.

23. Under agenda item 9, “Other matters”, the Working Group agreed to consider three items: participation of the Central Asian States in the Group of Eastern European States; nitrous oxide; and the implementation of paragraphs 2 and 4 of Article 2J of the Montreal Protocol in respect of Azerbaijan.

C. Organization of work

24. The Working Group agreed to the organization of work proposed by the Co-Chair, namely to establish contact and informal groups as necessary and to avoid, to the extent possible, the holding of

contact or informal group meetings in parallel with each other or with plenary meetings. Morning plenary sessions would run from 10 a.m. to 1 p.m. and afternoon sessions from 3 to 6 p.m.

III. Report of the Technology and Economic Assessment Panel on the 2027–2029 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol (decision XXXVII/6)

25. Introducing the item, the Co-Chair recalled that, pursuant to decision XXXVII/6, the Technology and Economic Assessment Panel had established a task force to prepare a report on the funding requirements for the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2027–2029. The replenishment report had been available on the meeting portal since mid-May 2026. A summary of the task force report was set out in an addendum to the note by the Secretariat on issues for discussion by and information for the attention of the Open-ended Working Group of the Parties to the Montreal Protocol at its forty-eighth meeting (UNEP/OzL.Pro.WG.1/48/2/Add.1, paras. 4–21), while the full executive summary was set out in annex I thereto. Thanking the Panel and its task force for their hard work and dedication, she invited the task force to present its report.

1. Presentation

26. The report was presented by Bella Maranion and Suely Carvalho, co-chairs of the Technology and Economic Assessment Panel, Bassam Elassaad and Omar Abdelaziz, members of the task force. A summary of the presentation is set out in annex [--] to the present report, without formal editing.

2. Question-and-answer session

27. In the ensuing question-and-answer session, Ms. Carvalho and Mr. Abdelaziz recognized that a number of the issues considered important by representatives, such as the challenges encountered by low-volume-consuming countries, life-cycle refrigerant management and energy efficiency, had not been included in the task force's replenishment calculations. That omission was due to the fact that they had not featured in the terms of reference for the task force, which had stipulated the use a compliance model. Some issues that did not relate to compliance, such as digitalization, life-cycle refrigerant management and energy efficiency, had nevertheless been deemed important by the task force and had been addressed separately in the report. Project management costs had not been included in the calculation given the variation in approved amounts. Nothing precluded any of the above-mentioned issues being considered in the supplementary report if the Working Group so wished, and Ms. Maranion said that the task force would welcome guidance from parties on how to do that.

28. Under the compliance model, the task force had been required to follow the Executive Committee decisions that were related to the cost framework applied to low-volume-consuming countries. Although a review of the cost guidelines was foreseen for stage II of the Kigali hydrofluorocarbon (HFC) implementation plans in 2028, the task force had not attempted to forecast the changes that might be made and the impact that they might have. Ms. Carvalho said that, in its report, the task force had tried to show that the funding levels would not be sufficient for low-volume-consuming countries because the fixed costs and training costs accounted for the majority of the funding available. As a result, there was insufficient funding for other activities, such as demonstration projects or further capacity-building activities. One representative expressed his party's intention to submit a conference room paper on the matter of the increased costs faced by low-volume-consuming countries and the problems analysed in chapter 6 of the task force's report. Ms. Carvalho proposed a bilateral discussion with the representative who wished to know more about the consideration of vulnerability in the compliance model.

29. In following a compliance model, the task force had understood that it was supposed to calculate target reductions using the HFC baseline, including the hydrochlorofluorocarbon (HCFC) consumption component, rather than actual consumption. Ms. Carvalho and Ms. Maranion both said that the task force would appreciate guidance on how to take a different approach in the supplementary report.

30. In response to a concern that Article 5, group 1, parties would not have sufficient funding to carry out stage I of their Kigali implementation plans, Ms. Carvalho recalled that the task force had estimated the funding needed over the course of three trienniums. The proportion of that total funding allocated to each triennium could be adjusted upon request by the parties and with guidance as to how that was to be done.

31. The task force had used the figure of 15 per cent as the percentage deduction for ineligible, foreign-owned enterprises, as that was the figure that had been used in previous replenishment reports. The task force had consulted the Multilateral Fund secretariat with a view to finding a more appropriate percentage, but insufficient complete data had hindered the process. The Multilateral Fund secretariat considered 15 per cent to be a reasonable number for use as an assumption.

32. With regard to a query about the number of parties that had yet to ratify the Kigali Amendment, Ms. Carvalho said that, as at 8 April 2026, a total of 19 Article 5 parties had not yet ratified the instrument. She noted that the updated figure would be checked. In response to a request for more information about the ratification outlook for those parties, Ms. Maranian said that the task force might have been too optimistic in its projection that all parties would ratify the amendment by the end of the next triennium, making them eligible for funding. That projection could be reconsidered.

33. Regarding whether regional cooperation was better than individual support for certain groups, including low-volume-consuming countries, Mr. Elassaad explained that discussions on regional centres, regional testing centres or centres of excellence were ongoing in the Executive Committee. If there was anything to add on the subject, it would be included in the supplementary report.

34. Mr. Abdelaziz confirmed that training on safety and flammability issues related to certain alternatives to HFCs was included in the HCFC phase-out management plans and Kigali implementation plans when such alternatives were chosen by a party, and activities under those plans were taken into account in the compliance model.

35. With regard to the use of historical cost-effectiveness thresholds for the manufacturing sectors in one scenario and the use of cost-effectiveness thresholds through the HCFC cost guidelines in another scenario, the task force acknowledged that those two approaches might not have been sufficiently different and had elaborated on that matter in annex 2L to its report.

36. The task force had considered using HCFC cost-effectiveness figures as a proxy for HFC conversions, but had abandoned the idea, because available data, although limited, had shown higher costs for HFCs depending on the technology used. As the Executive Committee continued to fund more Kigali implementation plans, additional data would become available.

37. Regarding a suggestion that a different approach to cost-effectiveness be taken in relation to the largest-volume-consuming party, Ms. Carvalho said the task force did not have the resources needed to conduct research in large numbers of databases, so it had looked at publicly available documents. Using limited information, it had tried to establish a value that could be applied to all parties. Guidance would be required in the task force's terms of reference were it to be asked to take a different approach based on the actual funding received in recent years.

38. Mr. Elassaad, responding to a question about the application to stage II of the cost-effectiveness values used in stage I, said that the task force had not considered any other approach.

39. In response to a question about how the funding scenarios aligned with real-world disbursement schedules and parties' cash flow needs, Ms. Carvalho and Ms. Maranion both said that the task force had tried to link the methodology used in previous replenishment reports more closely to the project cycle, cash-flow requirements and the functioning of the Executive Committee, to make it more familiar to parties and thus easier to understand.

40. Ms. Maranion confirmed that members of the task force had attended the ninety-eighth meeting of the Executive Committee and were eager to update the task force analysis on the basis of the new developments.

41. In response to a question about the grouping of parties by the task force in the report in comparison with the approach in the report for the triennium 2024–2026, Ms. Maranion said that the task force considered the two approaches to be similar, namely the grouping of parties according to their consumption profiles.

42. Mr. Elassaad said that the task force had not considered certification, licensing, safety standards and access to appropriate tools and equipment as part of the training costs. The information on training had been extracted from Kigali implementation plans submitted to the Multilateral Fund secretariat. Where the project had included more than just training, the task force had tried to extract the information relating solely to training. The task force's approach could be improved in the supplementary report by breaking the information down further and including the other activities.

43. In response to a question about the discrepancy between the estimate of needs for the triennium 2027–2029 in the previous replenishment report and the estimate in the new replenishment report, Ms. Carvalho explained that the methodology used in the past had been different and only an indicative figure had been given for the triennium 2027–2029. Given that there was now a clear compliance period over three trienniums, the actual replenishment figure for the triennium 2027–2029 would depend on how parties wished to divide the total projected funding needs over the three cycles.

44. Other questions posed by individual representatives related to why there were not even more scenarios in the report; the accuracy of the HCFC cost estimates; why the task force had estimated additional HFC-23 by-product mitigation costs in two countries that did not have approved projects under the Multilateral Fund; and whether the task force had evaluated the methodology used for the new replenishment report, including through a comparison of the projected needs under the previous replenishment and the actual spending from the Multilateral Fund.

3. Discussion

45. In the ensuing discussion, many representatives acknowledged with appreciation the efforts of the Panel and its replenishment task force in preparing the report on the upcoming replenishment. Most affirmed that the purpose of replenishment was to ensure full compliance with the Montreal Protocol and the Kigali Amendment, and several recognized the central role played by the Multilateral Fund in the Protocol's success to date.

46. Many representatives reaffirmed their commitment to supporting the Multilateral Fund as an integral part of the Montreal Protocol that supported Article 5 parties in meeting their compliance targets, including under the Kigali Amendment. One representative, speaking on behalf of a group of parties, nevertheless recalled that funding under the Multilateral Fund was intended for compliance-related activities, while another reiterated that statement, adding that his country also supported providing funding from the Multilateral Fund to help Article 5 parties to address issues that were related to, but not strictly needed for, compliance, where there was agreement from the parties and the Executive Committee to address such issues.

47. Many representatives, including one speaking on behalf of a group of parties, raised concerns regarding the methodologies used by the replenishment task force in estimating the funding required for the triennium 2027–2029. While they all expressed agreement that the replenishment level should reflect the actual needs of Article 5 parties, their views on the accuracy of the estimates diverged.

48. Some representatives said that the range of estimates significantly exceeded any realistic amount. Noting the importance of a pragmatic approach in ensuring the credibility of the Multilateral Fund, they underscored the need for additional analysis, in particular to include scenarios that were based on actual consumption levels of controlled substances by Article 5 parties rather than the maximum allowable consumption levels, which tended to be much higher. Several representatives, including one speaking on behalf of a group of parties, recommended that the task force use the data in the Kigali implementation plans to improve the accuracy of its HFC consumption estimates, and several others recommended applying the Multilateral Fund's experience and knowledge of transitioning to lower global-warming-potential (GWP) alternatives in all key manufacturing sectors. One representative pointed out that it was unrealistic to assume that the HFC phase-down could be achieved sooner than required under the Kigali Amendment given the length of time needed to draft and approve Kigali implementation plans. Some representatives also noted the importance of considering cost-effectiveness values.

49. Several representatives, including one speaking on behalf of a group of parties, stressed their desire to avoid a repeat of the triennium 2024–2026 replenishment, which in the end had far exceeded the amount actually requested. One pointed out that realistic estimates were especially important at a time of national budget constraints, and another suggested that replenishment estimates had been more accurate in the past and advocated a return to that greater accuracy. One representative stressed that a pragmatic approach was not an attempt to limit the ambition of the Multilateral Fund but rather to ensure support for all parties that was credible, sustainable, transparent and fit for purpose.

50. Many representatives voiced the concern that the replenishment estimates failed to account for all the challenges that they would face in attempting to comply with their commitments. A number of them recalled that the 2027–2029 replenishment period was one in which the completion of HCFC phase-out activities would run concurrently with the implementation of the Kigali Amendment. One representative also drew attention to the concurrent implementation challenges presented by the global backdrop of geopolitical instability, supply chain disruptions and rising manufacturing and transportation costs. Many representatives stressed their countries' need for adequate, sustainable and predictable funding. Digital technologies, life-cycle refrigerant management, institutional

strengthening and capacity-building were all flagged by several representatives as important elements to be accounted for in the funding estimates, as was the strengthening of the services sector, including technician training and certification. One representative recalled that the replenishment estimate was calculated as a global figure and recommended that parties avoid focusing too much on minutiae.

51. A number of representatives, including one speaking on behalf of a group of parties, highlighted elements that they hoped to see addressed in the supplementary report to be prepared by the task force. Their suggestions included additional scenarios based on actual HFC and HCFC consumption; a comparison between the average funding rate received by each Article 5, group 1, party in the past five years and the funding estimates in the report; funding to address the disproportionate burden of low-volume-consuming and very low-volume-consuming countries; and specific funding provisions for digitalization and refrigerant life-cycle management.

52. A number of representatives welcomed the recognition in the report of the disproportionate burden borne by low-volume-consuming and very low-volume-consuming countries owing to the fixed cost of system-building activities, although several noted that the current funding model failed to take that additional burden into account. One representative, adding that such countries were further disadvantaged by the reluctance of suppliers to supply small quantities of equipment that used alternative refrigerants, said that his delegation intended to submit a conference room paper on the matter at the Thirty-Eighth Meeting of the Parties requesting the Executive Committee to incorporate the conclusions in chapter 6 of the replenishment task force report into the 2028 review of the cost guidelines. His delegation had also prepared a document for consideration by the Executive Committee at its 100th meeting, in June 2027, to support further discussion of the matter.

53. One representative, speaking on behalf of a group of parties and echoed by another representative, recalled that, pursuant to Article 10, paragraph 6, of the Montreal Protocol, the Multilateral Fund was to be financed by contributions from parties not operating under paragraph 1 of Article 5 (non-Article 5 parties) and contributions by other parties were to be encouraged. Another representative urged parties in a position to do so to contribute to the Fund.

54. Many representatives who spoke expressed their willingness to discuss the matter further in a contact group. Elements proposed by representatives for further discussion included the assumptions underlying the estimates; the proposed resource allocations; additional scenarios; large cost estimates in situations where consumption was far below the allowable level; the proposed deferral of funding for Article 5, group 2, parties; the lack of specific funding provision for digital technologies, refrigerant life-cycle management and project management units; the reliance on conservative assumptions; and the use of a uniform 15 per cent discount assumption.

55. The Working Group agreed to establish a contact group, to be co-chaired by Miruza Mohamed (Maldives) and Ralph Brieskorn (Kingdom of the Netherlands), to develop additional guidance to the Panel for its supplementary report on the funding requirement for the replenishment of the Multilateral Fund for the period 2027–2029.

56. [to be completed]

IV. Presentations by the Technology and Economic Assessment Panel on its 2026 progress report and discussions on

57. Introducing the item, the Co-Chair drew attention to volume 1 of the Technology and Economic Assessment Panel 2026 progress report and to the summaries of the issues set out in the note by the Secretariat on issues for discussion by and information for the attention of the Open-ended Working Group of the Parties to the Montreal Protocol at its forty-eighth meeting (UNEP/OzL.Pro.WG.1/48/2, paras. 10–25) and an addendum thereto (UNEP/OzL.Pro.WG.1/48/2/Add.1, paras. 22–82 and annexes II–IV).

1. Presentation

58. Following an introduction by Marta Pizano, co-chair of the Panel, members of the Panel and its technical options committees summarized the findings of the Panel's 2026 progress report, including its responses to relevant decisions of the Meeting of the Parties, as follows: Dan Verdonik – Fire Suppression Technical Options Committee; Helen Walter-Terrinoni – Flexible and Rigid Foams Technical Options Committee; Ian Porter – Methyl Bromide Technical Options Committee; Helen Tope – Medical and Chemicals Technical Options Committee; Rajan Rajendran – Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee. Ashley Woodcock, co-chair of the Panel, then summarized findings on PFAS, and Ms. Pizano summarized procedural and organizational challenges facing the Panel and also presented the Panel's preferred options for the future organization

of its technical options committees. A summary of the presentation is set out in annex [--] to the present report, without formal editing.

2. Question-and-answer session

59. In the ensuing question-and-answer session, many representatives had specific questions on the presentation.

60. All the representatives who spoke thanked the Technology and Economic Assessment Panel and its technical options committees for their work.

61. Responding to questions to the Flexible and Rigid Foams Technical Options Committee, Ms. Walter-Terrinoni said that good progress had been made in the range of alternative foam-blowing agents available, although it was worth noting that the situation was not identical for all parties. There had been no recent changes in the types of chemicals used in the alternatives but changes had been seen in the blends being used, including the addition of water and carbon dioxide in efforts to reduce costs.

62. There had been an increase in the production and availability of alternative foam-blowing agents with low GWP, although she recognized that some countries might currently only have access to a single supplier of such alternatives, and more detail would be provided in future reports in that regard.

63. The Committee was continuing to monitor the discrepancy between the modelled and observed data on HCFC-141b. The hypotheses for the discrepancy included changing uses for the chemical, possibly as an equipment cleaner or a solvent, its use in more emissive types of foam, or an increase in production or emission levels that was not yet understood.

64. With regard to alternatives to HCFC-141b, given that supply of the chemical was due to cease in 2026 apart from that from existing stockpiles, she noted that some use of HFC-254fa had been recorded but overall there had been a move away from the use of HCFCs.

65. With regard to the use of foam-blowing agents for insulation, while it was true that the thermal properties of alternatives to HCFCs were not as good as those of HCFCs, that could be rectified in some cases by using a thicker layer of the agent. The lack of thermal properties should also be considered a trade-off against other advantages, which included cost-effectiveness.

66. A representative speaking on behalf of a group of parties said that those parties, for example, used policies on indirect emissions, such as eco-design and labelling, to counteract any effects there might be if direct emissions were being reduced.

67. He clarified that the ban in the European Union from 2033 onwards on fluorinated gas (F-gas) blowing agents, apart from where required for safety reasons, was not just a potential ban, as had been stated in section 2.2.3 of volume 1 of the progress report, but was in fact already enshrined in legislation.

68. He also asked the Panel to clarify how existing regulatory measures were reflected in future technology pathways and market transition in the foam sector.

69. In response to a question on pre-blended polyols containing HFCs, Ms. Walter-Terrinoni said that those substances were considered as a distinct group by the Committee but that there were limited amounts of import and export data available, given that the reporting of those substances was not required under Article 7 of the Montreal Protocol. It was therefore possible that the volume of trade in the substances was being under-reported. She added that the Committee also considered other information on the substances, such as cost.

70. Responding to questions to the Fire Suppression Technical Options Committee, Adam Chattaway confirmed that a single type certificate for the fire suppression system in aircraft could remain in place, effectively, for up to 50 years; although aircraft manufacturers would typically create variants of the original design, they would all still be covered by the same certificate. Under its resolution A42-11 on halon replacement, the International Civil Aviation Organization (ICAO) required alternatives to halon 1301 in cargo compartments to be used in completely new aircraft designs submitted after 2024 but, to the best knowledge of the Committee, no new type certificates had been issued since 2024.

71. In response to queries from several representatives, Mr. Chattaway clarified that the maps of Europe showing the location of maintenance, repair and overhaul entities of the aviation industry and of hotspots of halon 1301 emissions had been included in the Committee’s presentation as an example of the analysis that could be carried out with sufficient real-time data on emissions. The Committee

had been able to compile the map of hotspots in Europe thanks to emissions data provided by the University of Bristol and was working with the Scientific Assessment Panel and other bodies to obtain the relevant data from other regions. With more accurate regional monitoring of halon emissions, it would also be possible to link those emissions to a specific industry or sector activity. He noted, however, that the data were not straightforward to obtain and would not be available in time for the Committee's next progress report.

72. Responding to a question on the fire suppression options available for data centres, he said that the Committee could only provide an overview, as the detailed information was the proprietary information of the suppression companies. HFCs, most commonly HFC-227ea and HFC-124, and the fluoroketone FK-5-1-12 were still used, and it was likely that inert gas systems were also used, in particular in Europe.

73. In response to a question on halon destruction methodologies, he said that the Committee was not aware of any new projects in that regard in 2026 under the American Carbon Registry. He also noted that halon could be reprocessed with purification specifications as low as 90 per cent, depending on the nature of the contaminants present. If those contaminants had a significantly different boiling point than that of halon, they could easily be separated through fractional distillation.

74. Mr. Verdonik responded to a question on the run-out date scenarios for halon 1301 set out in table 3.5 of the progress report by clarifying that the scenarios were based on information provided by ICAO on 2025 figures for the amount of halon 1301 currently installed on aircraft and on anticipated growth rates for the global fleet. The Committee had then applied other variables, including consideration of sectors other than aviation. Some data gaps remained, as did some uncertainty over the calculation of estimated future emission rates, but the Committee intended to develop the scenarios further in its upcoming quadrennial assessment report, including by incorporating a scenario that would take into account the phase-out of halon 1301 use in aviation in the European Union.

75. In response to a question on 3,3,3-trifluro-2-bromo-propene (2-BTP) as an alternative to halon 1301 on aircraft, he said that if the use of 2-BTP was approved for new and retrofitted aircraft types, that would make more halon 1301 available to support the needs of existing aircraft and ensure their airworthiness under ICAO rules. The Committee's understanding was, however, that the aviation industry and ICAO were unwilling to commit to 2-BTP as an alternative, given the need for long-term viability in the aviation industry, even if government and environmental bodies approved 2-BTP for use. The aviation industry was focused on reducing aircraft emissions rather than on exploring alternatives to halon 1301 and he therefore underscored the crucial importance of improved emissions monitoring data for halon 1301.

76. He noted that the progress report incorrectly stated that the blend of 2-BTP and carbon dioxide had been approved under the Significant New Alternatives Policy of the United States of America and that the regulatory process was ongoing.

77. Regarding the issue of the uneven distribution of halon 1301 banks globally, he recalled that the issue had been raised in many of the Committee's reports but that the possibility of further analysis thereof was hampered by the lack of data disaggregated to the regional or country levels. There were companies that specialized in the reprocessing and sale of halon 1301 at the international level but there could be issues relating to transboundary movements of halon 1301 under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and under local regulations.

78. Responding to a question to the Methyl Bromide Technical Options Committee on non-chemical and emerging chemical alternatives for pest control, given the strict health and safety restrictions in some countries on alternatives such as sulfuryl fluoride and phosphine, Ms. Pizano said that, although the selection of a suitable alternative depended heavily on the pest involved and the specific circumstances of the application, effective non-chemical alternatives included heat or cold treatment and irradiation. The Committee would be happy to provide specific information to parties upon request.

79. With regard to the significant sharp decline in methyl bromide consumption in New Zealand, Mr. Porter noted that it had been achieved through the application of emissions policies at the national level, under which a stepwise approach was being taken to reduce emissions to close to zero by 2032. In order to achieve the targets, industries in New Zealand had implemented recapture processes for a range of emissions which had, in turn, reduced emissions of methyl bromide into the atmosphere.

80. In response to a question regarding the separation of quarantine and pre-shipment uses of methyl bromide, he highlighted the distinction between the requirements for exotic and common, or domestic, pests. Quarantine uses were generally for exotic pests that were not present, requiring a very

high level of disease control, as close as possible to 100 per cent. Pre-shipment uses were for common pests, hygiene and generally for commodities leaving a country and did not require the same level of disease control, therefore a wider range of alternatives to methyl bromide could be used. The Committee estimated that, by differentiating between the two uses and using a wider range of alternatives for pre-shipment, parties could reduce methyl bromide use by approximately 3,000 tons annually.

81. Responding to a question on controlled uses, he said that extensive surveys carried out by the Committee had shown that the controlled use of methyl bromide continued to take place in certain countries.

82. Responding to a question to the Medical and Chemicals Technical Options Committee, Ms. Tope explained that, while not appearing in the progress report, emissions estimates for feedstocks would be found in the quadrennial assessment report submitted later in the year. Responding to another query, she said that the 3.6 per cent feedstock emission factor reported in a recent paper had originally been developed by the Panel for its 2022 assessment report and repeated in its 2024 progress report. That figure was the Panel's estimate of a mean most likely emission factor from production feedstock use and distribution emissions. The 0.5 per cent emission factor estimated in the early 1990s had been the Panel's best estimate of emissions based on facilities primarily in the United States of America and the European Union. She recommended that any questions on the impact of such emissions on the ozone layer be directed to the Scientific Assessment Panel.

83. Asked how many facilities currently used the new steam plasma arc destruction technology, she indicated that it was difficult to tell based on the information provided. The technology was patented but not clearly in use, and might just be an emerging technology, not yet in commercial use. As to whether it could be recommended for approval for other categories of controlled substances, she said that the submission indicated that tests had been done on 90 different compounds but did not specify which compounds. The Panel could do a further evaluation of the technology if more information became available.

84. Addressing questions regarding inhalers, she noted that the progress report provided an overview of barriers for Article 5 parties and barriers arising from the regulatory impact on propellant availability and the potential impact of the HFC phase-down schedule on continuity of supply of **HFC-**134a and HFC-227ea, the current propellants in metered-dose inhalers. The 2026 quadrennial assessment report would have a more detailed assessment of the challenges and barriers as well as certain issues for Article 5 parties, including technology transfer. In terms of the pace of change, the transition was still in its early stages and it was difficult to say how the challenges might play out over time. For the moment, the Panel was indicating risk areas, which related to whether the pace of transition would match the phase-down schedule under the Kigali Amendment and whether an adequate supply of alternatives would be available. She recommended that parties use that information to make their stakeholders aware of the risks in order to smooth the way for transition and prevent the risks from materializing. In terms of the uptake of dry powder inhalers, the different rates among regions related to some degree to affordability; dry powder inhalers were not very accessible or affordable in many parts of the world, creating a barrier to adoption in Article 5 parties. In addition, dry powder inhalers were suitable for many patients but not all, such as very young or very old patients with poor inspiratory flow.

85. Mr. Zhang, responding to a question about feedstock use of HCFC-22, confirmed that the substance accounted for about 50 per cent of feedstock used. Its use had grown owing to increased demand for tetrafluoroethylene (TFE) but especially for hexafluoropropylene (HFP), which was a feedstock for HFO-1234yf as well as for the perfluororketone, a fire-fighting agent. HFP was also increasingly use as a heat transfer fluid in the data centres.

86. Responding to a question to the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee regarding capacities associated with the transition of air-conditioning and heat pump systems to HFC-32 and R-454B, Mr. Abdelaziz said that, according to the information available, there were capacities in the 5–15 ton range for conventional designs but not necessarily for high ambient temperature environments. The Panel had no evidence regarding whether system capacity degraded at high ambient temperatures of 46–48 degrees Celsius but was aware that the performance of HFC-32 and R-454B was better than that of R-410A at elevated temperatures. On the related question of the impact of refrigerant charge limits, room size limits and leak detectors and the impact on using ducted split and other air-conditioning systems in the range of 5–15 tons, he said that there would be limitations on using A3 refrigerants but the evidence showed no problems using A2N refrigerants, especially at the lower end of the range.

87. Addressing concerns raised in relation to the discussion in chapter 6 of the report, on low-volume-consuming and very low-volume-consuming countries, Mr. Abdelaziz assured parties that such countries were an important part of the Montreal Protocol family, and that the upcoming Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee assessment report on servicing would contain a dedicated chapter on their requirements. With regard to the implementation of decision XXXVII/3, on a study on quantities of and options for used and unwanted controlled substances under the Montreal Protocol, including those at their end of life, and how the Panel would assess whether destruction and reclamation facilities were accessible to low-volume-consuming and very-low-volume-consuming countries, Mr. Abdelaziz referred to chapter 8 of the replenishment task force report, which contained a cost estimate of $50,000 for a transboundary shipment of unwanted substances.

88. In response to a request, Mr. Abdelaziz provided additional information on the seven new refrigerant blends listed in table 6.1 of the progress report, saying that they had just recently been approved under American Society of Heating, Refrigerating and Air-Conditioning Engineers standard 34 or International Standards Organization standard 817 and that companies were just starting to find ways to use them in products. The Panel was not yet aware of their use by any companies or in any products. One of the refrigerant blends, R-496A, which contained perfluorocarbons R-14 and R-116, was designed to have a very low bubble point temperature and could be used for ultra-low temperature refrigeration applications. Responding to another query, he said that some 149 counties had minimum energy performance standards or labelling for air conditioning and about 135 countries had one or the other for domestic refrigeration.

89. Mr. Peixoto responded to a question about the impact of vehicle electrification on mobile air conditioning, noting that the issue had evolved from mobile air conditioning to thermal load management. New refrigerants, new systems and new technologies were being evaluated, opening up an opportunity to reposition CO_2, which was a very good refrigerant for heat pumps, an important consideration for electric vehicles that lacked engine gas for heating. For hybrid systems, propane using another indirect refrigerant was also being tested as a promising alternative. The quadrennial assessment report would contain a very detailed section addressing vehicle electrification.

90. Turning to questions related to life cycle refrigerant management, Mr. Peixoto referred representatives to the Medical and Chemicals Technical Options Committee and its sections in the progress and assessment reports on recovery, recycling, reclamation and destruction for more information on destruction technologies and alternatives. Beyond that, servicing training was very important for the refrigerant transition, emissions reduction and energy efficiency, and the Panel had decided to include a chapter with an in-depth discussion on the challenges, barriers and alternatives associated with servicing. Recovery, recycling and reclamation had been a major challenge since the time of chlorofluorocarbons, and there were many barriers, not only in developing countries and all small island developing States, but also in countries with more organized sectors. Financial, technical and logistical aspects had to be considered, and while climate change had recently become another driving force for life cycle refrigerant management, it remained a significant challenge for all countries.

91. Also responding to a number of questions, Mr. Rajendran began by acknowledging that, given that no single refrigerant met all the requirements for such aspects as safety, costs, climate, efficiency and environmental effects, equipment and refrigerant manufacturers were constantly faced with the question of how to prioritize trade-offs when selecting refrigerants. Clearly, a refrigerant had to deliver the desired cooling capacity, but after that, the other variables to be considered depended on the application. The Panel did not make any recommendations as to how that consideration should be tackled. Moving to a question on the growing use of carbon dioxide in large systems and propane in small systems and monoblock heat pumps and the key factors enabling that growth, he noted that carbon dioxide was clearly cost-effective in delivering the desired performance in large systems. In addition, the size factor was slowly decreasing and could be expected to eventually be much better than it was currently. Propane delivered very good performance but its use was limited by the amount of refrigerant charge allowed under the various safety standards. Small systems using propane were almost always factory charged and leak tested and shipped out pre-charged, a key factor in their acceptability.

92. Asked what effect the growth of data centres might be having on refrigerant demand, Mr. Rajendran acknowledged that while demand would clearly increase, a lot of research was being done on new ways of cooling data centres. Low-GWP refrigerants such as R-1234ze and R-1233ze tended to be used in data centres in traditional cooling technologies. The quadrennial assessment report would contain an entire chapter on data centres. As a final note, he observed that that the impact of the refrigerants themselves was apt to be miniscule compared to the energy impact of data centres.

93. [to be completed]

A. Halon 1301 and its continuing use in the aviation industry; management of other controlled substances used for fire suppression (decision XXXVII/4)

94. [to be completed]

B. Metered-dose inhalers with low-global-warming-potential propellants (decision XXXVI/6)

95. [to be completed]

C. Options for the organization of the Panel and its technical options committees (decision XXXV/20)

96. [to be completed]

D. Changes in the membership of the Panel

97. [to be completed]

E. Any other issues

98. [to be completed]

V. Enhancing regional atmospheric monitoring of substances controlled by the Montreal Protocol (decision XXXVII/1)

99. [to be completed]

VI. Ensuring the viability of Montreal Protocol operations (decision XXXVII/7)

100. Introducing the item, the Co-Chair recalled that, in decision XXXVII/7, the Thirty-Seventh Meeting of the Parties had requested the Ozone Secretariat to prepare a report, for consideration by the Open-ended Working Group at its forty-eighth meeting, on the options for making effective and efficient changes, with associated cost estimates, to the timing of, Ozone Secretariat support for and length of the Meetings of the Parties and meetings of the Open-ended Working Group, the Implementation Committee and the assessment panels, and the timing of replenishment decisions. The report was set out in documents UNEP/OzL.Pro.WG.1/48/4 and UNEP/OzL.Pro.WG.1/48/4/Add.1.

101. In the ensuing discussion, one representative said that he would have expected a brief presentation of the documents by the Secretariat to orient the discussion, but noted that it was not essential. He pointed out that the addendum to the document had only been issued on 9 July 2026, and said that he therefore required more time to consider it in detail.

102. Many representatives took the floor to thank the Secretariat for the report, stressing their agreement that the Montreal Protocol system should work as efficiently as possible. Several recalled that the Montreal Protocol was often cited as the most effective environmental treaty in history, and some said that its success was a direct result of its time-tested, inclusive and highly interactive institutional mechanisms. On that basis, some representatives asked why changes to the current processes were being considered, and why the Montreal Protocol would look at the processes of other multilateral environmental agreements to learn about best practice, as had been suggested by a representative speaking on behalf of a group of parties.

103. All the representatives who spoke said that any agreed changes should preserve the effectiveness, transparency and inclusive participation of all parties and should not compromise the success of the Protocol. Some representatives said that, as the Protocol had been operating the same way for several decades, it was time to review the processes with the aim of enhancing efficiency while maintaining or strengthening the Protocol’s impact, to adapt to changing circumstances and to ensure that the system remained fit for purpose. Several representatives said that the question of how to ensure the viability of the Protocol’s operations was timely, given the reduction of the cash reserves

over recent years, the general funding uncertainties and the ongoing United Nations reforms, including the UN80 Initiative.

104. On the issue of the formal format of meetings, many representatives said that, while online and hybrid formats offered financial savings, they created barriers to the participation of Article 5 parties, as had become apparent during the coronavirus disease pandemic. Unreliable connectivity and time-zone differences made meeting participation difficult. Furthermore, sensitive negotiations were difficult to conduct online; informal consultations in the margins of meetings were key to building consensus. As for the meetings of the Open-ended Working Group, that was where all the technical issues were explored in depth, delegations exchanged experiences and regional groups coordinated their positions to build common ground before decisions were taken by consensus at the Meeting of the Parties. A number of representatives expressed their agreement regarding the importance of in-person contact for certain issues but said that hybrid formats were well adapted to information-sharing objectives.

105. Several representatives stressed the need to address the issue of insufficient contributions, with one noting that, even with drastic operational cuts, the Trust Fund balances continued to be at risk if the contributions received remained at 70 per cent of what was needed. He said that structural alterations to Montreal Protocol operations should not be viewed as a substitute for addressing the problem of insufficient contributions. Several representatives, including one speaking on behalf of a group of parties, underscored the importance of all parties meeting their financial obligations, with one asking parties to consider increasing their contributions. Another representative supported the Secretariat proposal that contributions by parties should match the budget in any given year. One representative pointed out that the assumption used by the Secretariat that about 75 per cent of contributions would be received offered no guarantee. Future income was extremely difficult to predict. Another member said that the reduction of the cash reserve had occurred for several reasons: parties had decided to keep contributions at the same rate and draw down on the cash reserve to cover the difference between the budget and contributions; some parties had not made the required contributions to the Montreal Protocol and the Vienna Convention Trust Funds; and there was a willingness to use the cash reserve for extra activities in addition to activities funded through the regular budgets.

106. Regarding the frequency of meetings, several representatives said that they did not agree with the proposal to move to a biennial cycle for the Meetings of the Parties. Several representatives, including one speaking on behalf of a group of parties, said there was significant ongoing work or issues still to address, including the implementation of the Kigal Amendment, replenishment-related negotiations, consideration of the reports and recommendations of the assessment panels, illegal trade issues, atmospheric monitoring, ongoing emissions and new emerging issues. Furthermore, an extension of the interval between Meetings of the Parties could lead to a backlog of work on critical issues and risked creating delays in efforts to address urgent, time-sensitive compliance matters through the Implementation Committee. Another member noted that one or two years was not enough time to consider the impact of some of the decisions taken. Some representatives expressed the view that less frequent Meetings of the Parties could lead to more extraordinary Meetings of the Parties being held for the purpose of taking urgent decisions, which would increase the uncertainty of the financial situation. Another representative pointed out that meeting less frequently would have a positive impact from an environmental perspective by reducing travel.

107. Concerning the proposed changes to the Multilateral Fund and assessment panel cycles, some representatives highlighted the need to prioritize ensuring that the funding needs of Article 5 parties were assessed accurately and met without disruption and that access to up-to-date technical and scientific information for decision-making was not limited. The panels' reports provided early warning about the needs of Article 5 parties.

108. Many parties highlighted the importance of finding out more about the various options put forward, perhaps through discussions in a contact group and through further discussions with the Secretariat, and of making full use of the current meeting as an opportunity to explore ideas, ask questions and ensure that the full range of benefits, the related costs and the unintended consequences were properly understood. They expressed the view that the Secretariat's paper and the proposals made during the plenary discussion were a good basis for further discussions in a contact group.

109. One representative, supported by another said that, while there were many interesting ideas in the Secretariat's proposed scenarios, he saw them as individual measures for consideration rather than packages, and was unable to lend his support entirely to scenario B or C as they stood in the document.

110. Several representatives mentioned elements that they would like to consider further. Those included less frequent replenishments of the Multilateral Fund, possibly every four years; less frequent Meetings of the Parties; shorter meetings of the Open-ended Working Group; a reduction in the costs and therefore increased efficiency of meetings of the assessment panels, the technical options committees of the Technology and Economic Assessment Panel and the Implementation Committee; a reduction in the workload of the assessment panels, including the issuance of assessment panel progress reports every other year; a reduction in publications, streamlined documentation and greater use of digital document management; improved use of hybrid tools, but not to replace negotiation processes; and the minimization of some travel-related costs, provided that such measures did not undermine participation. One representative said that, should any adjustment be agreed, it should be done on a trial basis, allowing parties to evaluate the impact.

111. Another representative said that it could be useful to conduct a technical and legal review of the financial rules of the Montreal Protocol to see whether they continued to provide the most appropriate framework for addressing the identified financial risks. He also proposed requesting the Secretariat to draw up technical input on possible elements for review within the financial rules, or possible updates to the rules, in line with the operational and budgetary scenarios in its report, without prejudice to the outcome of future discussions.

112. The Open-ended Working Group agreed to establish a contact group, to be co-chaired by Alessandro Peru (Italy) and Sergio Merino (Mexico), to discuss in more depth documents UNEP/OzL.Pro.WG.1/48/4 and UNEP/OzL.Pro.WG.1/48/4/Add.1 and the proposals made during plenary discussions.

113. [to be completed]

VII. Further strengthening Montreal Protocol institutions (UNEP/OzL.Pro.37/9, para. 166)

114. [to be completed]

VIII. Status of preparations for the Thirty-Eighth Meeting of the Parties, to be held in Kigali

115. [to be completed]

IX. Other matters

116. [to be completed]

X. Adoption of the report of the meeting

117. [to be completed]

XI. Closure of the meeting

118. [to be completed]