

**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-sixth meeting  
Montreal, Canada, 8–12 July 2024**

**Draft report of the forty-sixth 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-sixth 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 International Civil Aviation Organization (ICAO), Montreal, Canada, from 8 to 12 July 2024. The meeting was co-chaired by Miruza Mohamed (Maldives) and Ralph Brieskorn (Kingdom of the Netherlands).
2. Ms. Mohamed opened the meeting at 10 a.m. on Monday, 8 July 2024. An opening statement was delivered by Megumi Seki, Executive Secretary, Ozone Secretariat.
3. Welcoming participants, Ms. Seki invited participants to observe a minute of silence in memory of Patrick McInerney (Australia) and Jacques Monlollamon Glai (Côte d'Ivoire), both of whom had died in recent months. Ms. Seki said that Mr. McInerney had been an experienced negotiator, always calm and reliable, and full of warmth and wit. He had always built consensus and drawn up constructive solutions. His personality and leadership had been instrumental in securing the adoption of the Kigali Amendment in 2016. Mr. Glai, who had headed the national ozone office in his country, had been responsible for organizing the recent regional meeting of the network of national ozone officers from African countries and had been due to travel to attend the current meeting. She described him as humble, discreet and hardworking, and a friend to many.
4. Turning to the work of the Montreal Protocol, Ms. Seki said that the Secretariat was increasing its efforts to raise the profile of the Protocol and seek synergies with relevant organizations. At the twenty-eighth meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change, the Secretariat had showcased the impact of the Protocol on climate mitigation efforts, including at the “Advancing climate action” pavilion, which had been run by the Secretariat in collaboration with 15 partners. The pavilion had hosted a variety of side events, including a high-level ministerial dialogue, and had demonstrated the use of R-290-powered freezers. The Secretariat had also developed a website and an application entitled “Avoided CO<sub>2</sub>e”.
5. Synergies between the Montreal Protocol and other multilateral environmental agreements, along with the achievements of the Protocol, had also been highlighted at the sixth session of the United Nations Environment Assembly. Experts from the assessment panels were providing expertise for ongoing multilateral processes such as the negotiations on a future plastics treaty and discussions on biodiversity. The Secretariat had been active in preparations for negotiations on creating a science-policy panel on chemicals, waste and pollution, had shared experiences of relevance with the Kunming-Montreal Global Biodiversity Framework and had collaborated further with Secretariat of the Basel, Rotterdam and Stockholm conventions on the topics of illegal trade, the transboundary movement of waste and the disposal of refrigerants and equipment.

6. Ms. Seki highlighted a number of key issues to be addressed at the current meeting in response to decisions taken by the Thirty-Fifth Meeting of the Parties, including life-cycle refrigerant management and a report thereon prepared by the Technology and Economic Assessment Panel. She drew attention to a workshop on fluorocarbon banks inventories, held the previous day by the Climate and Clean Air Coalition, describing the issue as of particular importance given that the management of banks was integral to life-cycle refrigerant management. She expressed the desire to build on the outcomes of the inventory workshop at a workshop on life-cycle refrigerant management to be convened by the Secretariat in October 2024. With regard to the atmospheric monitoring of controlled substances, the Working Group would consider a report on the costs of establishing monitoring stations and sustainable funding options for such monitoring stations. Other issues on the agenda resulting from the Thirty-Fifth Meeting of the Parties included very short-lived substances, feedstock uses of controlled substances, carbon tetrachloride emissions, energy efficiency, funding support for countries affected by the coronavirus disease (COVID-19) pandemic and options for amending form 3 to support reporting on HFC-23.

7. Ms. Seki welcomed Pablo Moscoso de la Cuba to the post of Senior Legal Officer within the Secretariat.

## **II. Organizational matters**

### **A. Attendance**

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

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

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

### **B. Adoption of the agenda**

11. The Working Group adopted the following agenda on the basis of the provisional agenda set out in document UNEP/OzL.Pro.WG.1/46/1/Rev.1:

1. Opening of the meeting.
2. Organizational matters:
  - (a) Adoption of the agenda;
  - (b) Organization of work.
3. Presentations by the Technology and Economic Assessment Panel and the Scientific Assessment Panel and discussions on:
  - (a) Very short-lived substances (decision XXXV/6);
  - (b) Feedstock uses of controlled substances (decision XXXV/8);
  - (c) Emissions of carbon tetrachloride (decision XXXV/9).
4. Life-cycle refrigerant management (decision XXXV/11).
5. Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol (decision XXXV/14).
6. Presentation of the Technology and Economic Assessment Panel 2024 progress report and discussions on:
  - (a) Nominations for critical-use exemptions for methyl bromide for 2025;
  - (b) Energy efficiency (decision XXXV/10);
  - (c) Panel membership changes;
  - (d) Any other issues.
7. Climate-friendly alternatives for metered-dose inhalers (UNEP/OzL.Pro.35/12, para. 251).
8. Future availability of halons and their alternatives (UNEP/OzL.Pro.35/12, para. 159).

9. Possible compliance deferral for Article 5, group 2 parties: technology review by the Technology and Economic Assessment Panel pursuant to paragraph 5 of decision XXVIII/2.
10. Strengthening Montreal Protocol institutions, including combating illegal trade (decision XXXV/12 and UNEP/OzL.Pro.35/12, para. 188).
11. Emissions of HFC-23: potential changes to reporting form 3 for reporting on HFC-23 (decision XXXV/7, para. 3).
12. Proposal by Cuba on additional funding to support countries seriously affected by the coronavirus disease (COVID-19) pandemic and listed in decision XXXV/16.
13. Other matters.
14. Adoption of the report of the meeting.
15. Closure of the meeting.

12. Under agenda item 13, “Other matters”, the Working Group agreed to consider the illegal and unwanted import of energy-inefficient products and equipment.

### **C. Organization of work**

13. 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. Presentations by the Technology and Economic Assessment Panel and the Scientific Assessment Panel and discussions on:**

### **A. Very short-lived substances (decision XXXV/6)**

### **B. Feedstock uses of controlled substances (decision XXXV/8)**

### **C. Emissions of carbon tetrachloride (decision XXXV/9)**

#### **1. Presentation**

14. Introducing the sub-items, the Co-Chair drew attention to the note by the Secretariat on issues for discussion by and information for the attention of the Open-ended Working Group at its forty-sixth meeting (UNEP/OzL.Pro.WG.1/46/2), the addendum thereto (UNEP/OzL.Pro.WG.1/46/2/Add.1) and the report of the Technology and Economic Assessment Panel, May 2024, volume 1.

15. The information on very short-lived substances was set out in paragraphs 7 and 8 of document UNEP/OzL.Pro.WG.1/46/2, paragraphs 5–18 of document UNEP/OzL.Pro.WG.1/46/2/Add.1 and section 5.2 of the Panel’s report. The information on feedstock uses of controlled substances was set out in paragraphs 9 and 10 of document UNEP/OzL.Pro.WG.1/46/2, paragraphs 19–30 of document UNEP/OzL.Pro.WG.1/46/2/Add.1 and section 5.3 of the Panel’s report. The information on emission of carbon tetrachloride was set out in paragraphs 11 and 12 of document UNEP/OzL.Pro.WG.1/46/2, paragraphs 31–37 of document UNEP/OzL.Pro.WG.1/46/2/Add.1 and section 5.4 of the Panel’s report.

16. The Working Group then heard presentations on the responses of the Technology and Economic Assessment Panel and the Scientific Assessment Panel to decisions XXXV/6, XXXV/8 and XXXV/9. The presentations were given by Helen Tope, Co-Chair of the Medical and Chemicals Technical Options Committee of the Technology and Economic Assessment Panel, and Stephen Montzka of the Scientific Assessment Panel. Summaries of the presentations, as prepared by the presenters, are set out in section [--] of annex [--] to the present report, without formal editing.

#### **2. Question-and-answer session**

17. In the ensuing question-and-answer session, many representatives had specific questions on the presentation and the relevant sections of chapter 5 of volume 1 of the Panel’s May 2024 report,

which Ms. Tope, Mr. Montzka and Nick Campbell, member of the Medical and Chemicals Technical Options Committee, proceeded to answer.

18. All the representatives who spoke thanked the Technology and Economic Assessment Panel and the Scientific Assessment Panel for their work.

19. In response to a question about the reasons for the focus, in the Panel's report, on only five very short-lived substances and about whether there might be other very short-lived substances that needed attention, Ms. Tope said that the five substances that had been included because they were produced in large volumes and because one substance in particular, dichloromethane, had a major impact on ozone depletion. In addition, given that information on very short-lived substances was not systematically reported by parties, the Panel had to use information that was publicly available or obtain information through industry experts. In that regard, and in response to other questions, Ms. Tope said that the Panel would welcome any information from parties on the quantities of very short-lived substances being produced so that it could be included in the Panel's 2026 quadrennial assessment report. One representative expressed concern at the lack of information available on other very short-lived substances and advocated more in-depth study of the subject. Mr. Montzka underscored that the Scientific Assessment Panel was reliant on the observational community to supply information about other short-lived chlorinated and brominated gases in the atmosphere and their distribution. The Panel would nevertheless continue to update the scientific information as more details became available. Mr. Campbell, noting a lack of expertise in the Medical and Chemicals Technical Options Committee on the uses of very short-lived substances given that they were not controlled under the Montreal Protocol, said that, if parties had experts on those uses and on alternatives to chlorinated very short-lived substances, the Committee would welcome interaction with them, which would help in building its knowledge and providing the parties with a more thorough 2026 quadrennial assessment report.

20. Following a proposal by one representative, Ms. Tope said that information on alternatives to very short-lived substances would also be important. One representative, speaking on behalf of a group of parties, asked whether solvent use of dichloromethane was on the decline because of available alternatives.

21. In response to a question about rationalization in feedstock manufacture and the use of best practices in the handling of feedstocks, Mr. Campbell said that manufacturing facilities were tending to be larger in size and were handling considerably larger tonnages of feedstock. As such, best practice was in any case being implemented in the facilities for the sake of efficiency, not least for economic reasons to minimize product loss.

22. One representative sought clarification about the 66 per cent increase in the use of feedstocks that had been witnessed over the previous 10 years and any reason for the increase. In addition, he asked whether any study had predicted potential further increases in the future. In response to a question by another representative, Ms. Tope agreed that more information about the measures adopted by parties regarding feedstocks would be welcomed.

23. In response to questions about feedstock emission factors, Ms. Tope confirmed that, in addition to use, the matters of production, transport, distribution and the supply chain were included in the emissions estimates. She noted that feedstocks had different properties and were used in different ways in different facilities of different ages and in varying condition across the world. When establishing the most likely emission factors, the Technology and Economic Assessment Panel had taken into account the range of possibilities, using an average. The methodology employed was set out in the 2022 assessment report of the Panel and its May 2024 report. When dealing with specific substances, such as carbon tetrachloride, however, the Panel had used published reports containing industry information to refine the emission factors.

24. One representative speaking on behalf of a group of parties asked for more information on emissions from one-way cylinders. Mr. Campbell said that he had no knowledge of one-way cylinders being used to transport products for feedstock, but would very much appreciate receiving any information on the matter.

25. In response to a question about the changes in the fluorinated industry emission factors, Mr. Campbell explained that the Technology and Economic Assessment Panel had incorporated the guidelines of the Intergovernmental Panel on Climate Change for reporting factors and emissions from fluorinated production. The Technology and Economic Assessment Panel had been influenced by a major report produced by the United States Environmental Protection Agency just before the latest version of the guidelines. Those guidelines for the basic tier of reporting were 4 per cent emissions from production and did not include incineration. Ms. Tope explained that the best estimate of

emissions by the Medical and Chemicals Technical Options Committee was 3.6 per cent. There was not much difference in the two values, but a range of emission factors was provided because what might apply in one country might not apply in another.

26. Mr. Campbell drew attention to a recent study conducted in the Netherlands that had considered the actual emissions from an HCFC-22 unit. The study was due to be published shortly and any relevant information would be incorporated into future panel reports.

27. One representative speaking on behalf of a group of parties, expressed the view that carbon tetrachloride emissions would continue to be an issue in the future because of the use of the substance in the production of hydrofluoroolefins (HFOs) as alternatives to HFCs and the lack of other options. He asked whether the Technology and Economic Assessment Panel was able to predict future trends in the use of HFOs, the consequences for carbon tetrachloride feedstock production and thus related emissions. In response, Ms. Tope said that prediction of the future volumes of carbon tetrachloride required for HFOs was a very difficult exercise. Mr. Montzka underscored that the Scientific Assessment Panel did not make such market predictions, but in chapter 7 of the report entitled "Scientific Assessment of Ozone Depletion: 2022", there were scenarios that considered various ranges of the future use of substances, including feedstocks, and their influence on ozone depletion and ozone recovery.

### 3. Discussion

#### (a) Very short-lived substances (decision XXXV/6)

28. In the ensuing discussion, several representatives recalled that very short-lived substances were not controlled under the Montreal Protocol. One representative noted that the information on the matter presented in the reports of the Technology and Economic Assessment Panel and the Scientific Assessment Panel had been based on hypothetical possibilities and, as such substances reacted differently to various meteorological and other conditions, any consideration of their emissions and lifespan in the context of the Montreal Protocol should be based solely on proven scientific fact rather than hypothesis. One representative further recalled that parties were not required to submit data on very short-lived substances and requested additional information on the sources of the information presented in the report of the Technology and Economic Assessment Panel on the matter. Another representative expressed the view that there should be no further consideration of very short-lived substances, as only substances that affected the ozone layer or produced greenhouse gases could be considered for control under the Montreal Protocol. He added that it was stated in the report of the Technology and Economic Assessment Panel that over 90 per cent of very short-lived substances were used as feedstock, under which circumstances they would produce no emissions, and noted that such substances by their very nature did not enter the stratosphere and could therefore not affect the ozone layer. Moreover, even if such substances could be considered for control under the Montreal Protocol, the sheer number of them would make regulation extremely challenging.

29. Several representatives, including one speaking on behalf of a group of parties, however, drew attention to the harmful effects of very short-lived substances on health and the environment, and noted that they were a substantial source of chlorine-related ozone depletion. They therefore requested that the Technology and Economic Assessment Panel and the Scientific Assessment Panel provide parties with information regarding the possible future impact of those substances, with one representative requesting recommendations from the panels regarding ways of managing very short-lived substances and their opinion as to whether or not such substances should be controlled under the Montreal Protocol in the future, although another representative recalled that policy measures could only be undertaken through proposals put forward by the parties themselves. Noting that there was a reference in the report of the Technology and Economic Assessment Panel to the considerable emissive solvent use of certain very short-lived substances, one representative requested further information on the emissive uses of very short-lived substances, including the quantities involved. Some representatives also requested that the Medical and Chemicals Technical Options Committee provide additional information regarding the impact in quantitative terms on the stratospheric ozone layer of each of the very short-lived substances referred to in table 5.2 of the report of the Technology and Economic Assessment Panel.

30. Some representatives, including one speaking on behalf of a group of parties, noted the concerning upward trend in very short-lived substances with emissive uses, in particular dichloromethane, emphasizing that emissive uses of very short-lived substances that reached the stratosphere needed to be monitored. The representative speaking on behalf of a group of parties noted that those countries were currently monitoring their levels of dichloromethane and perchloroethylene. He recalled that, under the Vienna Convention for the Protection of the Ozone Layer, parties had an

obligation to take appropriate measures against adverse effects resulting or likely to result from human activities which modified or were likely to modify the ozone layer, and said that it was important to investigate alternatives to such substances. One representative, however, sought clarification regarding dichloromethane. He noted that the chemical reactivity and physical solubility of dichloromethane shortened the lifetime of the substance in the lower atmosphere and that, once the substance reached the stratosphere, it was broken down by photolysis of sunlight. Accurate determination of the ozone-depleting potential of dichloromethane relied on the quantification of the amount of chlorine delivered by the substance to the stratosphere, which posed difficulties, as transport to the stratosphere could take a year, which was almost double the lifetime of the substance in the atmosphere.

31. One representative requested that, given the significant interest among parties regarding very short-lived substances, additional information be provided before the quadrennial assessment due to be presented in 2026. Another representative, however, recalling that the impact of very short-lived substances on the ozone layer and stratosphere was small and noting that it was more important to focus on the core work under the Montreal Protocol, said that it was appropriate to wait until the quadrennial report in 2026 for more information to be provided on the topic.

32. One representative requested that detailed mapping of alternatives be provided for each very short-lived substance in the progress report of the Technology and Economic Assessment Panel for 2025, and that information be included on the availability, technical feasibility, economic viability, safety and sustainability of those alternatives. Another representative underscored that any controls introduced on ethylene dichloride, which was used almost exclusively as a feedstock in the production of vinyl chloride monomer, a precursor to polyvinyl chloride, could have a significant negative economic impact. It was therefore vital to obtain more information on the feasibility and viability of alternatives for that substance in particular. One representative, noting that much information had been provided on alternatives to controlled substances in the reports of the Solvents, Coatings and Adhesives Technical Options Committee of 1998 and 2002, proposed that information relevant to alternatives to very short-lived substances could be extracted from those reports and that parties should discuss how best to extract and structure such information, as well as submit any information they had obtained at the national level on very short-lived substances. A number of representatives also suggested that, in order to make such a task manageable, the Technology and Economic Assessment Panel should be instructed to focus only on those very short-lived substances with major emissive uses over a set threshold and on identifying any very short-lived substances which could become a cause for concern in the future.

33. One representative requested that, in the future, information provided on the impact on the ozone layer of chlorinated very short-lived substances be disaggregated and that a table be produced listing all the very short-lived substances of potential concern to the ozone layer, on the basis of an agreed emissions threshold, and providing information such as recent production, consumption and emission levels of those substances, as well as their ozone-depleting potential or an agreed alternative metric in cases where an agreed ozone-depleting potential value was not available. He expressed an interest in discussing the issue further with interested parties with a view to presenting a draft decision.

34. One representative noted that increasing attention had recently been paid to very short-lived substances in scientific literature. He asked for the opinion of the Scientific Assessment Panel regarding the conclusions drawn in an article entitled "Very short-lived halogens amplify ozone depletion trends in the tropical lower stratosphere" by Villamayor et al. that had been published in the journal *Nature Climate Change* in 2023, in which scientists had described their use of a community earth system model, including consideration of bromine and iodine as well as controlled substances, and also noted that future scenarios suggested that 25 per cent of tropical lower stratosphere ozone depletion could be prevented by the end of the twenty-first century by controlling emissions of anthropogenic very short-lived substances.

35. Subsequently, the representative of Canada, speaking also on behalf of Australia, the European Union and Switzerland, introduced a draft decision, set out in a conference room paper, on additional information on very short-lived substances. In the draft decision, the Technology and Economic Assessment Panel was requested, in its 2025 progress report, to identify very short-lived substances not mentioned in its 2024 progress report; provide additional information on alternatives to emissive uses of very short-lived substances in the main applications for which they were currently used, focusing on those with estimated emissive uses of at least 100,000 tonnes; and include a table providing, to the extent possible, the estimated annual production and consumption and estimated annual emissions for each very-short-lived substance identified in its 2024 and 2025 progress reports, and, subject to further discussion with the Scientific Assessment Panel, the range of ozone-depleting potential for each of those substances and their contribution to effective equivalent stratospheric chlorine. In addition, parties with production data on very short-lived substances or information on

alternatives to emissive uses were invited to provide such information to the Ozone Secretariat. Finally, parties with national measures related to very short-lived substances were invited to provide such measures to the Secretariat by 1 February 2025, and the Secretariat was requested to make them available to parties in a compendium.

36. The Working Group agreed to establish a contact group, co-chaired by Bruna Veríssimo Lima Santos (Brazil) and Heidi Stockhaus (Germany), to discuss the matter further, taking into account the submission by Australia, Canada, the European Union and Switzerland.

37. [to be completed]

**(b) Feedstock uses of controlled substances (decision XXXV/8)**

38. In the ensuing discussion, several representatives, including one speaking on behalf of a group of parties, noting that feedstock use of controlled substances had increased by 66 per cent in the last 10 years and by 41 per cent in the last 5 years, said that they supported the view of the Scientific Assessment Panel expressed in 2023 that a significant threat was posed by the emissions from such uses to the recovery of the ozone layer. By applying the average emission factor of around 3.6 per cent, around 70,000 tons of controlled substances had been emitted from feedstock in 2022 and the amount in tons of carbon dioxide equivalent would be considerably higher. Such figures challenged the long-held assumption of parties that feedstock uses of ozone-depleting substances should be excluded from consumption accounting as they were negligible.

39. One representative requested information from the Medical and Chemicals Technical Options Committee regarding the fugitive leakage or losses, if any, of ozone-depleting substances used as feedstock, and the impact of emissions in terms of a percentage of the total production of controlled substances for feedstock uses. He also asked for feasible and viable alternatives to feedstock production of controlled substances. Furthermore, he requested details of the methodology used for estimating annual global emissions of controlled substances, in particular where noticeable differences had been observed on a global scale, as well as the emission factors used for the production, distribution and use of feedstocks in table 5.20, on the technical feasibility, economic viability and safety risk rating of various feedstocks, of the report of the Technology and Economic Assessment Panel. He requested details of the methodology used and the data sources for the detailed analysis in the report on various products that used controlled substances as feedstocks. Finally, he requested information from the Medical and Chemicals Technical Options Committee on strengthening the existing processes and mechanisms in place for the management of feedstock uses for controlled substances.

40. One representative called for attention to be drawn in particular to the use of ozone-depleting substances and hydrofluorocarbons (HFCs) as feedstock for plastic production, and for further information to be provided in future reports in that regard, in particular regarding the associated pollution which affected land, freshwater and delicate marine environments, most commonly in countries and communities that were not responsible for producing, exporting or using such products. Work to reduce feedstock emissions could therefore complement the work under way to develop an international legally binding instrument on plastic pollution, including in the marine environment. Another representative stressed the importance of not prejudging negotiations taking place in other forums.

41. A number of representatives, including one speaking on behalf of a group of parties, drew attention to the quick wins that could be achieved in relation to the aim of reducing feedstock emissions, namely the application of best practices during the distribution, storage, transport, handling and repackaging of controlled substances for feedstock use, as well as monitoring and reporting and the training of personnel in that regard. The use of abatement technologies in new plants, alternatives, and regulatory incentives to avoid emissions could reduce emissions still further. One representative, speaking on behalf of a group of parties, noted with concern the reference in the report of the Technology and Economic Assessment Panel to the use of non-refillable cylinders for feedstock and requested additional information on the issue. Another representative suggested that one or two projects within the production sector on the issue of feedstock uses of controlled substances could be considered under the Multilateral Fund for the Implementation of the Montreal Protocol in order to support best practices and technologies to minimize emissions of controlled substances used as feedstock, or that activities on the issue could be included in production projects related to the phase-down or phase-out of specific substances. He also suggested that the consideration of emissions of carbon tetrachloride could be included in a decision on feedstock, given the close relationship between the two issues.

42. Some representatives, recalling that feedstock uses were not controlled under the Montreal Protocol, asked the Technology and Economic Assessment Panel to focus on technologies that could reduce emissions from leakages and transportation of controlled substances and on suggesting alternatives, and to consider the whole life cycle of products rather than focusing on feedstock. Another representative noted that, although amounts of controlled substances used entirely as feedstock were subtracted from the amount considered as production, the production of controlled substances for feedstock uses were reported under the Montreal Protocol. He also noted that it was important to ensure that systems were in place to confirm that amounts of controlled substance produced with the intention of being used for feedstock were in fact used as such and not diverted into consumptive uses.

43. [to be completed]

(c) **Emissions of carbon tetrachloride (decision XXXV/9)**

44. Several representatives, including one speaking on behalf of a group of parties, thanked the Medical and Chemicals Technical Options Committee for its work, particularly for the progress made in resolving the discrepancy between top-down and bottom-up estimates, which one representative said had essentially addressed the issue.

45. Several representatives, including one speaking on behalf of a group of parties, said that the concern raised under item 3 (b) regarding increasing emissions from feedstock use was particularly applicable to carbon tetrachloride. All those who spoke expressed an interest in holding further discussions on the matter, including on alternatives to carbon tetrachloride and ways to assist parties in minimizing carbon tetrachloride emissions. Several representatives, including one speaking on behalf of a group of parties, suggested incorporating carbon tetrachloride into the general feedstock discussion under agenda item 3 (b).

46. One representative asked the Medical and Chemicals Technical Options Committee to provide additional information on fugitive leaks and losses of carbon tetrachloride used as feedstock; feasible and viable alternatives other than those indicated in previous reports; the methodology used to estimate annual global carbon tetrachloride emissions, in the light of the information provided in the 2024 progress report regarding recent scientific studies relating to chloromethanes and carbon tetrachloride; and non-fluorinated low-global-warming-potential (GWP) products, including their market penetration, especially in parties operating under paragraph 1 of Article 5 (Article 5 parties).

47. The Working Group agreed to address the issue of carbon tetrachloride emissions as part of the discussions to be held in the contact group on feedstocks established under agenda item 3 (b), and to record the outcome of those discussions under that agenda item.

#### **IV. Life-cycle refrigerant management (decision XXXV/11)**

48. Introducing the item, the Co-Chair recalled that, in response to the request contained in paragraph 1 of decision XXXV/11 on life-cycle refrigerant management, the Technology and Economic Assessment Panel had established a task force to prepare a report. A summary of the report could be found in document UNEP/OzL.Pro.WG.1/46/2/Add.1, and the full report was available on the meeting website.

49. The Co-Chairs of the task force, Hilde Dhont and Roberto Peixoto, gave a presentation on the content and conclusions of the report. A summary of the presentation, as prepared by the presenters, is set out in section [--] of annex [--] to the present report, without formal editing. In answering questions and responding to comments, they were joined by members of the task force, Bassam Elassaad, Pallav Purohit and Helen Walter-Terrinoni. Ashley Woodcock, Co-Chair of the Technology and Economic Assessment Panel, observed that the report, which had been prepared within a limited period of time, was the first time the Panel had considered the issue; it was a first effort, and any subsequent reports would be more comprehensive.

50. All the representatives who spoke complimented the task force on the report, describing it as comprehensive, clear and detailed, and containing many good examples of policies and measures that could be followed by parties, together with the challenges they were likely to encounter. Representatives said that they looked forward to discussing the issue in more detail at the workshop to be held back to back with the Thirty-Sixth Meeting of the Parties in October. The issue of life-cycle refrigerant management was a critical one for achieving the objectives of the Montreal Protocol and combating climate change. In the face of the increasing devastation caused by the impacts of climate change, the question was not whether the Montreal Protocol should fully support the incorporation of life-cycle refrigerant management, but how quickly and fully it could do so.



51. One representative pointed out that leaking cooling equipment was more expensive to operate, and its inefficiency contributed to other negative impacts, including food waste and energy insecurity. Two foundational measures to optimize action on life-cycle refrigerant management were already underway in Article 5 parties, namely the preparation of inventories and national plans. By themselves, however, those did not guarantee the ability of parties to formulate optimal plans or to deliver the benefits available throughout the life cycle. All countries could benefit from information and capacity-building, but not all countries had the same capacity to implement life-cycle refrigerant management strategies.

52. Responding to questions, Ms. Walter-Terrinoni observed that the reclamation of blends posed greater challenges than single component refrigerants. Some companies blended additional refrigerant into the reclaimed substances to ensure that they maintained the right composition. Others used distillation columns to separate the components and then re-blended them. Responding to a question on possible impacts of the breakdown products from destruction on air and water quality, she commented that local and regional requirements relating to emissions to both water and air would be important to consider. On the question of why substances in foams had not been covered in the report, she recalled that the topic had not been included in decision XXXV/11.

53. Responding to a question on how technicians could determine whether to reuse, or recycle or reclaim, recovered refrigerants, Ms. Dhont said that ISO standard 5149, referred to in the report, provided the steps to be followed. If there was no contamination, the refrigerants could be directly reused in the same system, for example if the equipment was moved to a different location, whereas in other cases, recycling or reclamation might be needed. Responding to a question on direct and indirect leak detection methodologies, she said that the report did not provide a mapping of the situation in different countries, but did include a reference to indirect methods typically being used in complex installations or where equipment was located outdoors.

54. Responding to questions about which elements of life-cycle refrigerant management strategies had the most impact, Ms. Dhont drew attention to chapter 8 of the report, in which it was stated that, based on theoretical modelling, the task force had concluded that leak prevention accounted for about 40 per cent of the contribution, and recovery, recycling, reclaiming and destruction about 60 per cent. That would, however, depend on local circumstances, including the size of the bank and the types of refrigerants. Responding to a question on why the issue of preventive maintenance had not been included in the report, she agreed that it deserved fuller consideration. One representative highlighted the need for continued training of technicians in best practices for servicing and maintenance to prevent leaks and ensure that equipment could be operated efficiently, as this was a key aspect of good refrigerant management.

55. Responding to a question on the cost of refrigerant identifiers, Mr. Elassaad noted that the task force understood that there was currently a global shortage of identifiers, and also that the technology was changing.

56. Some representatives raised the issue of particular challenges faced by high-ambient-temperature countries, and expressed their desire to see the topic explored in more detail. One pointed out that ambient temperatures in his country were sometimes higher than the operating temperature for some refrigerants, such as R410A. Temperatures on roofs regularly exceeded safe temperatures for technicians to work in, making maintenance and servicing of roof-mounted equipment impossible and adding to leakage rates.

57. Members of the task force observed that their analysis of challenges categorized by countries' consumption patterns had not identified any difference in the technologies used in high-ambient-temperature countries. They recognized, however, the specific implementation challenges faced by those countries, and said that they would welcome further discussion of the issue.

58. Some representatives highlighted the particular challenges faced by low-volume-consuming countries, which only had very small volumes of substances to account for and manage, meaning that realizing the benefits of economies of scale was not generally possible. Equipment was very costly – potentially exceeding the funds made available for the preparation of Kigali implementation plans – and often was not available. They expressed the hope that the task force could further develop its recommendations for technology accessibility and economic assessment in relation to life-cycle refrigerant management in low-volume-consuming countries.

59. Members of the task force agreed that such countries faced significant challenges in realizing economies of scale, in particular with regard to reclamation and destruction, which highlighted the need for training and awareness-raising campaigns, and also the potential for regional cooperation.

Another representative said that she would appreciate further discussion of the potential for regional cooperation.

60. Several representatives asked for more detail on the costs of equipment, and queried some of the estimated costs included in the report. One representative said that, in his experience, the cost of gas chromatography equipment was at least \$85,000 rather than the \$45,000 mentioned in the report. Mr. Peixoto stressed that the costs included in the report were estimates provided by experts; they had not been based on market surveys. The task force would welcome additional information from parties.

61. Several representatives drew attention to the need to provide adequate funding for capacity-building and institutional strengthening in Article 5 parties, including equipment and training for technicians, and called for greater consideration of funding options. One representative said that she was looking forward to the information and plans to be developed under the funding window open in the Multilateral Fund for the preparation of national inventories of banks and plans for their disposition and for identifying conditions and policy options for the effective implementation of life-cycle refrigerant management.

62. One representative highlighted some of the challenges his country had faced in implementing a life-cycle refrigerant management strategy, which had included regulatory restrictions affecting imports of some of the necessary equipment. Another representative drew attention to a policy successfully implemented in his country which required all importers and reclaimers of refrigerant for the stationary refrigeration and air-conditioning sector to develop and implement a refrigerant stewardship programme to collect used refrigerants for reclamation or destruction. He also highlighted the report's finding that, globally, 60 per cent of newly produced HFCs had been used for the servicing of refrigeration and air-conditioning equipment, while the remaining 40 per cent had been used for filling new equipment, which reinforced the need for effective life-cycle management.

63. One representative described how her Government was addressing the challenges of a large country with a relatively small and widely dispersed population. The Government had reached agreements with private companies operating reclamation centres, and had provided cylinders and other equipment and free transport to the centres and a share of recycled and reclaimed refrigerants, through an agreement with one of the biggest importers of refrigerants, which had its own transport network, thereby reducing costs and helping to increase the incentives to reclaim refrigerants.

64. One representative, speaking on behalf of a group of parties, described the legislation in place in her party, which included emission prevention, regular leak checks on refrigeration, air-conditioning and heat pump equipment containing controlled substances, recovery obligations, destruction, and detailed certification requirements for technicians and also for hydrofluoroolefins and alternatives to controlled substances. The unlawful release of controlled substances into the atmosphere was not only an infringement of climate regulations, but was also considered a crime, punishable by imprisonment. Good practices implemented by member States included central registration databases, including applications enabling the electronic recording of leak checks, as well as central reporting databases allowing clear monitoring of the movement of refrigerants. Another key driver for the careful management of available refrigerants was the establishment of use bans for existing equipment, which incentivized the recovery and the use of controlled substances. She added that a smart option to avoid the build-up of HFC consumption was the use of environmentally friendly low-GWP replacements, including natural refrigerants, from the start of the refrigeration life cycle. Some member States in her party also possessed a system which allowed equipment users to receive refunds if the refrigerants were returned for extraction or reclamation and recycling.

65. Closing the item, the Co-Chair observed that parties would be able to return to the topic in the workshop to be held before the Thirty-Sixth Meeting of the Parties in October. He encouraged parties to exchange views and consult with each other on the way forward.

## **V. Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol (decision XXXV/14)**

66. Introducing the item, the Co-Chair recalled that, in decision XXXV/14, the Thirty-Fifth Meeting of the Parties had requested the Secretariat to provide the parties at the current meeting with information on cost estimates associated with enhancing atmospheric monitoring, and on options for sustainable funding to establish new monitoring capacities. The Secretariat's response was set out in paragraphs 41–76 of document UNEP/OzL.Pro.WG.1/46/2/Add.1 and in annexes V and VI thereto, with additional information provided in document UNEP/OzL.Pro.WG.1/46/INF/4. She also informed the Working Group that in preparing its response on the cost estimates, the Secretariat, in conjunction

with the steering committee of the European Union-funded pilot project on atmospheric monitoring of controlled substances, had organized an online workshop to bring experts together to refine the cost estimates for establishing and operating monitoring stations.

67. Paul Newman, one of the members of the steering committee, presented the outcomes of the online workshop, as described in the background document entitled “Workshop on costs of atmospheric monitoring of gases controlled under the Montreal Protocol”, which was available on the meeting website.

68. The representative of the Secretariat presented the information pertaining to options for sustainable funding to establish new monitoring capacities, as set out in document UNEP/OzL.Pro.WG.1/46/2/Add.1.

69. [to be completed]

## **VI. Presentation of the Technology and Economic Assessment Panel 2024 progress report and discussions on:**

### **A. Nominations for critical-use exemptions for methyl bromide for 2025**

70. [to be completed]

### **B. Energy efficiency (decision XXXV/10)**

71. [to be completed]

### **C. Panel membership changes**

72. [to be completed]

### **D. Any other issues**

73. [to be completed]

## **VII. Climate-friendly alternatives for metered-dose inhalers (UNEP/OzL.Pro.35/12, para. 251)**

[to be completed]

## **VIII. Future availability of halons and their alternatives (UNEP/OzL.Pro.35/12, para. 159)**

74. [to be completed]

## **IX. Possible compliance deferral for Article 5, group 2 parties: technology review by the Technology and Economic Assessment Panel pursuant to paragraph 5 of decision XXVIII/2**

75. [to be completed]

## **X. Strengthening Montreal Protocol institutions, including combating illegal trade (decision XXXV/12 and UNEP/OzL.Pro.35/12, para. 188)**

76. [to be completed]

## **XI. Emissions of HFC-23: potential changes to reporting form 3 for reporting on HFC-23 (decision XXXV/7, para. 3)**

77. [to be completed]

**XII. Proposal by Cuba on additional funding to support countries seriously affected by the coronavirus disease (COVID-19) pandemic and listed in decision XXXV/16**

78. [to be completed]

**XIII. Other matters**

**Illegal and unwanted import of energy-inefficient products and equipment**

79. [to be completed]

**XIV. Adoption of the report of the meeting**

80. [to be completed]

**XV. Closure of the meeting**

81. [to be completed]

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