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Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Forty-fourth meeting
Bangkok, 11–16 July 2022

Report of the forty-fourth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

Introduction

I. Opening of the meeting

1. The forty-fourth 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 11 to 16 July 2022. The meeting was co-chaired by Mr. Martin Sirois (Canada) and Mr. Osvaldo Álvarez-Pérez (Chile).

2. Mr. Sirois opened the meeting at 10.05 a.m. on Monday, 11 July 2022. Opening remarks were delivered by Ms. Megumi Seki, Executive Secretary of the Ozone Secretariat.

3. Welcoming participants to the forty-fourth meeting of the Open-ended Working Group, Ms. Seki noted that it was the first in-person meeting of the Working Group to be held after two years of meetings held online owing to the coronavirus disease (COVID-19) pandemic, and she thanked all those involved for their patience, resilience and cooperation during those two years, which had helped in maintaining the momentum of progress under the Montreal Protocol.

4. Turning to the agenda for the meeting, Ms. Seki noted that it included a number of issues whose consideration had been deferred as they required in-depth discussion in a face-to-face setting. The replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2021–2023 was a case in point, having been delayed since 2020. Although interim budgets for the triennium had been approved in 2020 and 2021 to ensure the ongoing operation of the Multilateral Fund, parties now had to decide on the actual replenishment, taking many different elements into account, including the lower level of activities and expenditures arising from the pandemic; a large fund carry-over; new and advance contributions made by parties not operating under paragraph 1 of Article 5 (non-Article 5 parties); and needs for the remainder of the triennium and beyond. The Fifth Extraordinary Meeting of the Parties would be convened immediately after the current meeting to consider and adopt a replenishment decision and possibly also a decision on the fixed-exchange-rate mechanism in connection with the replenishment. After providing a brief overview of the various other important items on the agenda, Ms. Seki noted that the parties had six days to conclude the replenishment decisions and make as much progress as possible on the other items, with a view to taking decisions at the Thirty-Fourth Meeting of the Parties, which would take place in Montreal, Canada, from 31 October to 4 November 2022.

5. The year 2022 marked the thirty-fifth anniversary of the Montreal Protocol. The theme of World Ozone Day 2022, “Global cooperation protecting life on earth”, associated the Montreal Protocol with nature and biodiversity, issues of focus in the global environmental agenda. During the

recent international event marking the fiftieth anniversary of the United Nations Conference on the Human Environment and the creation of the United Nations Environment Programme (UNEP), "Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity", the Protocol had been hailed many times as the most successful global environmental agreement and a model for collaboration in other areas, such as the plastics treaty currently under negotiation. The Protocol still had much more to contribute, including through the phasing out of the remaining ozone-depleting substances, the strengthening of atmospheric monitoring, sound management and disposal of banks, addressing of exempted uses such as feedstocks, the phasing down of hydrofluorocarbons (HFCs) and enhancing of energy efficiency, and, in that spirit, Ms. Seki urged parties that had not yet ratified the Kigali Amendment to do so, to help slow climate change and continue the Montreal Protocol's long history of protecting life on Earth.

II. Organizational matters

A. Attendance

6. The following parties to the Montreal Protocol were represented: Afghanistan, Angola, Argentina, Armenia, Australia, Austria, Bahrain, Bangladesh, Belgium, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Burundi, Cambodia, Canada, Central African Republic, Chile, China, Colombia, Comoros, Cook Islands, Costa Rica, Cuba, Czechia, Denmark, Djibouti, Ecuador, Egypt, Eritrea, Estonia, Eswatini, Ethiopia, European Union, Fiji, Finland, France, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guinea, Guinea-Bissau, Honduras, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Italy, Jamaica, Japan, Jordan, Kenya, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Lithuania, Malawi, Malaysia, Maldives, Mauritius, Mexico, Micronesia (Federated States of), Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, New Zealand, Niger, Nigeria, Niue, North Macedonia, Norway, Oman, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Spain, Sri Lanka, State of Palestine, Sudan, Sweden, Switzerland, Syrian Arab Republic, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkïye, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Vanuatu, Viet Nam, Zambia and Zimbabwe.

7. The following United Nations entities, organizations and specialized agencies were represented: secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, United Nations Development Programme, United Nations Environment Programme, United Nations Industrial Development Organization, World Bank and World Meteorological Organization.

8. The following intergovernmental, non-governmental, industry, academic and other bodies and individuals were represented as observers: ADC3R; AGC Chemicals; Alliance for Responsible Atmospheric Policy; ATMOsphere; Carrier Corporation; Carrier Global Corporation; Centro Studi Galileo; Chemours LLC.; Climate and Clean Air Coalition secretariat, Council on Energy, Environment and Water; Daikin; Danfoss A/S (Denmark); Environmental Investigation Agency; European Chemical Industry Council; European Partnership for Energy and the Environment; EX Research Institute Ltd.; GIZ Proklima; Industrial Technology Research Institute; Institute for Governance and Sustainable Development; International Pharmaceutical Aerosol Consortium; Japan Refrigeration and Air-Conditioning Industry Association; Kulthorn Group; Leiden University; Lennox International Inc.; Mebrom Corporation; Natural Resources Defense Council; Nolan Sherry and Associates Ltd; Ökorecherche; Pollet Environmental Consulting; Refrigerant Gas Manufacturers Association (REGMA); Refrigerant Reclaim Australia; Refrigerants Australia; SRF Limited; Sun Vat Sen University; The Energy and Resources Institute; University of Birmingham, World Refrigeration Day Secretariat.

B. Adoption of the agenda

9. The Working Group adopted the following agenda on the basis of the provisional agenda set out in document UNEP/OzL.Pro.WG.1/44/1/Rev.1:

1. Opening of the meeting.
2. Organizational matters:
   (a) Adoption of the agenda;
   (b) Organization of work.

3. Replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2021–2023.

4. Identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring (decision XXXIII/4).

5. Institutional processes to strengthen the effective implementation and enforcement of the Montreal Protocol (UNEP/OzL.Pro.31/9, para. 170).

6. Energy-efficient and low-global-warming-potential technologies:

   (a) Report by the Technology and Economic Assessment Panel (decision XXXIII/5);

   (b) Dumping of new and old inefficient refrigeration and air conditioning appliances (proposal by the African Group) (UNEP/OzL.Conv.12(II)/9–UNEP/OzL.Pro.33/8, para. 82).

7. Terms of reference for a study on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2024–2026.

8. Technology and Economic Assessment Panel 2022 report, including issues relating to:

   (a) Nominations for critical-use exemptions for methyl bromide for 2023 and 2024;

   (b) Future availability of halons and their alternatives (decision XXX/7);

   (c) Panel membership changes;

   (d) Any other issues.

9. Strengthening the Technology and Economic Assessment Panel and its technical options committees for the phase-down of hydrofluorocarbons and other future challenges related to the Montreal Protocol and the climate (proposal by Morocco) (UNEP/OzL.Conv.12(I)/6–UNEP/OzL.Pro.32/8, para. 15).

10. Stocks of methyl bromide (UNEP/OzL.Pro.31/9, para. 100) and quarantine and pre-shipment uses (UNEP/OzL.Conv.12(II)/9–UNEP/OzL.Pro.33/8, para. 56).

11. Ongoing emissions of carbon tetrachloride (UNEP/OzL.Pro.31/9, para. 81).

12. Membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (UNEP/OzL.Pro.31/9, para. 147).

13. Mario Molina declaration on supporting and strengthening the Montreal Protocol (proposal by Mexico) (UNEP/OzL.Conv.12(I)/6–UNEP/OzL.Pro.32/8, para. 16).

14. Other matters.

15. Adoption of the report of the meeting.

16. Closure of the meeting.

10. During the adoption of the agenda, one representative, speaking on behalf of a group of parties, said that the act of aggression by the Russian Federation against Ukraine was unprovoked and unjustified, violated international law and the Charter of the United Nations and undermined international security and stability. He demanded that the Russian Federation cease its military actions, withdraw its troops from Ukraine and respect Ukraine's territorial integrity, sovereignty and independence within its borders, as recognized internationally and by General Assembly resolution ES-11/1. He affirmed his group's support for Ukraine's inherent right of self-defence and the efforts of the Ukrainian armed forces to defend the territorial integrity and population of Ukraine in accordance with Article 51 of the Charter of the United Nations, and called on the Russian Federation to respect its obligations under international law, including international humanitarian and human rights law, particularly with respect to the protection of civilians and of women and children, and to refrain from disinformation campaigns and cyber-attacks.

11. Another representative, speaking on behalf of Australia, Canada, Japan, New Zealand, Norway, Switzerland, the United Kingdom, and the United States of America, condemned the mounting casualties and widespread destruction, including environmental damage and transboundary harm, caused by the Russian Federation's military aggression against Ukraine, which, he said, was a violation of international law, including the Charter of the United Nations. The Russian Federation's actions, he said, violated the prohibition of the use of force and the territorial integrity and political

independence of Ukraine as enshrined in international law. He expressed support for efforts to hold those responsible to account and called on the Russian Federation to abide by its international obligations, cease all hostilities in Ukraine, withdraw its troops, facilitate rapid, safe and unhindered access of humanitarian assistance to those in need in Ukraine and turn to good-faith negotiation.

12. The representative of the Russian Federation said that the meeting agenda should be reserved for statements on relevant issues and that General Assembly sessions, not meetings under the Montreal Protocol, were the appropriate forum for political statements. He said that Western countries and the North American Treaty Organization had provoked the events in Ukraine and the Russian Federation had therefore had no option but to use the methods it was employing to protect its borders. He added that his delegation did not wish to contribute to eroding the cooperative atmosphere of discussions at the current meeting, and had come to Bangkok to address issues that were important for all countries and to contribute to collective efforts to protect the ozone layer.[1]

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. Replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2021–2023

14. Introducing the item, the Co-Chair recalled that parties had expected to adopt a decision on the replenishment of the Multilateral Fund for the triennium 2021–2023 in 2020 but, owing to the COVID-19 pandemic, had been unable to meet in person to negotiate a replenishment decision. Nevertheless, in 2020, pending the adoption of a final decision on replenishment and without setting a precedent, the Thirty-Second Meeting of the Parties had approved an interim budget of $268 million for the Multilateral Fund for the triennium, and, in 2021, the Thirty-Third Meeting of the Parties had approved an updated interim budget of $400 million, in both cases on the understanding that the interim budgets would be provided from contributions due to the Multilateral Fund and other sources for the triennium 2018–2020. In 2020 and 2021, the parties had also adopted decisions on the levels of contributions for 2021 and 2022, respectively, to allow for payment of contributions by individual parties to the Multilateral Fund on an interim basis. Given that the current meeting was being held in person, parties were now expected to negotiate the final decision on the replenishment for the triennium 2021–2023.

15. Noting that a replenishment report prepared by the Technology and Economic Assessment Panel had always served as an important basis for the replenishment negotiations, the Co-Chair also recalled that the report for the 2021–2023 replenishment had been issued in May 2020 and then updated in September 2021 to take into account the guidance for further work on which the parties had agreed at the forty-third meeting of the Working Group, held online in May 2021. The September 2021 replenishment report, which had not been updated since, was available in the meeting portal as a background document, with a summary of the report available in document UNEP/OzL.Conv.12(II)/2/Add.1–UNEP/OzL.Pro.33/2/Add.1.

16. The Co-Chair further recalled that when considering the contributions to be made for the replenishment period, parties would be expected to also consider whether the fixed-exchange-rate mechanism should be extended to the period 2021–2023 and, as per usual practice, to set a time period to be used in the event that the fixed-exchange-rate mechanism were to be used for the 2024–2026 replenishment period. Information on the scale of assessments, rates of exchange and average inflation rates for parties' contributions to the 2021–2023 replenishment were set out in document UNEP/OzL.Pro.WG.1/44/INF/3 for the parties' consideration during the negotiation of the replenishment and the extension of the fixed-exchange-rate mechanism.

17. Following the Co-Chair's introduction, many representatives, including one speaking on behalf of a group of parties, thanked the replenishment task force for its substantial work over the past several years in assessing the funding requirement for the 2021–2023 replenishment of the Multilateral Fund, although several, including the representative speaking on behalf of a group of parties, acknowledged that significant changes had occurred since the assessment was last updated, in September 2021. Several representatives, including one speaking on behalf of a group of parties, also

[1] See comment in section XV on the adoption of the report of the meeting.

acknowledged the willingness parties had shown in the previous two years to ensure the continued functioning of the Multilateral Fund, including through enabling and making advance contributions to the Fund, and some thanked the parties that had made those contributions.

18. Many representatives called for a replenishment for the triennium 2021–2023 that ensured the stable functioning of the Multilateral Fund, to enable it to provide parties operating under paragraph 1 of Article 5 (Article 5 parties) with the means to fully comply with their obligations under the Montreal Protocol, in particular with respect to the hydrochlorofluorocarbon (HCFC) phase-out and the HFC phase-down.

19. Many representatives indicated their desire to work constructively, in a contact group, to arrive at a decision on replenishment. They mentioned a number of factors that would have to be taken into account in the discussions, however, including the 65 per cent reduction target for 2025 for HCFC consumption and production; the freeze applicable to Group I parties in 2024 for the consumption and production of HFCs; the funding already approved under the Multilateral Fund up to mid-2022 and the funding likely or possibly to be approved up to the end of 2023; recent decisions by the Executive Committee of the Multilateral Fund on energy efficiency and disposal, which would require sufficient and reliable funding support but whose funding implications might prove difficult to estimate; the potential for the submission of Kigali HFC implementation plans before the end of the triennium; the ongoing preparation of Kigali HFC implementation plans in the absence of cost guidelines; and the specific challenges faced for the HFC phase-down in relation to flammable and high-pressure refrigerants. Several representatives also noted that, if a contact group were established, due consideration should be given to the fixed-exchange-rate mechanism and the United Nations scale of assessment; one said that the solutions for those elements should reflect the current situation and exceptional circumstances, while another noted that there were in fact two possible scales of assessment to consider.

20. Several representatives, including one speaking on behalf of a group of parties, also drew attention to the irregularity of holding replenishment negotiations midway through the triennium, cautioning that the decision language would need to reflect the exceptional circumstances.

21. The Working Group agreed to establish a contact group on replenishment, co-chaired by Mr. Daniel López Vicuña (Mexico) and Mr. Ralph Brieskorn (Netherlands), with a mandate to work toward drafting a decision on the replenishment for the triennium 2021–2023, using as a basis draft decision XXXIV/[A] set out in document UNEP/OzL.Pro.WG.1/44/2, annex I, section A. The contact group would be closed to observers, but would be open to all parties for its first meeting and open to a limited number of Article 5 and non-Article 5 parties, at the group's discretion, for subsequent meetings. The contact group was also expected to welcome the participation of members of the Technology and Economic Assessment Panel, the secretariat of the Multilateral Fund and the Ozone Secretariat.

22. Following the first meeting of the contact group, the co-chair reported that the group had agreed that, at future meetings of the group, its composition would be limited to 12 Article 5 parties and 12 non-Article 5 parties.

23. Subsequently, the co-chair of the contact group, reported that the group had finalized two draft decisions related to the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2021–2023, which were set out in two conference room papers, for consideration by the Working Group. The first draft decision related to the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2021–2023, while the second related to the extension of the fixed-exchange-rate mechanism to the 2021–2023 replenishment of the Fund.

24. The Working Group agreed to forward the two draft decisions, as set out in annex I to the present report without formal editing, to the Fifth Extraordinary Meeting of the Parties for consideration and possible adoption.

25. The representative of Australia noted that a new Government had been elected in Australia and, as a result, the 2023 national budget had not yet been confirmed. She said, while she trusted that Australia would be able to contribute to the Multilateral Fund, she could not make a commitment on the matter until the 2023 budget deliberations had been finalized.

26. Another representative said that, in the light of the global economic situation and the difficulties that many parties, in particular Article 5 parties, were experiencing, consideration should be given to the possibility of allowing some flexibility to those parties in making their assessed contributions during the triennium 2021–2023, enabling them to contribute at the levels of 2015–2018 or 2015–2019, instead of the levels of 2021. He suggested that the matter should be included on the

agenda for the Twenty-Fourth Meeting of the Parties and noted that, as advised by the Secretariat, he would make the necessary request through the national focal point.

IV. Identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring (decision XXXIII/4)

27. Introducing the item, the Co-Chair recalled that, at the Thirty-Third Meeting of the Parties, in decision XXXIII/4 on enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol, the parties had requested the Ozone Secretariat, in consultation with relevant experts from the Scientific Assessment Panel, the Technology and Economic Assessment Panel and the Ozone Research Managers, to report, at the forty-fourth meeting of the Open-ended Working Group, on progress made in relation to the issue. Furthermore, the European Union had informed the Thirty-Third Meeting of the Parties that it would fund an Ozone Secretariat pilot project on the identification of suitable locations for additional monitoring. The project, entitled "Regional quantification of emissions of substances controlled under the Montreal Protocol", had been developed in 2021 on the basis of a white paper prepared by the Scientific Assessment Panel, in cooperation with experts in atmospheric monitoring, and considered by the Ozone Research Managers at their eleventh meeting.

28. The progress report by the Ozone Secretariat was set out in documents UNEP/OzL.Pro.WG.1/44/2 and UNEP/OzL.Pro.WG.1/44/2/Add.1. The Working Group also had before it document UNEP/OzL/Conv.ResMgr/11(II)/4 of the Ozone Research Managers and the summary of the European Union-funded pilot project on regional quantification of emissions controlled under the Montreal Protocol.

29. On the basis of document UNEP/OzL.Pro.WG.1/44/2/Add.1, the representative of the Secretariat, Ms. Sophia Mylona, presented the progress report, including information on the implementation of the pilot project, which was managed by the Ozone Secretariat and overseen by a steering committee composed of the following members: herself; Mr. A.R. Ravishankara (Colorado State University); Mr. Ray F. Weiss (Scripps Institution of Oceanography); Mr. Paul A. Newman (National Aeronautics and Space Administration of the United States and co-chair of the Scientific Assessment Panel); and Mr. Cornelius Rhein (European Commission).

30. Many of the representatives who took the floor thanked the Secretariat and the European Union for the pilot project and stressed the importance of strengthening the global atmospheric monitoring network. They noted that the pilot project could provide important lessons in that respect; would help optimize the utility of new monitoring stations, enabling parties better to focus their future implementation efforts; and would build the capacity of scientists and technicians in Article 5 parties, including through the planned flask sampling exercise.

31. Several representatives expressed concern that Africa, South America and indeed the majority of the southern hemisphere were not being considered during the first phase of the pilot project, which involved the identification of suitable locations for carrying out measurements of controlled substances; those regions also suffered from insufficient coverage in terms of atmospheric monitoring. One representative proposed that there be several stations in Africa, one in each region of the continent. In response, Ms. Mylona, Mr. Newman and Mr. Rhein all recalled that the aim of the project, which had limited funding, was not to ensure global coverage but to identify one or two sites in developing countries in regions with expected sources from which emissions could be detected and to conduct flask sampling there. Ms. Mylona also drew attention to the existing monitoring station in Rwanda, which picked up signals of many controlled substances, and said that three sites in Morocco had been considered during the observing system simulation experiment under the pilot project. A number of other representatives noted both the intentionally limited scope of the project and the desire of other regions to be involved.

32. A number of representatives stressed that, in addition to following a science-based approach in the choice of additional monitoring sites, it was necessary to take into account parties' willingness to be part of the network; independence in terms of decision-making; national frameworks, legislation and capacities, including in terms of site construction, operation and maintenance and knowledge of data calibration standards; and workload in meeting Montreal Protocol compliance obligations. Technical and funding challenges also needed to be addressed. The same representatives stressed the need for a cautious, phased approach to expanding the global atmospheric monitoring network, consisting of practicable and implementable actions. Another representative highlighted the difficulties

that could occur if countries were required to adopt approaches that differed from those usually employed by their systems.

33. One representative, supported by another, stressed the importance not only of collecting data, but also of sharing them with the global scientific community, including the network of the Advanced Global Atmospheric Gases Experiment and the National Oceanic and Atmospheric Administration of the United States. Future efforts should keep that important principle in mind. Mr. Rhein concurred that collaboration with other institutions with existing monitoring capacities was essential.

34. Responding to other comments, Mr. Newman said that some measurements of trichlorofluoromethane (CFC-11) had been made near the Earth's surface using satellites, but such techniques were at a very early stage. It would therefore be difficult to integrate satellite data with ground observations. Ms. Mylona, noting the technical nature of the scientific techniques using satellite data or trade data analysis to ascertain where the highest emission levels were likely to occur, proposed that the Secretariat provide a written explanation about those methods in its next report on the issue.

35. Noting that the next report on the identification of gaps in the global coverage of atmospheric monitoring of controlled substances and options for enhancing such monitoring was foreseen to be presented at the forty-fifth meeting of the Open-ended Working Group, one representative asked whether it would be possible to have an interim report.

36. The representative of the Netherlands informed the Working Group that his Government had made a contribution of 30,000 euros to the General Trust Fund for Financing Activities on Research and Systematic Observations Relevant to the Vienna Convention for the Protection of the Ozone Layer to improve the monitoring of emissions of ozone-depleting substances. He expressed the hope that other parties could provide similar support.

37. One representative highlighted his party's intention to complement the pilot project with an initiative that would look at and help identify sources of emissions of substances relevant to the Montreal Protocol, in particular from industrial processes, their location and the related regional distribution. His party was working on a proposal for submission to the Working Group requesting further advice and guidance on potential sources that would not only help hone future monitoring activities, but also provide information to individual parties that wished to take containment measures domestically. He was presently undertaking consultations in order to ensure consistency and avoid duplication with other initiatives in preparation at the current meeting.

38. Subsequently, the representative of the European Union introduced a conference room paper containing a proposed draft decision. He said that there might still be overlaps with the revised proposal submitted by Switzerland under agenda item 11 on ongoing emissions of carbon tetrachloride (UNEP/OzL.Pro.31/9, para. 81), but he hoped that there would be an opportunity to resolve those issues and to adjust the present proposal in the light of the discussions on the proposal by Switzerland.

39. The draft decision proposed by the European Union tackled industrial processes from an angle that was different to that of the proposal by Switzerland. Parties had seen, in relation to the unexpected increase in emissions of CFC-11, the importance of complementing atmospheric monitoring with monitoring on the ground to better understand the processes and the locations of production that could lead to the emissions.

40. The proposal for the draft decision included a request to the Technology and Economic Assessment Panel to prepare a report for the Thirty-Sixth Meeting of the Parties on chemical processes in which substantial emissions of controlled substances and of their most common intermediates – chloromethane, dichloromethane and trichloromethane – were likely to occur and on their regional localization. It was important for parties to be able to verify reported production using methods such as mass balance. The proposal sought to enable a better understanding of emissive processes that would enable better targeting of atmospheric monitoring.

41. Given that it was very difficult to obtain detailed data on production processes, owing to practical and legal constraints or the related administration or cost burden, the proposal was for parties simply to be invited to provide such data, leaving them free to contribute if they wished or were able to do so. Any piece of information that allowed a better understanding of potential emissions sources would be helpful.

42. Several representatives noted the links between the present proposal and the proposal by Switzerland on carbon tetrachloride under agenda item 11 and proposed discussion of those links, perhaps in the contact group set up under item 11. One of them said that it was important to ensure that the invitation to parties to provide additional information was not too broad or beyond their ability.

Another representative said that he knew already that his country's national ozone unit would not be able to obtain the requested data. He noted that, in any case, given the present workload of the parties and the Technology and Economic Assessment Panel with regard to implementation of the Kigali Amendment, they should not be burdened with such an additional task. In response, the representative of the European Union recalled the voluntary nature of the invitation and stated that any country that had production might benefit from information provided by other parties. One representative said that his delegation was willing to engage in a general discussion on the proposal, but it would be unable to enter into substantive consideration thereof, owing to the insufficient time remaining at the current meeting for preparation. Furthermore, he recalled that decision XXXIII/4, on enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol, already provided a mandate for the Secretariat to consult the Technology and Economic Assessment Panel and the Scientific Assessment Panel on the issue of atmospheric monitoring with a view to identifying gaps.

43. The Working Group agreed to expand the mandate of the contact group established under agenda item 11 on ongoing emissions of carbon tetrachloride (UNEP/OzL.Pro.31/9, para. 81) to include consideration of the proposal by the European Union under the present agenda item.

44. Subsequently, the co-chair of the contact group on ongoing emissions of carbon tetrachloride (UNEP/OzL.Pro.31/9, para. 81), reporting on the group's work, said that there had not been sufficient time for the group to consider the proposal by the European Union in addition to conducting the work mandated under agenda item 11.

45. The Working Group agreed to forward the draft decision proposed by the European Union, as set out in section A of annex II to the present report, to the Thirty-Fourth Meeting of the Parties for further consideration.

V. Institutional processes to strengthen the effective implementation and enforcement of the Montreal Protocol (UNEP/OzL.Pro.31/9, para. 170)

46. Introducing the item, the Co-Chair recalled that, at the Thirty-First Meeting of the Parties, the President of the Implementation Committee had reported that, at its sixty-third meeting, the Committee had considered documents prepared by the Ozone Secretariat at the Committee's request on possible ways of dealing with the illegal production of, and trade in, controlled substances under the Montreal Protocol.

47. The Committee had agreed that the information provided by the Ozone Secretariat was relevant to all the parties in considering possible ways of strengthening the effective implementation of the Montreal Protocol in combating illegal activities. The Committee had recommended to the Thirty-First Meeting of the Parties that the matter be included on the agenda of the forty-second meeting of the Open-ended Working Group but, owing to the exceptional circumstances caused by the COVID-19 pandemic, it had not proved possible to discuss the matter any earlier than at the current meeting.

48. He drew attention to two notes by the Secretariat, one containing background information on the issue (UNEP/OzL.Pro.WG.1/44/2) and one that reproduced the relevant annexes to the report of the sixty-third meeting of the Implementation Committee, covering possible ways of dealing with the illegal production of and illegal trade in controlled substances under the Montreal Protocol, identifying potential gaps in the non-compliance procedure, challenges, tools, ideas and suggestions for improvement (UNEP/OzL.Pro.WG.1/44/3).

49. Several representatives, including one speaking on behalf of a group of parties, noted the importance of developing ways to strengthen the effective implementation of the Montreal Protocol specifically in combating the illegal production of and trade in controlled substances and many representatives expressed a desire to take part in further discussions on the issue. Several representatives expressed support for establishing a contact group, whereas other representatives, including one speaking on behalf of a group of parties, requested that a more informal group be established that would allow for "brainstorming" on the issue, using the ideas set out in document UNEP/OzL.Pro.WG.1/44/3 as a starting point, and considering which possible measures to explore further. Several representatives highlighted that the aforementioned document did not contain recommendations, but rather ideas that were intended to act as a springboard for a discussion on the topic of compliance. Some representatives noted that it was important that the outcomes of discussions at the most recent meeting of the Executive Committee of the Multilateral Fund on the same issue were considered during any discussion of the matter at the current meeting, and suggested that the issue concerned all parties and not only Article 5 parties.

50. Some representatives, including one speaking on behalf of a group of parties, noting that the discussion of the matter by the Working Group would probably extend over several of its meetings, said that the focus should not be solely on identifying long-term measures, but also on any short-term measures that could be implemented relatively quickly to increase the robustness of the instruments already in place and close some of the gaps in monitoring.

51. Some representatives noted that the current non-compliance procedure was well established and had proved highly effective, thanks in no small part to its non-confrontational nature, working on the basis of mutual trust and cooperation. It was important to consider the significant burden and added complexity that any additional reporting would impose on parties and avoid it if at all possible. One representative highlighted the importance of weighing up the need for exploring the issue against that of dealing with other issues currently facing the Working Group. Another representative said that it was more appropriate to deal with compliance concerns relating to any individual countries on a case-by-case basis rather than to change the system already in place. In addition, one representative recalled that the issues of illegal production, trade and use had already been discussed at length by the Thirty-First Meeting of the Parties, and she drew attention to the effective implementation by parties of decision XXXI/3, on unexpected emissions of trichlorofluoromethane (CFC-11), and institutional processes to be enhanced to strengthen the effective implementation and enforcement of the Montreal Protocol.

52. Several representatives, including one speaking on behalf of a group of parties, noted that, although they agreed that the non-compliance procedure worked well overall, some gaps in procedures had come to light as a result of the unexpected emission levels of CFC-11, instances of illegal trade, and inconsistencies between reported production and consumption of substances, among other things. It was therefore appropriate to look again at the current non-compliance procedure, but only introduce additional reporting measures if the environmental benefits outweighed the burden of such measures.

53. Several representatives, including one speaking on behalf of a group of parties, highlighted that it would be especially beneficial to produce working definitions of “illegal trade”, “illegal production” and “illegal consumption” in the context of the Montreal Protocol, given the absence of such definitions. One representative noted, however, that, as the Montreal Protocol had been implemented successfully for the last 35 years without those definitions because parties had acted in the spirit of the regulations, it would be more productive for the Working Group to focus on more pressing matters, such as compliance with the Kigali Amendment and the phase-out of HCFCs.

54. The Working Group agreed to establish an informal group to discuss objectives related to institutional processes for strengthening the effective implementation and enforcement of the Montreal Protocol, using document UNEP/OzL.Pro.WG.1/44/3 as a starting point.

55. Subsequently, the co-chair of the contact group, reporting on the informal group’s work, said that the group had produced a non-exhaustive list of ideas for areas for improvement, which was not organized in order of priority or indicating agreement on which issues required further actions, to serve as a basis for further discussion. The group had also agreed that parties should be given the opportunity to provide input in the intersessional period prior to continuing the discussion at the Thirty-Fourth Meeting of the Parties.

56. The Working Group agreed to forward the list of ideas for areas for improvement related to institutional processes for strengthening the effective implementation and enforcement of the Montreal Protocol, as set out in section B of annex II to the present report without formal editing, to the Thirty-Fourth Meeting of the Parties for further consideration.

VI. Energy-efficient and low-global-warming-potential technologies

A. Report by the Technology and Economic Assessment Panel (decision XXXIII/5)

57. Introducing the sub-item, the Co-Chair outlined the information set out in paragraph 21 of document UNEP/OzL.Pro.WG.1/44/2, recalling that, by decision XXXIII/5, the parties had requested the Technology and Economic Assessment Panel to prepare a report on energy-efficient and lower-global-warming-potential technologies, and on measures to enhance and maintain energy efficiency during HFC transition in equipment, for consideration by the Working Group at the current meeting. Accordingly, the Panel had established a task force to prepare the requested report. The report was set out in volume 3 of the Panel’s 2022 report, which was available on the portal of the current meeting, while a summary of the report was set out in the annex to document

UNEP/OzL.Pro.WG.1/44/2/Add.1. The report had also been posted in the online forum to allow parties to submit related comments and questions prior to the current meeting.

58. The report of the task force was presented by Mr. Omar Abdelaziz (Egypt) and Mr. Ashley Woodcock (United Kingdom), co-chairs of the task force, and by task force members Ms. Hilde Dhont (Belgium), Mr. Ray Gluckman (United Kingdom) and Ms. Gabrielle Dreyfus (United States of America). A summary of the presentation is set out in section A of annex III to the present report, without formal editing.

59. At the suggestion of the Co-Chair, the Working Group agreed to first submit to the task force questions or requests for clarification on the report, and then to engage in a general discussion on the way forward on the sub-item.

60. In the first part of the discussion, many representatives expressed their appreciation to the Panel and the task force for the report and the presentation, stressing that the report was comprehensive and provided invaluable technical and scientific information that would help the parties, and in particular those with limited technical and scientific capacities, to make more informed decisions at the national level.

61. Many representatives raised specific questions on various sections of the task force report, which members of the task force proceeded to answer.

62. On questions raised around the data on costs provided in section 4.6 of the report, Ms. Dreyfus responded that section 4.6 was intended to provide an example of the type of detailed cost-benefit analysis that could be undertaken by the parties. Addressing a related question of whether the cost-benefit analysis case studies provided in chapter 4 applied to countries with high-ambient-temperature conditions, she said that they did, noting that two of the examples related to India and Brazil, but noted that the task force had drawn on available information and had not conducted additional case studies for the 2022 report.

63. Reflecting on what kinds of information were needed to produce more detailed cost-benefit analyses, and whether pilot projects under the Multilateral Fund could help provide the additional data needed to produce more complete cost-benefit analyses, Mr. Abdelaziz said that key data included detailed information on market size, data on costs, which depended on supply chains, the volume of commodities or components being used, manufacturing costs, investment or borrowing costs. He noted that the implementation plans for the Kigali Amendment could help to provide such information.

64. On questions regarding the applicability of low-global warming potential (GWP) and energy efficiency to countries with high ambient temperatures, Mr. Samir Hamed (Jordan), a member of the task force, replied that lower-global-warming-potential refrigerants, in particular R32, had been used for seven or eight years in several countries in the Persian Gulf, and a project with the United Nations Industrial Development Organization showed that at least one manufacturer was using R32 in high-ambient conditions which showed higher energy efficiency than the baseline R410A refrigerant. The main constraint in high-ambient conditions was ensuring compliance with safety standards, which limited the maximum refrigerant charge per circuit, but different products were available to address such constraints by using multi-refrigerant circuits, and at least one manufacturer was using different techniques to comply with safety standards using R32 in medium- and large-capacity air-conditioning systems. The use of refrigerant R290, also discussed in the 2022 report, was very limited in high-ambient conditions, as in most cases it did not comply with the maximum refrigerant charge set out in the ISO standard, which was 10 kilowatts.

65. On a question regarding energy efficiency savings and safety risks in countries with high-ambient temperature conditions, where the use of hydrocarbons in large chillers presented considerable risks and where the thermodynamic performance of equipment could be affected by high temperatures and the types of equipment used, Mr. Gluckman said that the significance of energy savings related to small, medium or large equipment was very country-specific; for instance, in some countries, commercial refrigeration of food in supermarkets and food shops was dominated by very small, stand-alone equipment, whereas other countries had much larger and centralized systems. As for the issue of safety, the use of hydrocarbons such as propane could be done in split systems, in which small amounts of propane were used indoors, but greater amounts could be used in secure areas with limited public access. With regard to the thermodynamic performance of equipment, Mr. Abdelaziz said that section 9.3 of the annex to the report contained detailed thermodynamic analysis for the impact of refrigerant choice on the cycle parameters, with cycle analysis for different conditions and different refrigerants, and further to that, reports from the Promoting Low-GWP Refrigerants for Air-Conditioning Sectors in High-Ambient-Temperature Countries (PRAHA) project and the Egyptian Programme for Promoting Low-GWP Refrigerant Alternatives (EGYPRA) provided

detailed analysis of refrigerants in high-ambient-temperature climates, which was outside the scope of the work of the task force.

66. On the use of flammable refrigerants to improve energy efficiency, and task force expectations for countries with high-ambient temperatures, Mr. Abdelaziz said that chapters 2 and 3 explained that flammability and toxicity might limit the acceptable amount of refrigerants used for safety reasons, and thus the cooling and heating capacities and/or energy efficiency that could be achieved through the use of such refrigerants, and while some technologies were available to reduce refrigerant charge, these could also pose technical and application challenges. At the same time, new International Electrotechnical Commission (IEC) standards had increased options for using flammable refrigerants.

67. Regarding the obstacles to access to energy-efficient, low-GWP technologies in Articles 5 parties, including low-volume-consuming countries, Ms. Dreyfus said that low-volume-consuming countries were importers of technology and were therefore dependent on imports. That situation did not appear to have changed since 2021, but could be addressed through the policy options discussed in the previous task force report.

68. On the opportunities that renewable energy sources presented for the refrigeration and air-conditioning sector, Ms. Dreyfus said that the report touched briefly on two examples, deep-sea cooling and renewably-powered absorption technology, which were discussed in more detail in the upcoming 2022 quadrennial assessment report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee, but a broader discussion of renewables, especially in the context of off-grid applications, was not in scope of the 2022 task force report.

69. Responding to a question related to the parameters used in regional and national forecasting models, Mr. Gluckman said that the models discussed in chapters 4 and 7 were very different and thus needed different input parameters. The models discussed in chapter 4 concerned the parameters of a specific technology, such as the minimum energy performance standards of particular products, for example chillers or small-room air conditioners, and thus required an examination of different design options and a full cost-benefit analysis for each of those options, including the cost of producing and selling each option, and the energy costs and benefits over the full life cycle of the equipment. In contrast, chapter 7 dealt with national models that were intended to provide a forecast for many technology sectors, and to provide, for each of those sectors, a picture of the stock of equipment in a given country in order to make predictions regarding how each sector would grow, for instance as a function of increased wealth, and of the gases that might be introduced in order to transition from high-global-warming-potential to low-global-warming-potential gases. More recently, national models had also examined the energy being used by that stock of equipment, which required country-specific climate input data that would help to determine the amount of cooling and energy required in a given country.

70. Responding to a question about ways to enhance collaboration between ozone units on the one hand, and climate and energy-efficiency authorities on the other, Ms. Dreyfus said that the 2022 report provided some specific examples of collaboration with regard to labelling schemes, which complemented the case studies of collaboration provided in the 2021 task force report.

71. Regarding whether any country was putting refrigerant types or low-global-warming-potential information on energy efficiency labels, Mr. Abdelaziz said that several countries, including Ghana, had already started doing so, while other countries, such as Kenya and Rwanda, had adopted the United for Efficiency (U4E) model regulation developed by UNEP, resulting in information on refrigerant GWP being included on the energy efficiency label.

72. In response to a question on whether regional centres to test compliance with energy-efficiency appliance standards could apply to multiple markets, Mr. Abdelaziz said that although energy-efficiency testing procedures were unfortunately not harmonized, there was a push for harmonization at the regional level, and the establishment of regional energy efficiency performance standards and tests and of regional centres could lead to improvements in energy efficiency at the regional level.

73. Regarding the matter of whether the task force had examined the issue of overall energy building efficiency, Mr. Abdelaziz said that while the issue had not been detailed in the 2022 report, chapter 5 referred to standards on limits for building thermal insulation, but did not include a discussion of what kinds of insulation should be used.

74. On questions raised around the limited accessibility of energy-efficient and low-global-warming-potential technologies, and how to overcome accessibility challenges, Ms. Dreyfus noted that the task force had considered those issues in detail in its 2021 report, including

barriers related to market acceptance and risk, supply chain issues and limited service technician training, regulatory and environmental policy environments, and impacts on affordability.

75. Responding to a question regarding the lack of analysis in the 2022 report of the risks of new technologies to ensure their social acceptance by industry, traders and the public, Mr. Abdelaziz said that while a detailed risk assessment of flammable refrigerants had been conducted as part of the PRAHA and EGYPRA assessment of phase 2 of the HCFC phase-out management plans, market acceptance required detailed case-by-case analysis that went beyond the scope of the 2022 report. In chapter 3 of the report, however, the task force had stressed that, when designing new equipment, it was important to consider the safety of the new equipment over its entire life cycle.

76. Regarding whether the task force could identify specific sectors that policymakers should be looking at, Mr. Gluckman said that the answer would depend on the specific market of each country; for instance, if the country had considerable retail display cabinets, as was the case in the United Kingdom, a key energy-saving method would be to ensure that all displays had doors; another was to implement variable speed drives, particularly on compressors, a matter on which, unlike the air-conditioning sector, the refrigeration sector was making limited progress.

77. Regarding a query about potential energy efficiency trade-offs from leapfrogging from ozone-depleting substances to low-global-warming-potential technologies, Ms. Dohnt said that that would depend on the product, the application and the GWP the country was seeking to leapfrog to.

78. Responding to a query regarding whether higher upfront cost was a major barrier for consumer acceptance of energy-efficient products, Mr. Abdelaziz said that it constituted a major barrier in both developed and developing countries and that financial mechanisms to promote energy-efficient products could help in that regard.

79. In response to a question about the impact of dumping on the cost of equipment, Ms. Dreyfus said that the task force had documented the issue, which had a significant impact on access to higher-efficiency and lower-global-warming-potential equipment. She suggested that, drawing on the history of the Montreal Protocol, the parties might wish to tackle the issue as a common responsibility of importing and exporting countries.

80. Finally, on questions raised around specific measures that parties could take to facilitate the adoption of more low-global-warming-potential technologies, and the need to consider different national circumstances, Ms. Dreyfus said that chapter 5 provided illustrative example of options that a country might want to examine to facilitate the adoption of energy-efficient and low-global-warming-potential technologies, depending on its specific circumstances.

81. The co-chairs of the task force subsequently provided additional responses to certain questions. Mr. Woodcock began by confirming that the Panel very much relied on parties for relevant data and case studies, which enabled the Panel, in turn, to inform parties, in a process that was somewhat circular. Turning to a question on the relevant time frame for updating the parties on technology developments, he said that the relevant time frame for natural refrigerants and not-in-kind technologies was similar to that for HFCs and hydrofluoroolefins (HFOs). In his view, natural refrigerants and HFCs/HFOs were developing equally fast and not-in-kind technologies would also produce solutions, although perhaps on a slower time frame – deep-sea cooling, for instance, would eventually be very important in some areas. When industry understood that there was an emergency, it developed solutions at speed, he said, offering industry's response to the COVID-19 pandemic as an example. At present, the refrigeration, air-conditioning and heat pump industry was responding with speed to the climate emergency; the challenge would be to translate availability to accessibility through the framework within which new solutions would be developed.

82. Mr. Abdelaziz addressed a question regarding cost increases for the various safety aspects and refrigerant properties by drawing attention to annex 9.4 of the report, which provided detailed information on the topic. He added that the information on cost increases was highly dependent on studies performed as part of conversion projects. He then turned to the question of whether going one step down in energy efficiency during conversion would produce any climate benefit, saying that, in the view of the task force, there was currently no reason to sacrifice energy efficiency during conversion.

83. Following the question-and-answer part of the discussion, many representatives provided their general comments on the report and on the topic of energy efficiency more generally.

84. Several representatives noted that the report highlighted the climate benefits achievable under the Montreal Protocol, with some noting the associated importance of early action on incorporating energy efficiency into the HFC phase-down. One representative pointed out that action taken to

improve cold chain management under the Protocol would benefit food security and vaccine delivery, both of which were also high on the global agenda. One representative, speaking on behalf of a group of parties, remarked that the report also indicated that progress had been made on standards, in that charge size had been increased to facilitate the use of very-low-global-warming-potential (GWP) alternatives, including propane and other hydrocarbons, in refrigeration and air conditioning.

85. A number of representatives indicated their interest in having the Panel produce an updated report; with one cautioning that the time frame for such a report should be considered carefully given that the Panel had indicated its strong reliance on progress made by parties as a source of data for its analysis. Several representatives asked that additional topics be covered in an updated report, including the accessibility of energy efficient low-GWP technologies; the availability and accessibility of alternatives for air conditioning specifically for high-ambient-temperature countries; the status of adoption of low-GWP, energy-efficient technologies in non-Article 5 parties, including flammable technologies, to guide industry in developing countries on technology choices; the benefits of combining energy efficiency and HFC phase-down; cold chain management; and mobile air conditioning.

86. There was general interest in discussing energy-efficiency-related issues at the current meeting, with many representatives proposing that a contact group be established, in particular to discuss next steps that could be taken to make progress. Suggestions for possible next steps included training technicians in the servicing sector; carrying out awareness-raising and demonstration projects to allay the fears of end-users, manufacturers and technicians; developing mandatory minimum efficiency performance standards, labelling and a compliance and testing programme for cooling equipment to enable end-users to identify obsolete, low-energy-efficiency equipment; addressing the barrier of the high cost of low-GWP-technology equipment by tackling dumping and creating financial incentives for energy-efficient equipment purchases; providing assistance in developing policies and regulations for the adoption of energy-efficient technologies; supporting the incorporation of international standards at the national level; conducting regional surveys on standards compared to available technologies; carrying out pilot projects for low-GWP technologies; strengthening cooperation between national ozone units and energy efficiency departments to effectively enforce the minimum energy standards in each country, including strengthening or reviving energy departments as needed; providing training on flammable refrigerants; exploring bulk procurement at a regional level; raising awareness of enforcement officers, importers and consumers with respect to standards; raising consumer awareness of the long-term benefits of energy-efficient equipment to increase acceptance of high initial investment; raising awareness at top political levels to prevent obsolete technologies from being accepted into countries as donations; supporting the establishment of a certification process; and ensuring that the refrigerant transition was coordinated with energy policies at the national level.

87. Representatives also indicated their interest in discussing barriers to access; strengthening of cold chain management under the Montreal Protocol; policy and finance issues raised in the Panel's report; Multilateral Fund funding for maintaining and enhancing energy efficiency and for energy efficiency pilot and demonstration projects; minimum energy efficiency standards for medium- and high-volume appliances; and the specific accessibility situation of low-volume-consuming countries, small island developing States and countries with economies in transition owing to their small market size.

88. Several representatives drew attention to parallel discussions on energy efficiency taking place in the Executive Committee, which at its most recent meeting had requested the Multilateral Fund secretariat to develop criteria for pilot projects on energy efficiency and to prepare a report elaborating on possible options for expanded work under the Multilateral Fund to maintain or enhance energy efficiency as part of the HFC phase-down. Another representative noted that the current agenda item was linked to the proposed restructuring of the Panel and the HFC assessment report, both of which were slated for consideration by the parties in 2022.

89. Following discussion in the contact group established under agenda item 6 (b), the co-chair of the contact group reported that during the discussion in the group, parties had put forward many ideas for action in response to the Panel's report on energy efficiency, including specific areas for more information and follow-up from the Panel, such as new standards; the use of new refrigerants in high-ambient-temperature countries and modelling of energy efficiency benefits; capacity-building at the national and regional levels, such as minimum energy performance standards and regional training centres; and ways to integrate HFC phase-down and energy efficiency activities at the national level, such as through cooling plans and coordination between national ozone units and their energy-efficiency and climate colleagues. While the group had not had sufficient time to capture every idea or to prioritize the ideas that had been presented, a summary of ideas proposed and feedback on

the Panel's report had been prepared for consideration by the parties during the intersessional period and further discussion by the Thirty-Fourth Meeting of the Parties.

90. The Working Group agreed to forward the feedback and summary of ideas on energy efficiency and low-global-warming-potential technologies, as set out in section C of annex III to the present report without formal editing, to the Thirty-Fourth Meeting of the Parties for further consideration.

B. Dumping of new and old inefficient refrigeration and air conditioning appliances (proposal by the African Group) (UNEP/OzL.Conv.12(II)/9–UNEP/OzL.Pro.33/8, para. 82)

91. Introducing the item, the Co-Chair recalled that, at the Thirty-Third Meeting of the Parties, the representative of Ghana, on behalf of the African States parties to the Montreal Protocol, had introduced a draft decision on stopping environmentally harmful dumping of inefficient refrigerant and air-conditioning appliances using obsolete refrigerants. The parties had agreed to place the matter on the agenda of the next in-person meeting to allow for in-depth exploration of the challenges underlying the proposal and of actions that could be taken under the Protocol to address those challenges.

92. Paragraphs 23 to 35 of document UNEP/OzL.Pro.WG.1/44/2 provided background information on the proposal, while annex II to that document contained the proposal itself, as submitted to the Thirty-Third Meeting of the Parties.

93. The representative of Ghana introduced the proposal. He recalled that, on behalf of the African States, Ghana had submitted to the Thirty-Third Meeting of the Parties a proposal to stop the dumping of inefficient appliances with high-global-warming-potential ozone-depleting refrigerants. The meeting had been held virtually and it had not been possible to reach agreement on the matter at that time. Dumping increased the chances of non-compliance by Article 5 parties; punished Article 5 parties owing to unaffordable electricity costs and associated air pollution; and punished non-Article 5 parties that were donors to the Multilateral Fund as they faced much higher replenishment costs. Temperatures in Africa were increasing more quickly than the global average, putting the continent at risk from multiple climate disasters. It was therefore necessary to use every tool available to help Africa and the world in addressing the climate crisis. The proponents were requesting that the proposal be included in the draft decision on energy efficiency to be presented to the Thirty-Fourth Meeting of the Parties for its consideration.

94. In the ensuing discussion, all those who took the floor acknowledged that the proposal raised important and relevant issues related to the management of controlled substances under the Protocol and to energy efficiency. Several representatives supported the proposal, with some stating that they had experienced dumping in their countries or that they feared it might occur in the future, especially given how quickly technology became obsolete. Many other representatives felt that further discussion of the proposal was needed, either to refine the text or, more fundamentally, to obtain more information about the basis for its elaboration or because they believed that there were other possible ways to address the underlying issues. The matters that were cited as needing further clarification included the scope and extent of the problem, given that evidence of dumping was mainly anecdotal and general apart from a few statistics in volume 4 of the 2021 report of the Technology and Economic Assessment Panel prepared pursuant to decision XXXI/7 on the continued provision of information on energy-efficient and low-global-warming-potential technologies; the definition of the terms "obsolete" and "inefficient" in relation to technologies and refrigerants; the scale of the exportations to Article 5 parties and their provenance; the specific countries that did not wish to receive such products, and which of them had enacted legislation to prevent importation and how any such legislation was being implemented. It was proposed that the Working Group might want to request the Secretariat or the Panel to study the matter further.

95. In terms of alternative solutions to the problem of dumping, representatives mentioned the enforcement of various regulations and standards related to obsolete equipment; importation restrictions; quota systems; incentives to encourage the use of alternative technologies; and, pursuant to decision X/9, notification of the Secretariat that parties did not consent to the importation of products and equipment whose continuing functioning relied on Annex A and Annex B substances. One representative informed the Working Group that the Executive Committee of the Multilateral Fund had held a good initial discussion on ways to help Article 5 parties deal with obsolete equipment and was expecting the Multilateral Fund Secretariat to prepare a paper on options for strengthening the capacities of Article 5 parties for consideration by the Committee at its subsequent meeting.

96. Several representatives pointed out that responsibility for addressing the issue of dumping was shared, and it did not lie solely with Article 5 parties.

97. Several representatives referred to prior informed consent procedures that were in place under other multilateral environmental agreements such as the Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. They highlighted the need for cooperation and synergy with those conventions and highlighted the utility of such mechanisms in enabling importing countries to protect themselves against unwanted imports. Several representatives, however, remarked that any solution to the problem of dumping needed to be firmly within the mandate of the Montreal Protocol. One representative was sceptical about the use of an informal mechanism such as the UNEP OzonAction informal prior informed consent platform, while another said that it would be difficult use that mechanism when dealing with imports of equipment.

98. Other issues that were cited as requiring further consideration included tariffs and the codes of the Harmonized Commodity Description and Coding System, especially for blends; destruction facilities; and capacity-building and funding for Article 5 parties.

99. There was unanimous support for further discussion of the proposal made by the African States.

100. The Working Group agreed to establish a contact group, to be co-chaired by Ms. Annie Gabriel (Australia) and Ms. Bitul Zulhasni (Indonesia), to consider further the two sub-items under agenda item 6, namely sub-item 6 (a) on the report by the Technology and Economic Assessment Panel (decision XXXIII/5) and sub-item 6 (b) on dumping of new and old inefficient refrigeration and air-conditioning appliances (proposal by the African Group) (UNEP/OzL.Conv.12(II)/9–UNEP/OzL.Pro.33/8, para. 82). With respect to sub-item 6 (a), the mandate of the contact group was to consider how to advance the issues related to energy efficiency on the basis of the report by the Panel and to explore what further action could be taken. With regard to sub-item 6 (b), the mandate of the group was to consider the proposal by the Group of African States and to solicit responses from the proponents to the questions raised during the discussion in plenary. The group would then report back to the plenary, which would enable the Working Group to hone the mandate further as it deemed necessary.

101. Subsequently, the co-chair of the contact group, reporting on the group's work, said that the group had held a general discussion on the context and background to the African proposal, including many questions exploring the situation of African countries, what constituted obsolete equipment, what actions had been taken to date, what actions could be taken in the future and the specific role of the Montreal Protocol in assisting African countries to address their concerns. One representative had made a presentation, which had provided useful information for parties and generated additional discussion. It had been clarified that the African proposal did not cover waste refrigeration and air-conditioning equipment, but rather was specifically related to new and used equipment that contained older controlled substances, like R-22 or R-12, or was not energy efficient. It had also been noted that different circumstances might require different responses. In terms of the various elements of the draft decision proposed by the group of African States, while concerns had been expressed regarding the articulation of the informal prior consent procedure, the concept of countries sharing information on unwanted equipment containing ozone-depleting substances or HFCs and finding ways to respect the regulations of importing countries was understood to be important. Parties had also indicated that they could work with elements of the draft decision related to capacity-building, building cooperation and improving the information base.

102. The Working Group agreed to forward the draft decision by the group of African States and the feedback and summary of ideas on energy efficiency and low-global-warming-potential technologies, as set out in sections D and C, respectively, of annex II to the present report without formal editing, to the Thirty-Fourth Meeting of the Parties for further consideration.

VII. Terms of reference for a study on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2024–2026

103. Introducing the item, the Co-Chair recalled that it was customary, in the year preceding the final year of each funding cycle of the Multilateral Fund, for the parties to develop and adopt terms of reference for a study to estimate the funds necessary to enable Article 5 parties to achieve compliance with the Montreal Protocol during the subsequent replenishment period. Furthermore, the Technology

and Economic Assessment Panel usually formed a replenishment task force to carry out the replenishment study. Accordingly, in 2022, the parties were due to consider the terms of reference for a study of the funding needed for the replenishment period 2024–2026. The Co-Chair further recalled that normal practice was to establish a contact group to develop the terms of reference after an initial discussion in the plenary on the elements that parties wanted to include therein.

104. Paragraphs 26 to 29 of document UNEP/OzL.Pro.WG.1/44/2 provided related background information, while annex III to that document contained the terms of reference adopted in decision XXXI/1 on the terms of reference for the study on the 2021–2023 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.

105. Several representatives noted the abnormal situation that the parties found themselves in, as they were considering the terms of reference for the study on the subsequent replenishment while still negotiating the present replenishment. Others noted that the period 2024–2026 was a crucial time for Article 5 parties in terms of compliance obligations.

106. A number of representatives proposed elements to be considered in the study on the replenishment for the period 2024–2026. Those elements included the promotion of low-global-warming-potential alternatives; replacement technologies; human resource requirements; the specific needs of low-volume-consuming countries and very-low-volume-consuming counties; that all the elements of decision XXVIIII/2 should be considered as compliance obligations; and that the aim should be to build back better after the COVID-19 pandemic.

107. The Working Group agreed to establish a contact group, to be co-chaired by Mr. Samuel Pare (Burkina Faso) and Ms. Cindy Newberg (United States), to develop terms of reference for a study on the replenishment of the Multilateral Fund for the period 2024 –2026, using decision XXXI/1 as the starting point for its work.

108. Subsequently, the co-chair of the contact group, reporting on the group's work, said that the group had reviewed the text of the previous decision on terms of reference for the study on replenishment and had managed to reach agreement on certain aspects. It had made some updates to the text and had removed paragraphs that were no longer required. The resulting version of the draft decision had been posted on the meeting portal by the contact group, with some sections remaining in brackets.

109. The Working Group agreed to forward the draft decision, as set out in section E of annex II to the present report without formal editing, to the Thirty-Fourth Meeting of the Parties for further consideration.

VIII. Technology and Economic Assessment Panel 2022 report, including issues relating to:

110. The Co-Chair, introducing the agenda item, drew attention to volumes 1 and 2 of the 2022 report of the Technology and Economic Assessment Panel, which contained information related to sub-items (a) to (d).

111. Following an introduction by Ms. Marta Pizano, co-chair of the Panel, members of the Panel and its technical options committees summarized the findings of volumes 1 and 2 of the 2022 Panel report as follows: Ms. Helen Walter-Terrinoni – Flexible and Rigid Foams Technical Options Committee; Mr. Adam Chattaway – Halons Technical Options Committee; Mr. Ian Porter– Methyl Bromide Technical Options Committee; Mr. Keiichi Ohnishi– Medical and Chemicals Technical Options Committee; and Mr. Roberto Peixoto – Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee. Ms. Bella Maranion, co-chair of the Panel, presented a proposal by the Panel for restructuring its technical options committees, which would be discussed under agenda item 9. A summary of the presentation is set out in section C of annex III to the present report, without formal editing.

112. In the ensuing discussion, Panel members responded to questions raised by representatives and expressed their willingness to discuss specific issues bilaterally with interested representatives.

113. On the Panel's expectations for the foams sector, and concerns expressed about the limited availability and affordability of alternatives to HFCs in the sector, including delays in the production of HFO due to the COVID-19 pandemic, Ms. Walter-Terrinoni said that there was a shortage of supply of HFC alternatives in both Article 5 and non-Article 5 parties, which had resulted in a return to HFC use in some cases. However, the situation was expected to normalize, with increased production of alternatives by some producers. The Panel would examine the issue in more detail in its 2022 assessment report. With regard to shortages in the availability of blowing agents, additional

capacity had come online recently, and, despite continued challenges, the use of blends had allowed some parties to deal with the temporary shortages in a creative way.

114. Addressing questions related to the existence of alternatives to halon 1301 and 1211 in civil aviation, Mr. Chattaway said that halon was used in four main areas in aircrafts, namely in lavatory waste bins, where a number of HFC alternatives to halons were available; portable or hand-held fire extinguishers, which formerly used halon 1211 and had mostly successfully transitioned to a material known as 2-BTP (2-bromo-3,3,3-trifluoroprop-1-ene); in engine areas, for which two agents were still being trialled and would need to go through the certification process; and cargo compartments, where a number of agents had been tested over the years, but most had fallen short in some area or another, and which presented the greatest challenge, given the justifiably stringent requirements applicable and the technical complexities involved.

115. Responding to questions on the contamination of halons as a result of halon recycling, including regarding the source and the extent of the problem, he said that the Panel believed that the contamination was occurring primarily during the recovery process, when fire extinguishers were removed from aircraft and bulked up to facilitate recycling, a situation that had led to the development by the Halon Recycling Corporation (HRC) of a voluntary code of practice outlining responsible handling procedures for companies that reclaimed used halons. Whether or not recovered halons were destroyed depended on the extent of the contamination; some recovery processes could remove certain levels of contaminants, but in cases of severe contamination, distillation was required, which led to some loss of halon and was not a method available to all halon recyclers. On a question regarding the potential application to other chemicals of lessons learned in the recycling or recovery of halon, he said that there was a tremendous opportunity to apply such lessons to HCFCs and HFCs. Finally, Mr. Chattaway said that the Panel would give consideration in its 2022 assessment report to the new United States regulations on 2-BTP, which had been finalized after the release of the 2022 update report.

116. Asked about how Article 5 parties might destroy in an environmentally sound manner obsolete stocks of ozone-depleting substances, including stockpiles of methyl bromide, Mr. Nick Campbell , a member of the Medical and Chemicals Technical Options Committee, said that the Panel had identified a number of destruction technologies that had been approved by the parties, and which many parties possessed. The Panel could provide information on such technologies to interested parties, and those parties were also encouraged to engage with the parties that held specific destruction technologies. Mr. Porter added that very deep burial might be a solution to deal with stockpiles of methyl bromide in some cases.

117. On a question regarding the rise in stocks of methyl bromide for non-quarantine and pre-shipment applications, Mr. Porter said that the Panel required better data in order to determine the cause of the rise in stocks. As to whether the slight rise in the atmospheric concentration of methyl bromide in 2020/2021 could be due to natural variation, he said that, due to insufficient data, the Panel was unable to determine whether that was the case, or whether a significant portion of the rise could be due to human activities, as recent research suggested.

118. Responding to a question related to the use of alternatives to methyl bromide in quarantine and pre-shipment applications, Ms. Pizano said that there was considerable experience and research on alternatives to methyl bromide for quarantine and pre-shipment uses, especially for pre-shipment applications, and there was good experience with ethane-dinitrile, which had been successfully used in New Zealand for the treatment of logs in quarantine applications.

119. On the reasons for the rise in consumption of methyl bromide in Article 5 parties for quarantine and pre-shipment uses, and a concern expressed that some parties that exported agricultural products were required to fumigate their products with methyl bromide in order to fulfil the requirements of importing countries, Ms. Pizano said that the increase could be observed from 2010, based on data reported by the parties under Article 7 to the Convention, and was most noticeable in Asia. The causes for the increase could be increased trade, improved reporting, and/or trade requirements for agricultural products, but in order to determine the cause, the Panel would need more information on the reasons why parties were using methyl bromide in quarantine and pre-shipment applications. Mr. Porter stressed that bilateral consultations and coordination between regulatory authorities of importing and exporting parties was key to addressing the issue of methyl bromide use in traded agricultural products, stressing that the Methyl Bromide Technical Options Committee would consider the issue in its final report, following consultations with the parties.

120. On whether the Methyl Bromide Technical Options Committee collaborated with the International Plant Protection Convention (IPPC), Ms. Pizano said that the Ozone Secretariat and the Food and Agriculture Organization of the United Nations, on behalf of the IPPC secretariat, had

signed a memorandum of understanding in 2013 to collaborate on issues related to methyl bromide, under which the Committee submitted annual reports to IPPC on its work.

121. On a question regarding the possible impact of the widespread market availability of blends or mixtures of refrigerants on controlled ozone-depleting substances, Mr. Peixoto said that, over the previous 10 to 15 years, over 100 new refrigerant blends had been tested and placed in the market, but their ultimate survival would depend on their market penetration, as well as capacity-building and training efforts in the servicing sector on the use of such blends, which was an important factor given their complexity. On a related question on Panel expectations for future refrigerant production, he said that alternatives to HFCs, in particular HFC134a, for use in existing and new equipment, had been put in the market over the previous years, and the market would determine their success, which would also depend on the conservation of refrigerants, leakage decreases, and recovery and recycling efforts.

122. In response to further queries from the floor, Mr. Peixoto said that the Panel recognized the importance of servicing when it came to flammable refrigerants, and the issue had been the focus of several reports and guidelines on good practice both within and beyond the scope of the Montreal Protocol. Due to the recent revision of safety standards on flammable refrigerants, it was important to intensify training processes for such refrigerants, and the 2022 assessment report would include a chapter on the servicing of refrigeration and air-conditioning equipment, including transport and food chain refrigerants, as well as the expansion of HFC32, which was a mildly flammable refrigerant.

123. Asked whether the Panel could examine and rank the factors that were responsible for the slow uptake of alternatives to controlled substances in all sectors, Ms. Walter-Terrinoni said that such a ranking would depend on a wide number of factors that would vary according to the industries, parties and locales involved, and was not simply about an analysis of each sector.

124. Responding to questions related to the proposed restructuring of the technical options committees, Mr. Chattaway said the proposed new names for some of the committees reflected the broadening of the scope of work of those committees. Ms. Walter-Terrinoni and Mr. Peixoto noted that the proposed restructuring of the committees contemplated the consideration of energy efficiency by the new proposed committees dealing with buildings and cold chains.

125. Responding to additional questions from the floor, Ms. Walter-Terrinoni said that the quadrennial report would include extensive modelling of HFC-23, which was a priority chemical that deserved careful consideration.

A. Nominations for critical-use exemptions for methyl bromide for 2023 and 2024

126. Introducing the sub-item, the Co-Chair of the Working Group referred representatives to the interim recommendations of the Methyl Bromide Technical Options Committee on the critical-use nominations put forward by parties, which had been included in the Technology and Economic Assessment Panel's presentation and were set out in volume 2 of the Panel's 2022 report and summarized in document UNEP/OzL.Pro.WG.1/44/2/Add.1 (paras. 18–26).

127. The representative of Australia, thanking the Committee for its work, said that, although he was disappointed that the Committee had not been able to assess Australia's critical-use nomination, even though the technical and economic basis had not changed since the 2021 nomination, he noted that the Committee intended to revise its interim recommendation before the Thirty-Fourth Meeting of the Parties on the understanding that a decision was currently pending regarding the registration of an alternative in Australia. He recalled that his party had engaged in many years of research, working closely with its strawberry runner industry, on suitable alternatives to methyl bromide. Trials of methyl iodide had proved its effectiveness as an alternative, but there had been delays in the registration process under the relevant national registration authority, which was an independent body that would conduct a robust risk assessment of the chemical, and a decision on registration was currently expected no earlier than September 2022, making the timeline of the transition uncertain. It had therefore been necessary for Australia to submit a further critical-use nomination for 2024. He said that he would keep the Committee apprised of the progress of the registration and subsequent transition process, and intended to meet with the Committee in the margins of the current meeting, as well as bilaterally with any interested parties.

128. The representative of Canada, thanking the Committee for its work, said that her country remained committed to finding alternatives for methyl bromide in the strawberry runner industry and recalled that it had reduced the amounts in its critical-use nominations by 92 per cent since 2005. No suitable alternatives had yet been identified despite considerable national efforts and resources being expended, and the research process had recently been hampered by the COVID-19 pandemic.

Research was continuing, however, and promising soilless technologies were currently being investigated. She expressed surprise that the Committee had not been able to assess Canada's critical-use nomination. The Committee had not followed its established practice of requesting any additional information required from a party before publishing its interim report and Canada was not aware of any decision made by the parties that required the provision of a national management strategy that included timelines for the complete phase-out of methyl bromide. Canada would meet with the Committee to discuss the issue further and was available to engage in bilateral discussions with any interested parties.

129. The representative of South Africa, thanking the Committee for its work, said that her country had made a critical-use nomination only for structural fumigation for 2023, as it now had alternatives in place for mills. South Africa had not submitted a critical-use nomination for 2022, as stock levels had not been depleted at the usual rate given the decreased activity during the COVID-19 pandemic. Pests were, however, currently endemic in the Western Cape Province, causing significant damage to structures, and the sulfuryl fluoride alternative was not proving effective. South Africa was currently continuing trials of two alternatives that had been approved and was conducting stewardship awareness training. The national plan to phase out methyl bromide for structural fumigation use by 2024 was on track, with the interim target of 30 per cent reduction in 2021 having been exceeded, so the country was pleased to accept the interim critical-use exemption amount proposed by the Committee. South Africa requested that the Committee conduct further evaluation of the long-term impact of sulfuryl fluoride and support the country with the issues of stockpiling and misuse of methyl bromide intended for quarantine and pre-shipment use, which was causing poor market penetration of alternatives. South Africa, in addition to providing a national methyl bromide framework report, had developed relevant guidelines, standard operating procedures and training for monitoring and controlling the quarantine and pre-shipment uses of methyl bromide and had proposed a national cap of 48 tons of methyl bromide for those uses to encourage the use of alternatives. The Committee was encouraged to continue to pursue the complete phase-out of methyl bromide globally, in particular by seeking alternatives for the regulatory treatment of packaging material for timber.

130. The representative of the United States noted that he was not aware of any decision that required a party to submit a timeline for the phase-out of methyl bromide as part of a national management strategy and urged the Committee to ensure that the basis for the review process was consistent with the framework set out by parties.

131. The representative of the European Union, recalling that the European Union had phased out methyl bromide in 2010, said that she welcomed the reduction in the total amounts in critical-use nominations from 18,700 tons in 2005 to 40 tons, and the fact that Argentina had not put forward a nomination in 2022 for, and South Africa was phasing out, the use of methyl bromide. She congratulated Article 5 parties on their efforts, noting that if such trends continued critical-use nominations from Article 5 parties would cease. She expressed concern that Australia and Canada continued to submit nominations that the Committee was unable to assess. On the Canadian nomination, she said that in her understanding there was no updated national strategy as required and she encouraged the party to provide the Committee with the information requested as soon as possible, including a clear time frame for phasing out methyl bromide for critical uses. She did, however, express gratitude to those parties for the additional information provided during the current meeting and looked forward to bilateral discussions on the margins of the meeting.

132. Following the discussion, the Co-Chair encouraged all interested parties to arrange bilateral meetings with the Committee in the margins of the current meeting.

B. Future availability of halons and their alternatives (decision XXX/7)

133. Introducing the sub-item, the Co-Chair of the Working Group recalled that, in decision XXX/7, on the future availability of halons and their alternatives, the parties had requested that the Panel, through its Halons Technical Options Committee, continue engaging with the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) to better assess future amounts of halons available to support civil aviation.

134. The Panel had also been requested to identify, in its progress report for the forty-second meeting of the Open-ended Working Group, relevant alternatives already available or in development; ways to enhance the recovery of halons from the breaking of ships; and specific needs, other sources of recoverable halon and opportunities for recycling. Owing to the COVID-19 pandemic, parties had been unable to consider the issues at the forty-second or forty-third meetings, but the Panel had provided updates in both its 2021 and 2022 progress reports. A summary of the information provided in the 2022 progress report was set out in document UNEP/OzL.Pro.WG.1/44/2/Add.2 (paras. 6–12).

135. In the ensuing discussion, several representatives, including one speaking on behalf of a group of parties, expressed their appreciation to the Halons Technical Options Committee for the report.

136. Several representatives, including one speaking on behalf of a group of parties, said that they shared the concerns of the Committee regarding the future availability of halons, given the continuing demand for them and the slow progress in identifying alternatives, and supported the recommendations of the Committee.

137. Some representatives, including one speaking on behalf of a group of parties, said that the continued management of halon stocks should be the main priority of the Committee, with particular focus on raising awareness of halon recycling guidance. One representative, speaking on behalf of a group of parties, said that the regulations for that group of parties in that regard were currently under review and that it had been proposed that the destruction of halons that could be reclaimed be prohibited. Furthermore, a new analysis of recent data for the European Union had been carried out, showing lower emission rates and amounts destroyed as well as stable amounts available in stock.

138. A number of representatives, including one speaking on behalf of a group of parties, suggested that it would be appropriate to wait for the updated information to be provided in the upcoming 2022 quadrennial assessment report of the Committee rather than to discuss the matter at the current meeting. One representative suggested that the discussion be continued before the publication of the report, at the Thirty-Fourth Meeting of the Parties, so that work could continue on ensuring that information on halon recycling was available to all parties.

139. One representative said that it would be helpful if the upcoming report contained information on suggested alternatives for different types of halons.

140. The Working Group agreed to defer further consideration of the item to its forty-fifth meeting and to request that an item on the issue be added to the agenda of the Thirty-Fourth Meeting of the Parties, on the understanding that the matter could also be discussed informally in the margins of the current meeting.

C. Panel membership changes

141. Introducing the sub-item, the Co-Chair of the Working Group recalled that annex I to the Panel's 2022 report contained updated information on the status of the membership of the Panel and its technical options committees. He drew attention to the table in document UNEP/OzL.Pro.WG.1/44/2/Add.2, which contained a list of Panel members whose terms of office would expire at the end of 2022, and recalled that the terms of reference of the Panel, containing the relevant nomination and appointment procedures, and the matrix of needed expertise provided by the Panel in its progress report, to be taken into consideration by parties when making nominations, had been made available to participants on the internet portal of the current meeting. According to those procedures, the appointment of co-chairs, including the co-chairs of technical options committees, and senior experts to the Panel were made under a decision taken by the Meeting of the Parties. Nominations of members to a technical options committee who were not nominated as a co-chair to that committee could be made by parties at any time, as a decision of the Meeting of the Parties was not required. For ease of reference, a list of the members of the technical options committees whose membership would expire at the end of 2022 was included in annex II to document UNEP/OzL.Pro.WG.1/44/2/Add.2.

142. Following the discussion, and as no nominations had yet been received, the Co-Chair encouraged interested parties to consult informally in the margins of the current meeting with a view to submitting nominations to the Thirty-Fourth Meeting of the Parties.

D. Any other issues

143. No other issues were discussed.

IX. Strengthening the Technology and Economic Assessment Panel and its technical options committees for the phase-down of hydrofluorocarbons and other future challenges related to the Montreal Protocol and the climate (proposal by Morocco) (UNEP/OzL.Conv.12(I)/6–UNEP/OzL.Pro.32/8, para. 15)

144. Introducing the item, the Co-Chair recalled that, at the Thirty-Second Meeting of the Parties, held in 2020, the representative of Morocco had introduced a draft decision on strengthening the Technology and Economic Assessment Panel and its technical options committees for the phase-down of hydrofluorocarbons (HFCs) and other future challenges related to the Montreal Protocol and the climate. The parties had agreed that the proposal raised important issues requiring careful thought but, as time at that meeting was limited, had decided to defer the discussion to 2021. The matter had not been taken up in 2021, however, because of the ongoing COVID-19 pandemic. The proposal by Morocco was set out in a note by the Secretariat on the issues for discussion by and information for the attention of the Working Group at its forty-fourth meeting (UNEP/OzL.Pro.WG.1/44/2/Add.2, annex IV). In addition, the Technology and Economic Assessment Panel had formulated recommendations on possible adjustments to its current structure to enable it to more efficiently support the parties' efforts to phase out ozone-depleting substances and phase down HFCs. Those recommendations were set out in chapter 8.4 of volume I of the Panel's May 2022 progress report and were also summarized in the note by the Secretariat on issues for discussion by and information for the attention of the Working Group at its forty-fourth meeting (UNEP/OzL.Pro.WG.1/44/2/Add.2).

145. The representative of Morocco briefly presented the draft decision submitted by Morocco, which, she said, was aimed at addressing parties' concerns and needs regarding the specific challenges associated with the implementation of the Kigali Amendment, as well as regional and gender issues. The draft decision reflected proposals to merge the Halons Technical Options Committee and the Methyl Bromide Technical Options Committee into the Medical and Chemicals Technical Options Committee, to restructure the Flexible and Rigid Foams Technical Options Committee for expertise in the alternatives and substitutes to high-global-warming-potential HFCs and to create an energy efficiency technical options committee. The proponent requested that a contact group be established to discuss the proposal, consider how to integrate the relevant recommendations formulated by the Technology and Economic Assessment Panel and perhaps consider which technical options committees could best deal with the emerging challenges presented by the HFC phase-down.

146. Many representatives, including one speaking on behalf of a group of parties, thanked Morocco for its patience as well as its draft decision and the Technology and Economic Assessment Panel for its recommendations, welcoming the opportunity to consider the proposals, which many said were timely.

147. A number of those who spoke, including one speaking on behalf of a group of parties, cautioned, however, that both the draft decision and the Panel's recommendations required careful consideration, as they represented fundamental changes to the current structure of the Panel and its technical options committees. While all agreed that new issues like energy efficiency and the cold chain should be integrated into the Panel's work, several, including one speaking on behalf of a group of parties, questioned the need for significant structural change, suggesting that it might be possible to address such emerging issues within the existing structure by, for instance, reviewing and amending the mandates and focus areas of the current committees. One representative articulated what he considered to be the three key objectives of any structural change, namely ensuring an effective and efficient structure to respond to ongoing party requests and needs; facilitating greater collaboration between experts regarding common considerations for ozone-depleting substance and HFC replacement selection, in particular for foam blowing agents and refrigerants; and establishing synergies between technical options committees in dealing with cross-cutting and emerging issues such as the selection of common alternatives for different sectors or systems, energy efficiency and flammable alternatives.

148. A number of representatives offered specific comments on the recommendations put forward by the Technology and Economic Assessment Panel. With respect to the proposal to essentially replace the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee with two new committees, namely a cold chain technical options committee and a building and indoor climate control technical options committee, to enable more holistic consideration of the food cold chain in one case and indoor comfort cooling in the other, some representatives were supportive of the concept, while others, including one speaking on behalf of a group of parties, were more cautious, citing concerns about overlap, the kind of experts needed and optimization of the experts' work. There was

also uncertainty regarding the proposed elimination of the Flexible and Rigid Foams Technical Options Committee and integration of foam issues into the two proposed new committees, with a general desire expressed for more explanations and more time to consider the proposal and specific concerns raised regarding the potential loss of focused expertise and important work on foams. Several representatives said that they would require additional justifications before considering the proposed widened scope of the Methyl Bromide Technical Options Committee to include sustainable production in agriculture, with one commenting that it appeared to expand the Committee's work far beyond the mandate of the Montreal Protocol. The proposal to change the name of the Halons Technical Options Committee to the Fire Protection Technical Options Committee met with general approval from those who commented, on the basis that the name would more accurately reflect the Committee's work going forward.

149. In terms of specific comments on the draft decision proposed by Morocco, one representative said that she saw value in the proposed merging of the Methyl Bromide Technical Options Committee into the Medical and Chemicals Technical Options Committee, but did not see a similar merging of the Halons Technical Options Committee as timely given the continuing need for halon replacements and the management of halon stocks. Another representative opposed the creation of an energy efficiency technical options committee, saying that the focus should be on HFC equipment and alternatives rather than energy efficiency in general, which was beyond the scope of the Protocol. Several representatives referred to the expert nomination process as alluded to in the draft decision, saying that it was important to follow the agreed nomination process and to ensure gender and geographical balance and Article 5 party representation. One specified that the principle of full consultation of national focal points should be adhered to, including national focal point endorsement of proposed nominations, and another urged parties to take the Panel's matrix of needed expertise into account when nominating experts.

150. All those who spoke expressed an interest in discussing the draft decision and Panel recommendations further and receiving additional information and explanations on both.

151. The parties agreed to establish a contact group, co-chaired by Mr. Paul Krajnik (Austria) and Ms. Azra Rogović-Grubić (Bosnia and Herzegovina), to consider the recommendations of the Technology and Economic Assessment Panel and the draft decision submitted by Morocco, also taking into consideration ideas that parties might have in relation to restructuring. The group was also to ensure that any restructuring maintained or improved the effectiveness and efficiency of and synergies among the Panel and its technical options committees.

152. Subsequently, the co-chair of the contact group reported that, following comprehensive discussions, a list of questions had been collated to be forwarded to the Technology and Economic Assessment Panel and work would continue on the matter during the intersessional period.

153. The Working Group agreed to continue work on the matter during the intersessional period and to resume discussions on the restructuring of the Technology and Economic Assessment Panel at the Thirty-Fourth Meeting of the Parties.

X. Stocks of methyl bromide (UNEP/OzL.Pro.31/9, para. 100) and quarantine and pre-shipment uses (UNEP/OzL.Conv.12(II)/9–UNEP/OzL.Pro.33/8, para. 56)

154. Introducing the item, the Co-Chair recalled that at the Working Group's forty-first meeting, held in 2019, the European Union had introduced a draft decision, co-sponsored by Norway, inviting the parties to provide information on their stocks of methyl bromide on a voluntary basis and requesting the Technology and Economic Assessment Panel to further clarify, through specific examples, what constituted an exempted use, or quarantine and pre-shipment application, of methyl bromide and what constituted a controlled use of the chemical. After discussions in an informal group, the Working Group had agreed to defer further consideration of the issue to the Thirty-First Meeting of the Parties, and, at that meeting, the proponent had requested that the item be included on the agenda of the Working Group's subsequent meeting, its forty-second, scheduled for 2020. The issue had not been taken up at either the forty-second or the forty-third meeting, however, owing to the circumstances of the COVID-19 pandemic, and at the Thirty-Third Meeting of the Parties, the proponent had requested that the issue of stocks of methyl bromide and quarantine and pre-shipment uses be included on the agenda of the Working Group's forty-fourth meeting. A draft decision on stocks and quarantine and pre-shipment uses of methyl bromide had subsequently been submitted by Ecuador, the European Union, Norway and Switzerland for the consideration of the parties at the current meeting.

155. The representative of the European Union presented a conference room paper containing the proposed draft decision, noting that had been updated to reflect discussions held with a number of parties since the Working Group's forty-first meeting in 2019 and that the proponents hoped it would be discussed in a contact group to which the Methyl Bromide Technical Options Committee would be invited. He went on to explain that methyl bromide had significant ozone-depleting potential, but was also relatively short-lived, meaning that emissions had a strong effect on the ozone layer and reducing emission sources would have very quick remedial effects. Methyl bromide was still used for quarantine and pre-shipment purposes and the level of stocks remained persistently high. According to the Technology and Economic Assessment Panel in its 2020 progress report, methyl bromide was one of the remaining challenges for ozone depletion; the increasing uncontrolled use of methyl bromide for quarantine and pre-shipment had the potential to offset the benefits gained by phasing out controlled uses and was now the key contributor to global anthropogenic concentrations of methyl bromide in the atmosphere. Discrepancies were seen in top-down and bottom-up estimates of methyl bromide, and the Methyl Bromide Technical Options Committee had indicated that it needed better reporting and data to produce good information on the remaining use of the chemical. Furthermore, there were economically and technically feasible alternatives for certain quarantine and pre-shipment uses. Thus, in the proposed draft decision, parties were reminded to report all uses of methyl bromide, encouraged to reinforce the mechanisms in place at the national level for such reporting and invited to submit details on stocks to the Ozone Secretariat on a voluntary basis. Parties were also invited to review their relevant legislation with a view to allowing the use of suitable alternative treatments or procedures allowing the relevant phytosanitary protection, to minimize methyl bromide use through recycling, recapture and reuse and to submit information on the key target pests for which the use of methyl bromide was still required. Finally, the Methyl Bromide Technical Options Committee was asked to consult with relevant experts and the IPPC secretariat with a view to producing a list of current quarantine and pre-shipment uses where economically and technically feasible alternatives were available, and those where alternatives were not available, for consideration by the Open-ended Working Group at its forty-fifth meeting.

156. The co-sponsors of the proposal also made brief statements in which they reiterated their support for the proposed draft decision. In addition, the representative of Norway characterized the proposal as a response to the Methyl Bromide Technical Options Committee's call for increased transparency around significant discrepancies between reported stocks and estimated emissions, the perception that unreported stocks were hindering the ability of the Committee to fulfil its mandate efficiently and frustrating the desire to see a faster transition to the many available environmentally friendly alternatives, while the representative of Switzerland said that sharing information voluntarily in addition to reporting under Article 7 was an important first step to eliminating a remaining blind spot of the Montreal Protocol, as well as being an immediate action that would complement the longer-term effects of strengthening the institutions of the Protocol.

157. In the ensuing discussion, several representatives, while fully supportive of efforts to ensure that parties and the Technology and Economic Assessment Panel had access to technical and scientific information, said that the proposed draft decision required more in-depth discussion. They noted its wide scope and sought to clarify its ultimate objectives and to ascertain which of the suggested elements would be beneficial to the parties at present to ensure that the cost of the exercise in terms of the time required by and the burden placed on parties and the Panel would be worthwhile in relation to the utility of the results obtained. One of them said that the phase-down of HFC domestically was his party's priority at present, and he was not in a position to divert resources devoted to that effort to the generation of detailed information on quarantine and pre-shipment uses of methyl bromide, which was an agreed exemption under the Protocol. Another representative was also against introducing procedures that related to uses not controlled under the Protocol. One representative, supported by another, said that it might be useful to revisit the proposal following receipt of the quadrennial reports of the Technology and Economic Assessment Panel and the Scientific Assessment Panel later in 2022, as those reports would contain detailed information that could help parties hone the scope of the endeavour.

158. A number of other representatives, however, said that they would be interested in receiving from the Technology and Economic Assessment Panel a report that included a list of current quarantine and pre-shipment uses at the country level for which economically and technically feasible alternatives were available, and the remaining obstacles and challenges to the use of such alternatives. Another representative pointed out that relevant information would vary from country to country, and together with another representative, he questioned whether the Panel and its Methyl Bromide Technical Options Committee had the expertise required to conduct technical and economic analyses of circumstances at the country level. He suggested that IPPC bodies might be better equipped to do so.

159. One representative noted that the proposal did not use the agreed language of the Protocol. It often cited reports of the Methyl Bromide Technical Options Committee that had interpreted Protocol language on issues that were usually left to the discretion of the parties. That was especially true of the preamble to the draft decision, which in any case was considered too extensive, but there were also instances in the body of the draft decision itself. The actions that the parties were being invited to undertake were also well beyond their obligations under the Protocol.

160. When questioned regarding his assertion that the levels of stocks of methyl bromide were high, the representative of the European Union said that the exact quantities were not known as there was a lack of information on stocks, which was indeed one of the reasons for the proposed actions. According to reports by the Methyl Bromide Technical Options Committee, methyl bromide stocks had stood at about 10,000 tonnes for years. The volumes in critical-use nominations and exemptions had decreased, but the stocks remained. He proposed consulting the Methyl Bromide Technical Options Committee for additional quantitative information.

161. One representative said that his country had no mechanism for obtaining information on methyl bromide as its use was under the purview of import and export companies.

162. The Working Group agreed that the European Union would conduct bilateral consultations with interested parties with a view to discussing the concerns that they had raised about the proposal and report back on the outcome. In the event that it was possible to make progress, further consideration of the proposal could take place in an informal group and, eventually, a contact group that would work on specific wording.

163. Subsequently, the representative of the European Union introduced a revised conference room paper, co-sponsored by Ecuador, Norway and Switzerland, containing a draft decision on stocks and quarantine and pre-shipment uses of methyl bromide. The draft decision had been revised following bilateral consultations with interested parties and now focused only on two issues, namely the voluntary submission of data on the volumes of all methyl bromide stocks at the national level, in order to improve the “bottom-up” provision of data, and the provision by the Technology and Economic Assessment Panel to parties of updated information on alternatives. He requested that a contact group be established to discuss the matter further.

164. Several representatives, thanking the European Union for engaging with them on the matter, said that the revised version of the draft decision addressed many, but not all, of their concerns, and that further discussion was therefore required. One representative noted that his party had not yet had the opportunity to engage in bilateral discussions and required time to consult industry stakeholders on the matter. Several representatives said that they did not support the establishment of a contact group on the matter.

165. The Working Group agreed to establish an informal group, co-chaired by Mr. Alain Wilmart (Belgium) and Mr. Diego Montes (Colombia), to discuss the revised draft decision.

166. Subsequently, the co-facilitator of the informal group reported that the group had not been able to reach agreement on the draft decision contained in the revised conference room paper, which therefore remained unchanged. The group had agreed that informal discussions between interested parties on the draft decision should continue during the intersessional period leading up to the Thirty-Fourth Meeting of the Parties.

167. The Working Group agreed to forward the draft decision, as set out in section F of annex II to the present report, to the Thirty-Fourth Meeting of the Parties for its consideration, on the understanding that interested parties could continue informal consultations on the matter in the lead-up to that meeting.

XI. Ongoing emissions of carbon tetrachloride (UNEP/OzL.Pro.31/9, para. 81)

168. Introducing the item, the Co-Chair recalled that the issue of carbon tetrachloride emissions had been discussed at the forty-first meeting of the Open-ended Working Group in 2019 following the new findings on emissions of carbon tetrachloride and their sources in the 2018 quadrennial assessment report by the Scientific Assessment Panel. The new findings had contributed to reducing the discrepancy between the top-down and bottom-up estimates of carbon tetrachloride emission levels and to a better understanding of emission sources. Discussions at that meeting had highlighted that the issue, including unregulated industrial emissions, still needed to be addressed. Suggested actions had included extended atmospheric monitoring, mitigation measures for emissions and relevant research, with guidance from the assessment panels. The representative of Switzerland had submitted a proposal

containing a list of possible actions, but agreement had not been reached thereon, and the draft decision had been forwarded to the Thirty-First Meeting of the Parties for its consideration. At that meeting, discussions had continued in an informal group, but again no agreement had been reached. It had been decided that the issue would be placed on the agenda of the subsequent meeting of the Open-ended Working Group. Owing to the COVID-19 pandemic, however, the parties had been unable to consider the issue in 2020 and 2021. Switzerland had submitted a revised proposal for consideration at the current meeting.

169. The parties had before them the background information contained in paragraphs 49 to 52 of document UNEP/OzL.Pro.WG.44/2 and the report of the Thirty-First Meeting of the Parties (UNEP/OzL.Pro.31/9).

170. The representative of Switzerland introduced a conference room paper containing his party's revised proposal. He said that bilateral consultations with other parties had continued since the proposal had last been discussed, and the text had been posted in the online meeting forum for further comment. Parties' comments had been integrated into the revised version before the Working Group at the current meeting. He recalled that the proposal had been motivated by the discrepancy between bottom-up and top-down estimates of carbon tetrachloride emissions. The discrepancy had been narrowed thanks to scientific findings, but the source of the emissions, and why they were not decreasing, was still unknown. Potential emission sources included inadvertent or coincidental production during manufacturing processes, unreacted feedstock or process agent use. In the past, the emission sources had been assumed to be insignificant, but that assumption might not hold true in all cases. Information from industry was needed, therefore, particularly as the use of carbon tetrachloride as a feedstock had increased over the past years, as reported by the Technology and Economic Assessment Panel. The proposal was thus to invite parties with carbon tetrachloride production to provide to the Ozone Secretariat, on a voluntary basis, any information on their domestic industrial processes that might help assist parties in better understanding potential sources of carbon tetrachloride emissions, including in relation to their locations, the volumes of substances that were part of such production chains, monitoring practices in place and, where available, flows and/or actual or estimated emissions. The Ozone Secretariat would be requested to share that information with the Panel, and the Panel would be requested to review the information and to present the conclusions in its progress report to the Open-ended Working Group at its forty-fifth meeting.

171. A number of representatives thanked Switzerland for its perseverance with the proposal and for taking on board comments from parties to improve it.

172. Several representatives stressed the importance of addressing the issue of carbon tetrachloride emissions and obtaining more information and data with a view to understanding the discrepancy between the bottom-up and top-down estimates of the emissions. Another representative recalled that the discrepancy had, to some extent been explained in a general way as a result of work by the Stratosphere-Troposphere Processes and their Role in Climate (SPARC) project, two scientific studies on carbon tetrachloride emissions published in 2018 and the compilation of information in the progress reports of the Technology and Economic Assessment Panel. Nevertheless, there was still uncertainty regarding the source of the discrepancy, and up to 25 gigagrams per year could be coming from uncontrolled sources.

173. One representative said that, although he found the proposed approach interesting in that it might allow the Technology and Economic Assessment Panel to link emissions to specific industrial sources and he acknowledged that the Panel had said that it needed specific data from parties to advance work on the issue, he was not sure to what extent progress could be made because, as indicated by the SPARC project and the Panel report, some of the top-down emission estimates could be related to emissions of carbon tetrachloride from chlorine-based products and legacy or contaminated sites, not necessarily from production from industrial sources. In that respect, the references in the preamble to the identification of all emission sources and the elimination of all emissions were probably too ambitious. Together with a number of other representatives, he was of the view that further consultations were needed to address that and other questions. One of the representatives sought clarification regarding the purpose of collecting information on domestic production techniques, transport chains and all substances involved in the use and production of carbon tetrachloride and the relevance of a review of such information to emissions of carbon tetrachloride. The collection of such information would require the involvement of companies in the production and transport sectors, and there was insufficient legal basis for her Government to request it.

174. One representative said that, although there was an exemption under the Montreal Protocol for feedstock use, she considered it reasonable to ask for information thereon in order to increase collective knowledge on the subject. She proposed that there be greater knowledge-sharing among parties to ensure that best practices in the management of emissions of carbon tetrachloride in the industrial sector could be taken up.

175. One representative said that she was in favour of strengthening the management of carbon tetrachloride, but noted that it was necessary to ensure that actions did not exceed the scope of the Protocol. Another representative expressed the view that existing mechanisms under the Protocol were working well and that parties had established effective national frameworks to achieve compliance targets. An additional reporting and monitoring burden would be unnecessarily complex, and he saw no need for the proposed action. A number of representatives underscored the fact that the proposal was for a non-binding invitation to parties to provide the information, allowing them the flexibility to contribute or not.

176. The Working Group agreed to establish a contact group to discuss further the revised proposal submitted by Switzerland, including its aim and how it could help to address the issue of ongoing emissions of carbon tetrachloride.

177. Subsequently, the co-chair of the contact group, reporting on the group's work, said that the group had considered the proposal by Switzerland and had made some progress on the matter, including with regard to revisions to terminology and to the specifications for the information to be requested from and provided by companies on a voluntary basis. The resulting version of the proposal had been posted on the meeting portal by the contact group.

178. The Working Group agreed to forward the draft decision, as set out in section G of annex II to the present report without formal editing, to the Thirty-Fourth Meeting of the Parties for further consideration.

XII. Membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (UNEP/OzL.Pro.31/9, para. 147)

179. Introducing the item, the Co-Chair recalled that, at the forty-first meeting of the Open-ended Working Group, Armenia and Bosnia and Herzegovina had submitted, on behalf of some parties in Eastern Europe and Central Asia, a proposal to modify the current membership of the Executive Committee by adding one member from an Article 5 party and one member from a non-Article 5 party, with Eastern Europe and Central Asia being given a permanent seat among the membership from Article 5 parties. At the forty-first meeting, an informal group had been established to discuss the draft decision, but no agreement had been reached. The draft decision had subsequently been forwarded to the Thirty-First Meeting of the Parties, where no consensus had been reached. It had not been possible to discuss the issue at the meetings in 2020 and 2021 owing to the circumstances of the COVID-19 pandemic.

180. The representative of Armenia, introducing the issue and speaking on behalf of a group of parties in Eastern Europe and Central Asia, recalled that the region of Eastern Europe and Central Asia was currently only entitled to representation on the Executive Committee once every four years, as it did not have a permanent seat allocated to it. That arrangement went against the principle set out in Articles 1 and 2 of the Charter of the United Nations, namely the principle of the sovereign equality of all its members. Opposing the proposal for a permanent seat on the Executive Committee for a representative of the region of Eastern Europe and Central Asia thus constituted discrimination against, and a violation of the rights and legal interests of, Member States of the United Nations in that region.

181. The representative of Bosnia and Herzegovina, also speaking on behalf of a group of parties in Eastern Europe and Central Asia, recalled that Eastern Europe and Central Asia constituted one of the five regional groups under the Montreal Protocol and other multilateral environmental agreements, and consisted mainly of relatively young States that had been established following the dissolution of the Union of Soviet Socialist Republics and Yugoslavia. The group enjoyed geographically equitable representation under the Minamata, Basel, Rotterdam and Stockholm conventions and had demonstrated its commitment to the Montreal Protocol though active participation and ratification of the Kigali Amendment by all its members. As the Executive Committee was the most important body of the Montreal Protocol, it was therefore appropriate for the region to be suitably represented on that committee with a permanent seat. She requested that an informal group be established to discuss the

matter further especially as, owing to the small size of the delegations from the region, it was not practical to engage effectively in discussions on the issue in the margins of the current meeting.

182. One representative noted that, in order to be able to work together effectively on the implementation of the Kigali Amendment, which would require the establishment of complex national programmes to enable a transition to new technologies and improved energy efficiency, it was even more important for the region of Eastern Europe and Central Asia to have equitable representation on the Executive Committee.

183. One representative, noting that he did not oppose the proposal, said that other regions faced similar issues with representation which had required creative solutions, such as ensuring that representatives from Arabic- and Portuguese-speaking countries in Africa could participate fully in discussions. If changes were made for the region of Eastern Europe and Central Asia, then changes for other regions might also be requested. It was important to look for justice in the matter and provide the same opportunities to all the regions. In response, a number of representatives, speaking on behalf of a group of parties, highlighted that there were also various groups of languages spoken in the region of Eastern Europe and Central Asia, and that the African region had two permanent seats on the Executive Committee whereas the region of Eastern Europe and Central Asia only had one seat every four years.

184. One representative, thanking the representatives of Armenia and Bosnia and Herzegovina for their proposal, noted that strong wording had been used by representatives during the current discussion. He recalled that the concept of a Montreal Protocol "family" had been much used in the past, and discussions at meetings should therefore take place in that same spirit, demonstrating mutual trust in order to reach an understanding and ensuring that parties of every region felt that they were treated equally. He supported further discussion of the issue in a contact group.

185. Several representatives, including one speaking on behalf of a group of parties, acknowledging the issues raised by the representatives of Armenia and Bosnia and Herzegovina, said that the current structure of the Executive Committee should be retained, as it had proved effective. One representative highlighted that there was a need both for the many bodies with limited membership, ensuring that work was completed effectively, and for bodies in which all parties could participate, such as the Meeting of the Parties. The Executive Committee was seen as a model for other processes within other multilateral environmental agreements and United Nations organizations, as its structure had enabled the effective identification of solutions. Some representatives noted that they had previously expressed their willingness to discuss the issue and had proposed other ways to bridge the gap in representation, such as through Article 5 parties from other regions co-opting parties from the region of Eastern Europe and Central Asia, and through the provision of additional funding under the Montreal Protocol for travel for a representative from that region. They also highlighted that, under the Montreal Protocol itself, there was nothing that obliged Article 5 parties to follow the current seat allocation by region. They expressed regret that the proponents of the proposal had not shown a willingness to engage in discussions regarding such solutions. Several representatives did not support the establishment of a contact group to discuss the issue but stood ready to engage in discussions in the margins of the current meeting.

186. Some representatives expressed support for the statements made by the representatives of Armenia and Bosnia and Herzegovina.

187. As consensus could not be reached on the proposal, the Working Group agreed to bring to a close its consideration of the agenda item.

188. The representative of Armenia, requesting that her statement be reflected in the present report, said that none of the statements made against changing the number of seats on the Executive Committee had been backed up by a reasonable argument.

XIII. Mario Molina declaration on supporting and strengthening the Montreal Protocol (proposal by Mexico) (UNEP/OzL.Conv.12(I)/6–UNEP/OzL.Pro.32/8, para. 16)

189. Introducing the item, the Co-Chair recalled that, during the combined twelfth meeting of the Conference of the Parties to the Vienna Convention and the Thirty-Second Meeting of the Parties to the Montreal Protocol, held in 2020, the representative of Mexico had submitted a proposal for a "Mario Molina declaration to support and strengthen the Montreal Protocol" for consideration and possible adoption by the parties. Due to the reduced and streamlined agenda of the combined meetings, the parties had agreed to defer consideration of the proposed declaration to 2021. However,

given the continuing challenges associated with the COVID-19 pandemic, the parties had been unable to discuss the proposal in that year. An item on the proposal had therefore been added to the agenda for the current meeting and the proposed declaration had been posted in the online forum to allow parties to review it and provide relevant comments prior to the meeting.

190. The representative of Mexico said that, following bilateral consultations with interested parties, Mexico had revised the proposal, which no longer took the form of a declaration, but was instead a draft decision that would be submitted for consideration and possible adoption by the Thirty-Fourth Meeting of the Parties.

191. Subsequently, the representative of Mexico introduced a draft decision, set out in a conference room paper, which he explained was aimed at recognizing the work of the three scientists who had been awarded the Nobel Prize in 1995, Mr. Paul Jozef Crutzen (Netherlands), Mr. Mario José Molina (Mexico) and Mr. Frank Sherwood Rowland (United States). Thanks to their work, 35 years after the adoption of the Montreal Protocol, the objectives of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol, to protect the ozone layer, environment and human health, were being achieved. Behind those objectives was the work of the three great scientists who had studied the composition of the ozone layer and the substances used by ordinary people in everyday life. It was important to recognize their work and the work of all scientists who made it possible to protect the environment and human health.

192. The representatives of the co-sponsors of the proposal, the European Union and the United States, also made statements, thanking Mexico for taking the initiative on the proposal, echoing its representative's comments and indicating their full support for the text of the decision.

193. Many representatives also took the floor to thank the co-sponsors for submitting the proposal, to express their support for the draft decision and to pay tribute to the three Nobel-prize-winning scientists for their world-changing contribution, as well as to all scientists who, through their work, enabled the parties to make progress in achieving the objectives of the Montreal Protocol.

194. The parties agreed to forward the draft decision, as set out in section H of annex II to the present report, to the Thirty-Fourth Meeting of the Parties for further consideration.

XIV. Other matters

195. No other matters were raised.

XV. Adoption of the report of the meeting

196. The parties adopted the present report on the basis of the draft report that had been circulated, as orally amended. The Ozone Secretariat was entrusted with the finalization of the report.

197. During the adoption of the report, one representative requested that the paragraphs of the report that alluded to the situation in Ukraine be deleted or significantly shortened, noting that they summarized political statements that did not relate to the Montreal Protocol. He also stated that there had been a violation of the decision-making procedure based on consensus, ignoring the opinion of one delegation.

198. A number of representatives, including one speaking on behalf of a group of parties, objected to the proposed deletion, noting that the statements delivered during the meeting had been summarized in the meeting report, in accordance with the objective for such reports, which was to accurately reflect the proceedings of the meeting.

199. Following the discussion, the Working Group agreed to include the following statement by the Russian Federation in the present report, under agenda item 15, and to include a footnote in paragraph 12 of the report directing readers to the statement: "During the adoption of the present report, the representative of the Russian Federation insisted that paragraphs 10, 11 and 12 therein should be deleted, and said that the procedure of adopting all decisions by consensus had been violated and the views of the Russian Federation had been ignored."

XVI. Closure of the meeting

200. Following the customary exchange of courtesies, the forty-fourth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol was declared closed at 4.30 p.m. on Saturday, 16 July 2022.

Annex I

Draft decisions to be forwarded to the Fifth Extraordinary Meeting of the Parties for its consideration[1]

The Working Group agreed to forward to the Fifth Extraordinary Meeting of the Parties, the following draft decisions for further consideration.

The Fifth Extraordinary Meeting of the Parties decides:

Decision Ex.V/[--]: Replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the triennium 2021–2023

Recalling decisions XXXII/1 and XXXIII/1, by which the parties adopted interim budgets for the Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer for the triennium 2021–2023,

Noting that any contributions made by parties in advance of the present decision on replenishment would count towards the level of contributions referred to in paragraph 4 of the present decision,

Acknowledging that the exceptional circumstances related to the coronavirus disease (COVID-19) pandemic have disrupted the customary practice of adopting a budget for the Multilateral Fund prior to the start of the related triennium, and that the present decision is being adopted without prejudice to the adoption of future budgets of the Multilateral Fund,

1. To adopt a budget for the Multilateral Fund for the Implementation of the Montreal Protocol for the triennium 2021–2023 of $540,000,000, on the understanding that $65,000,000 of that budget will be provided from the contributions due to the Multilateral Fund and from other sources for the triennium 2018–2020;

2. To note that $246 million in remaining funds that were due to the Multilateral Fund during the triennium 2018–2020 will be used after 2023 to support the implementation of the Montreal Protocol;

3. To note that outstanding contributions from parties with economies in transition for the period 2018–2020 amount to $3,659,668;

4. To adopt the scale of contributions for the Multilateral Fund for the triennium 2021–2023 based on replenishment of $475 million for the triennium 2021–2023 as it appears in the annex to the present decision;

5. That the Executive Committee of the Multilateral Fund should take action to ensure, to the extent possible, that the entire budget for the triennium 2021–2023 is committed by the end of 2023 and that parties not operating under paragraph 1 of Article 5 should make timely payments in accordance with paragraph 7 of decision XI/6.

[1] Presented without formal editing.

Annex to decision Ex.V/[--]

Scale of contributions for the Multilateral Fund for the triennium 2021–2023

No.	*Country*	*United Nations scale of assessment for the period 2019–2021**	*Adjusted United Nations scale of assessment using the 2019–2021 scale with no party contributing more than 22 per cent*	*Triennial contributions for the years 2021–2023 (United States dollars)*	*Average inflation rate for the period 2018–2020 (per cent)***	*Qualifying for fixed exchange rate mechanism, use 1=Yes, 0=No*	*Fixed exchange rate mechanism users' currencies rate of exchange 1 January–30 June 2020*	*Fixed exchange rate mechanism users' national currencies*	*Fixed exchange rate mechanism users' contribution amount in national currencies*
1	Andorra	0.005	0.0082	38 976	0.761	1	0.90244	Euro	35 174
2	Australia	2.210	3.6268	17 227 482	1.463	1	1.52067	Australian dollar	26 197 246
3	Austria	0.677	1.1110	5 277 378	1.669	1	0.90244	Euro	4 762 538
4	Azerbaijan	0.049	0.0804	381 967	2.623	1	1.69617	Azerbaijan manat	647 879
5	Belarus	0.049	0.0804	381 967	5.334	1	Not Available	N/A	
6	Belgium	0.821	1.3473	6 399 893	1.329	1	0.90244	Euro	5 775 545
7	Bulgaria	0.046	0.0755	358 581	2.102	1	1.76489	Bulgarian lev	632 855
8	Canada	2.734	4.4868	21 312 188	1.645	1	1.37100	Canadian dollar	29 219 010
9	Croatia	0.077	0.1264	600 234	0.793	1	6.83717	Croatian kuna	4 103 896
10	Cyprus	0.036	0.0591	280 629	0.079	1	0.90244	Euro	253 252
11	Czechia	0.311	0.5104	2 424 320	2.719	1	23.91857	Czech koruna	57 986 267
12	Denmark	0.554	0.9092	4 318 563	0.590	1	6.73467	Danish krone	29 084 082
13	Estonia	0.039	0.0640	304 014	1.682	1	0.90244	Euro	274 356
14	Finland	0.421	0.6909	3 281 796	0.896	1	0.90244	Euro	2 961 637
15	France	4.427	7.2652	34 509 531	1.306	1	0.90244	Euro	31 142 919
16	Germany	6.090	9.9943	47 473 016	1.220	1	0.90244	Euro	42 841 739
17	Greece	0.366	0.6006	2 853 058	0.010	1	0.90244	Euro	2 574 725
18	Holy See	0.001	0.0016	7 795	N/A	N/A	N/A		
19	Hungary	0.206	0.3381	1 605 820	3.180	1	314.92286	Hungarian forint	505 709 298
20	Iceland	0.028	0.0460	218 267	2.848	1	135.35667	Icelandic króna	29 543 859
21	Ireland	0.371	0.6088	2 892 034	0.370	1	0.90244	Euro	2 609 899

No.	*Country*	*United Nations scale of assessment for the period 2019–2021**	*Adjusted United Nations scale of assessment using the 2019–2021 scale with no party contributing more than 22 per cent*	*Triennial contributions for the years 2021–2023 (United States dollars)*	*Average inflation rate for the period 2018–2020 (per cent)***	*Qualifying for fixed exchange rate mechanism, use 1=Yes, 0=No*	*Fixed exchange rate mechanism users' currencies rate of exchange 1 January–30 June 2020*	*Fixed exchange rate mechanism users' national currencies*	*Fixed exchange rate mechanism users' contribution amount in national currencies*
22	Israel	0.490	0.8041	3 819 668	0.358	1	3.48467	New Israeli shekel	13 310 267
23	Italy	3.307	5.4271	25 778 861	0.577	1	0.90244	Euro	23 263 979
24	Japan	8.564	14.0544	66 758 442	0.477	1	107.46222	Japanese yen	7 174 010 538
25	Kazakhstan	0.178	0.2921	1 387 553	6.023	1	407.93500	Kazakh tenge	566 031 377
26	Latvia	0.047	0.0771	366 376	1.794	1	0.90244	Euro	330 634
27	Liechtenstein	0.009	0.0148	70 157	N/A	N/A	N/A		
28	Lithuania	0.071	0.1165	553 462	1.945	1	0.90244	Euro	499 469
29	Luxembourg	0.067	0.1100	522 281	1.223	1	0.90244	Euro	471 329
30	Malta	0.017	0.0279	132 519	1.350	1	0.90244	Euro	119 591
31	Monaco	0.011	0.0181	85 748	N/A	N/A	N/A		
32	Netherlands	1.356	2.2253	10 570 347	1.795	1	0.90244	Euro	9 539 146
33	New Zealand	0.291	0.4776	2 268 415	1.644	1	1.59589	New Zealand dollar	3 620 136
34	Norway	0.754	1.2374	5 877 612	2.073	1	9.83713	Norwegian krone	57 818 800
35	Poland	0.802	1.3162	6 251 783	2.436	1	4.02450	Polish zloty	25 160 301
36	Portugal	0.350	0.5744	2 728 334	0.449	1	0.90244	Euro	2 462 169
37	Romania	0.198	0.3249	1 543 458	3.701	1	4.37333	Romanian leu	6 750 054
38	Russian Federation	2.405	3.9469	18 747 554	3.577	1	70.51133	Russian rouble	1 321 915 032
39	San Marino	0.002	0.0033	15 590	0.977	1	0.90244	Euro	14 070
40	Slovakia	0.153	0.2511	1 192 672	2.433	1	0.90244	Euro	1 076 320
41	Slovenia	0.076	0.1247	592 438	1.105	1	0.90244	Euro	534 642
42	Spain	2.146	3.5218	16 728 587	0.684	1	0.90244	Euro	15 096 613
43	Sweden	0.906	1.4868	7 062 488	1.471	1	9.68163	Swedish krona	68 376 362
44	Switzerland	1.151	1.8889	8 972 322	0.190	1	0.96013	Swiss franc	8 614 551
45	Tajikistan	0.004	0.0066	31 181	6.742	1	10.06583	Tajikistan somoni	313 862

No.	*Country*	*United Nations scale of assessment for the period 2019–2021**	*Adjusted United Nations scale of assessment using the 2019–2021 scale with no party contributing more than 22 per cent*	*Triennial contributions for the years 2021–2023 (United States dollars)*	*Average inflation rate for the period 2018–2020 (per cent)***	*Qualifying for fixed exchange rate mechanism, use 1=Yes, 0=No*	*Fixed exchange rate mechanism users' currencies rate of exchange 1 January–30 June 2020*	*Fixed exchange rate mechanism users' national currencies*	*Fixed exchange rate mechanism users' contribution amount in national currencies*
46	Ukraine	0.057	0.0935	444 329	7.191	1	26.60000	Ukraine hryvnia	11 819 144
47	United Kingdom of Great Britain and Northern Ireland	4.567	7.4949	35 600 865	1.707	1	0.79300	Pound sterling	28 231 486
48	United States of America	22.000	22.0000	104 500 000	1.831	1	1.00000	United States dollar	104 500 000
49	Uzbekistan	0.032	0.0525	249 448	14.968	0			

* General Assembly resolution 73/271.

** Data extracted from United Nations operational rates of exchange data export tools, United Nations Treasury: https://treasury.un.org/operationalrates/OpRatesExport.php.

Decision Ex.V/[--]: Extension of the fixed-exchange-rate mechanism to the 2021–2023 replenishment of the Multilateral Fund

1. To direct the Treasurer to extend the fixed-exchange-rate mechanism to the period 2021–2023;

2. That parties choosing to pay their contributions to the Multilateral Fund for the Implementation of the Montreal Protocol in national currencies will calculate their contributions on the basis of the average United Nations exchange rate for the six-month period commencing 1 January 2020;

3. That, subject to paragraph 4 of the present decision, parties not choosing to pay in national currencies pursuant to the fixed-exchange-rate mechanism will continue to pay in United States dollars;

4. That no party should change the currency selected for its contribution during the triennium 2021–2023;

5. That only parties with inflation rate fluctuations of less than 10 per cent for the preceding triennium, pursuant to published figures of the International Monetary Fund, will be eligible to use the fixed-exchange-rate mechanism;

6. To urge parties to pay their contributions to the Multilateral Fund in full and as early as possible in accordance with paragraph 7 of decision XI/6;

7. To agree that, if the fixed-exchange-rate mechanism is to be used for the replenishment period 2024–2026, parties choosing to pay their contributions in national currencies will calculate their contributions on the basis of the average United Nations exchange rate for the six-month period commencing 1 January or 1 July ending at least three months prior to the replenishment to be decided.

Annex II

Draft decisions and other input to be forwarded to the Thirty-Fourth Meeting of the Parties for its consideration

The Working Group agreed to forward to the Thirty-Fourth Meeting of the Parties, the following draft decisions for further consideration, on the understanding that they did not constitute agreed text and were subject in their entirety to further negotiation.

A. Identifying sources of emissions originating from industrial processes

Submission by the European Union

The Thirty-Fourth Meeting of the Parties decides:

Considering that emissions of controlled substances and other ozone-depleting substances originating from industrial processes pose an ongoing threat to the ozone layer and may contribute to climate change,

Noting decision IV/12, in which the Parties were urged to take steps to minimize emissions originating from industrial processes,

Recognizing the contribution of atmospheric monitoring to an effective response to unexpected concentrations of trichlorofluoromethane (CFC-11) in the atmosphere,

Understanding that targeted monitoring requires the identification of potential sources of emissions of controlled substances and of their intermediates chloromethane, dichloromethane and trichloromethane that are produced in large quantities and may have a significant effect on the ozone layer, and the regional localization of such emissions, and that such identification requires a better understanding of the industrial processes that might lead to emissions,

1. To request the Technology and Economic Assessment Panel to prepare a report for the Thirty-Sixth Meeting of the Parties on:

(a) Chemical processes in which substantial emissions of controlled substances and of their intermediates chloromethane, dichloromethane and trichloromethane are likely to occur, as well as their regional localization;

(b) Best practices for verifying, through measurements, emission factors in order to better reflect actual emission levels;

2. To invite parties to provide to the Ozone Secretariat, by [30 September 2023], relevant data on the emissions and industrial processes referred to in paragraph 1 of the present decision for use by the Technology and Economic Assessment Panel in the preparation of the report requested in paragraph 1.

B. List of ideas for areas for improvement related to institutional processes for strengthening the effective implementation and enforcement of the Montreal Protocol[1]

Overarching thoughts and challenges

- Montreal Protocol institutions, including the Implementation Committee already work well
- This item provides an opportunity to improve sharing of information and best practices
- Opportunities to improve reporting
- New actions should apply to all Parties
- New measures should be proportionate to expected benefit
- The cost and burden of any new measures should be considered

[1] Reproduced without formal editing.

- Parties should consider the differences between legal obligations as a Montreal Protocol Party and compliance with domestic law

Issues of interest, including examples of specific subitems

- **Illegal trade and production**
  - Currently no definition
  - Effective implementation of Advanced Cargo Information (ACI)
  - Mislabeling
  - HS codes for HFCs
  - Improving Quota system
  - Management of feedstock uses, exemption uses and stockpiling
  - Sustaining compliance after phase-out period
- **Licensing systems**
  - Trade and transfer of licenses
- **Interpretation issues**
  - HFC23 emissions: interpretation of obligations
- **Products**
  - Pre-blended polyols
- **Capacity building / information sharing on best practices and experiences**
  - Training for enforcement and customs officers
  - How can cooperation be better facilitated?
  - Do we need to work more on strengthening processes?
- **Trade through free trade zones**
- **Implementation Committee**
  - Role and processes
  - How to identify issues to be considered by the Implementation Committee?
  - Periodic examination of systemic issues of non-compliance

C. Feedback and ideas in response to the Technology and Economic Assessment Panel report, volume 3 - decision XXXIII/5: continued provision of information on energy efficiency and low-global-warming-potential technologies[2]

- How to integrate regular Energy Efficiency updates in the TEAP report
- Further development of modelling with a focus on operationalization of Energy Efficiency during implementation of phase-down of HFCs / pathways / Benefits of HFC phase-down and energy efficiency
- Supplementary information from TEAP
  - Cost Benefit Analysis
  - Consumer Acceptability
  - Insulating foams / enhancing efficiency
  - Enabling Environment / interlinkages
  - Energy Efficiency of R-290/R-32 in High-Ambient Temperature (HAT) areas

[2] Reproduced without formal editing.

  - Safety standards and charge limits
  - Heat pumps
  - Non-halogenated refrigerants
  - Growth and modelling of Energy Efficiency refrigerant friendly ozone and climate in the Mobile Air Conditioning (MAC) sector
  - Availability of renewable energy options
- Capacity building needed for servicing sector
  - Regional training, including equipment installation and maintenance for Energy Efficiency, including gender parity
  - Certification / Assessment of capability
  - Risk analysis of training centers
  - Design and planning sector
- Validation of Energy Efficiency claims / Minimum Energy Performance Standards (MEPS) / labelling schemes / Regional testing facilities
- Cost of new technologies is prohibitive (barriers)
- National Ozone Units / Energy Efficiency / climate change departments linkages: capacity building / coordination with Energy Efficiency authorities
- Need to develop cooling plans and integration into Nationally determined contributions (NDCs)
- Review of cold chain management
- Priority actions / sectors for energy efficiency
- Coupling - Energy efficiency and HFC phasedown / Integration at national levels / to increase climate benefits / inclusion of Energy Efficiency in Kigali HFC Implementation Plans (KIPs)
- Pilot projects – improvement in compressors
- Assistance for phase-out low Energy Efficiency equipment / Waste management
- Take into consideration special situation of Very low volume consuming countries (VLVCs)
- Electrical compatibility of equipment in recipient countries (barriers)
- Req ExCom support for cooling plans, cold chain management and OzonAction
- Promotion of Low Global Warming Potential (LGWP) technologies in the refrigeration and air-conditioning (RAC) sector

D. Stop the Harmful Dumping of New and Used, Inefficient Refrigeration and Air Conditioning Appliances Using Obsolete ODS and HFC Refrigerants[3]

Proposal by Ghana on behalf of the African States parties to the Montreal Protocol

The Thirty-Fourth Meeting of the Parties decides:

Noting with concern the increasing numbers of new and used appliances that are not acceptable for sale in countries of origin and that are exported to African and other developing countries that may have less stringent laws or enforcement systems that are being overwhelmed with such dumping;

Aware that dumping of inefficient appliances causes importing countries harm by, *inter alia,* creating or prolonging dependence on obsolete refrigerants that are increasingly expensive and unavailable; flooding markets with poor quality equipment; stressing over-burdened energy grids and perpetuating elevated energy demand; aggravating air pollution and climate change from avoidable electricity consumption; increasing non-recyclable refuse; and damaging the quality of life of low-income consumers with unaffordable electricity costs;

[3] Presented without formal editing.

Recognizing that Ghana and other Article 5 Parties in Africa and elsewhere have worked hard to prevent this environmentally harmful dumping and to increase energy efficiency within their borders, but that countries working alone are never as effective as they are when working with the combined strength of the Montreal Protocol;

Recalling the Report of the Technology and Economic Assessment Panel, September 2020, Decision XXXI/7– Continued Provision of Information on Energy-Efficient and Low-GWP Technologies (Volume 2), which *inter alia* recognizes studies documenting widespread dumping of new and used refrigeration and air conditioning equipment that is inefficient in energy use and utilizing obsolete ODS and HFC refrigerants scheduled for phase out and phase down, respectively, under the Montreal Protocol;

Further recalling Decision X/9, which establishes a list of countries that do not manufacture for domestic use and do not wish to import products and equipment whose continuing functioning relies on Annex A and Annex B substances, and which noted *inter alia* that "in order for…export measures to be effective, both importing and exporting parties need to take appropriate steps;"

Further recalling Decision XIX/12, which stressed the need for action to prevent and minimize illegal trade in controlled ozone-depleting substances, and recognizing, *inter alia,* the importance of measures that promote information sharing information among Parties, such as Project Sky Hole Patching's, informal prior informed consent (iPIC) procedure, or similar systems, implemented with certain regional parties and the Regional Intelligence Liaison Office of the World Customs Organization;

Further recalling Decision XXVII/8, which invited those parties that do not permit the importation of products and equipment containing or relying on hydrochlorofluorocarbons from any source to inform the Secretariat that they do not consent to the importation of such products and equipment, and requesting the Secretariat to maintain a list of such parties, to be distributed to all parties by the Secretariat and updated on an annual basis;

Also recognizing that multiple decisions of the Montreal Protocol, including Decision XIX/6, and XXIII/2, have highlighted the importance of promoting the use of alternatives that minimize environmental impacts, including on the climate, taking into account global warming potential (GWP).

Recognizing the common practice of trade controls and other measures to support compliance and stop illegal trade in ODSs under the Montreal Protocol;

Acknowledging that Parties to the Montreal Protocol have strengthened the partnership of Multilateral Environmental Agreements involved in the Green Customs initiative aimed at enhancing the capacity of customs and other relevant border control officers to monitor and facilitate the legal trade and to detect and prevent illegal trade in environmentally sensitive commodities, including those within scope of the Montreal Protocol.

Taking note of the 2019 African Ministerial Conference on the Environment, Decision 17/1, wherein the African ministers of the environment "*urge Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer to adopt an action plan preventing market penetration of obsolete equipment in Africa while facilitating access to secure and energy-efficient technologies on the continent*."

The Meeting of the Parties:

Recommends all Parties wanting to avoid imports of inefficient appliances containing obsolete ODSs and HFCs register their country with the UNEP OzonAction Informal Prior Informed Consent (iPIC) platform;

Requests all Parties implement domestic legislation enforcing iPIC registration by importing countries;

Invites the Secretariat to update the iPIC platform to include the option for countries to designate upper GWP bounds and minimum energy efficiency, in line with the Kigali Amendment, that are acceptable for specific equipment categories;

Requests UNEP's OzonAction and its Regional Offices in consultation with National Ozone Units to intensify training and coordination efforts, consistent with Decision XVI/34 on cooperation between the Secretariat of the Montreal Protocol and other conventions and international organizations to stop unwanted dumping;

Further requests that the Technology and Economic Assessment Panel put forward a methodology and associated bibliography for estimating the integrated damage of the obsolete

products traded today compared to the environmental performance required by law for products sold in countries of manufacture.

Further request that Parties consider the advantage of additional funding for national action plans to prevent dumping of obsolete equipment in A5 parties while facilitating access to affordable energy-efficient technologies to support early compliance with the HFC phase down.

E. [Draft decision: Terms of reference for the study on the 2024–2026 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol[4]

The Thirty-Fourth Meeting of the Parties decides:

Recalling the parties' decisions on previous terms of reference for studies on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer,

Recalling also the parties' [relevant] decisions on previous replenishments of the Multilateral Fund,

1. To request the Technology and Economic Assessment Panel to prepare a report for submission to the Thirty-Fifth Meeting of the Parties to the Montreal Protocol, and to submit it through the Open-ended Working Group of the Parties to the Montreal Protocol at its forty-fifth meeting, to enable the Thirty-Fifth Meeting of the Parties to adopt a decision on the appropriate level of the 2024–2026 replenishment of the Multilateral Fund;

2. That, in preparing the report referred to in paragraph 1 of the present decision, the Panel should take into account, among other things:

(a) All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee of the Multilateral Fund, including decision XXVIII/2, and the decisions of the Thirty-Fourth Meeting of the Parties and the Executive Committee at its meetings, up to and including its ninety-second meeting, insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2024–2026;

(b) [The need to consider] the special needs of low-volume-consuming and very-low-volume-consuming countries;

(c) The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 of the Montreal Protocol (Article 5 parties) to achieve and/or maintain compliance with Articles 2A–2J of the Protocol, taking into account decision XIX/6 [and decision XXVIII/2] of the Meeting of the Parties [activities supporting compliance with the Kigali Amendment], and the reductions and extended commitments made by Article 5 parties under approved hydrochlorofluorocarbon (HCFC) phase-out management plans [and Kigali HFC implementation plans [including risk-assessment studies, market acceptance and safety issues]], [and [all elements of] [decision XXVIII/2]][, and noting that the Panel in its supplementary report shall provide any information or clarification as requested by any party relating to the allocation of resources];

(d) Decisions, rules and guidelines agreed by the Executive Committee at all its meetings, up to and including its [ninety-second] meeting, in determining eligibility for the funding of investment projects and non-investment projects;

(e) [The need to allocate resources for Article 5 parties to comply with the Kigali Amendment to the Montreal Protocol, including the preparation and, if needed, the implementation of phase-down plans for hydrofluorocarbons (HFCs) that could include early activities in the servicing and end-users sector in order to comply with the Kigali Amendment by addressing the high growth rate in HFC consumption;]

(f) [The need to allocate resources to the low-volume-consuming countries [and very-low-volume consuming countries] for the introduction [and promotion] of zero-global-warming-potential or low-global-warming-potential alternatives to HFCs and to maintain energy efficiency in the servicing and end-users sector, in line with any relevant decisions of the Executive Committee;]

(f) Alt 1 [The need to allocate resources for a funding window for activities including pilot demonstration projects to maintain and/or enhance energy efficiency while phasing-down HFCs;]

[4] Presented without formal editing.

(f) Alt 2 [The need to allocate resources for demonstration activities to maintain and/or enhance energy efficiency while replacing HFCs with non-HFC alternatives;]

(g) [The cost of supporting activities related to gender mainstreaming as part of the gender policy of the Multilateral Fund;]

(h) [The need to allocate resources to support end-of-life management and destruction of controlled substances [in accordance with any relevant decisions by the Executive Committee]]

3. [That the Panel should provide indicative figures of the resources within the estimated funding required for phasing out HCFCs that could be associated with enabling Article 5 parties to directly transition from HCFCs to the use of low-global-warming-potential or zero-global-warming-potential alternatives, taking into account global warming potential, energy use, safety and other relevant factors. The indicative figures should be provided for a range of typical scenarios, including a low-volume-consuming country, a small manufacturing country and a medium-sized manufacturing country;]

4. That in estimating the funding requirement associated with the HCFC and HFC targets, the Panel will use a clearly explained compliance-based methodology, [[independent of the business plan of the Multilateral Fund,] and avoid policy prescriptions that are not based on decisions of the parties or the Executive Committee];[That the Panel should provide indicative figures of the resources required if HPMPs and KIPs are implemented following an integrated approach in relevant sectors in comparison to a parallel implementation;]

5. That, in preparing the report, the Panel should consult widely, including all relevant persons and institutions and other relevant sources of information deemed useful;

6. That the Panel should strive to complete the report in good time to enable it to be distributed to all parties two months before the forty-fifth meeting of the Open-ended Working Group;

7. That the Panel should provide indicative figures for the periods 2027–2029 and 2030–2032 to support a stable and sufficient level of funding, on the understanding that those figures will be updated in subsequent replenishment studies.

8. [The need to allocate resources to meet unforeseen issues [including additional assistance that the A5 countries may need, arising from the pre-and-post COVID-19 pandemic situation related to the HFC baseline and growth of HFC consumption]]]

F. Stocks and quarantine and pre-shipment uses of methyl bromide

Submission by the European Union, Ecuador, Norway and Switzerland

The Thirty-Fourth Meeting of the Parties decides:

Noting that recent scientific results point to as yet unexplained discrepancies between top-down and bottom-up estimates of methyl bromide emissions, and that complementing the available information to derive bottom-up estimates could help clarify these discrepancies,

Noting that the Technology and Economic Assessment Panel's Methyl Bromide Technical Options Committee has pointed out that the available information it has on stocks likely does not accurately show the total stocks of methyl bromide held globally for controlled and exempted uses,

Noting also that some parties may not be aware that economically and technically feasible alternatives exist for some continuing uses of methyl bromide,

1. To remind parties of the requirement to report all uses (whether controlled or not) under paragraph 3 of Article 7 of the Montreal Protocol on Substances that Deplete the Ozone Layer and to submit, together with their reports on quantities of methyl bromide used for quarantine and pre-shipment applications, information on the key target pests for which the use of methyl bromide is required;

2. To invite parties to submit, on a voluntary basis, accessible data on the volumes of all methyl bromide stocks at the country level, including those in mixtures, to the Ozone Secretariat by 1 July 2023;

3. To request the Technology and Economic Assessment Panel and its Methyl Bromide Technical Options Committee, in consultation with other relevant experts and the secretariat of the International Plant Protection Convention, to provide updated information, as part of their progress

report to the Open-ended Working Group at its forty-fifth meeting, on current quarantine and pre-shipment uses for which economically and technically feasible alternatives are available;

4. To invite parties to take into account the standards and guidelines under the International Plant Protection Convention in their national processes of updating legislation in order to avoid unnecessary methyl bromide use and to review the potential for uptake of practices to minimize the use of methyl bromide by recycling, recapture and reuse.

G. Ongoing emissions of carbon tetrachloride

Submission by Switzerland

The Thirty-Fourth Meeting of the Parties decides:

Recalling decisions XVI/14, XVIII/10, XXI/8, XXIII/8 and XXVII/7, in which the Meeting of the Parties, *inter alia*, requested the assessment panels to assess global emissions and specific emission sources of carbon tetrachloride (CTC) and to suggest solutions for reducing CTC emissions, and encouraged the parties to review their relevant national data,

Acknowledging that the information provided by the assessment panels, the parties and the scientific community has enabled advances in closing knowledge gaps, in particular regarding the discrepancy between estimates of CTC emissions based on reported information and those based on observed atmospheric concentrations, as well as advances in the understanding of specific emission sources,

Recognizing that there are ongoing efforts to establish additional monitoring systems at industrial sites,

Noting, however, that resolving the remaining discrepancy will require further efforts to identify all relevant emission sources and to review the assumption that the quantities of controlled substances originating from inadvertent or coincidental production during a manufacturing process, from unreacted feedstock or from their use as process agents, are actually insignificant,

Aware that a better understanding of all relevant CTC emission sources will enable the application of mitigation measures for those sources in order to reduce emissions to levels that are in line with the ultimate objective of the Montreal Protocol on Substances that Deplete the Ozone Layer to eliminate those substances, and on the basis of developments in scientific knowledge,

Mindful that CTC has an impact on both the ozone layer and the global climate, that its use as a feedstock has increased in recent years, and that eliminating all emissions would accelerate the recovery of the ozone layer by several years,

1. To invite parties with production of CTC, including inadvertent and coincidental production in chloromethane or perchloroethylene plants, and/or using CTC as a feedstock or a process agent, to provide to the Ozone Secretariat by 1 March 2023, on a voluntary basis, any information on their domestic industrial processes that may help assist parties in better understanding potential CTC emission sources, including:

(a) The locations where production or use as a feedstock or a process agent takes place and the transportation chains between and within facilities, including pipe-to-pipe transportation;

(b) The volumes of substances that are part of such production chains of CTC and other chemicals manufactured from CTC, including chlorine, chloromethanes, perchloroethylene and other halogenated hydrocarbons;

(c) The monitoring practices that are in place for the flows and/or emissions of the above-mentioned substances and the technologies that are in place to minimize emissions;

(d) Where available, flows and/or actual or estimated emissions of the above-mentioned substances;

2. To request the Ozone Secretariat to share with the Technology and Economic Assessment Panel the information received in accordance with paragraph 1 of the present decision;

3. To request the Technology and Economic Assessment Panel to review the information received and to present the conclusions of its review in its progress report to the Open-ended Working Group at its forty-fifth meeting.

H. Recognition of the achievements of Paul Jozef Crutzen, Mario José Molina and Frank Sherwood Rowland, winners of the Nobel Prize in Chemistry in 1995

The Thirty-Fourth Meeting of the Parties decides:

Deeply grateful for the pioneering contributions and the extraordinary, visionary and courageous scientific work of scientists Paul Jozef Crutzen (Netherlands), Mario José Molina (Mexico) and Frank Sherwood Rowland (United States of America) throughout their careers in atmospheric chemistry, and particularly for their work concerning the formation and decomposition of ozone, which led to their being awarded the Nobel Prize in Chemistry in 1995,

Aware that their scientific work paved the way for global action to protect the ozone layer and led to the adoption of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer and that, furthermore, their work spurred related action by every United Nations Member State as a party to those global environmental treaties,

Acknowledging the importance of continuing work to restore the ozone layer and the many associated benefits of such work to the planet and therefore to humanity,

1. To express recognition of and gratitude for the invaluable scientific contributions of Paul Jozef Crutzen, Mario José Molina and Frank Sherwood Rowland, which inspired countries around the world to join in solidarity and cooperation to protect the ozone layer from depletion, thus making the planet safer for present and future generations;

2. To uphold their legacy by maintaining mutual trust in and commitment to the work of the Vienna Convention and the Montreal Protocol;

3. To strive to continue to strengthen the institutions that their achievements helped establish in order to achieve the aims of those institutions and protect the atmosphere for the benefit of all.

Annex III

Summaries of presentations by the members of the Technology and Economic Assessment Panel and responses thereto[1]

A. Presentation by the Energy Efficiency Task Force

1. Mr Ashley Woodcock introduced the TEAP Energy Efficiency Task Force (EETF) 2022 report, in response to Decision XXXIII/5 on Continued provision information on energy efficient and low-global-warming-potential technologies. He explained that TEAP had established the EETF consisting of 24 members with good geographical balance (13 A5, 11 non-A5).

2. He thanked the Co-chairs Suely Carvalho and Omar Abdelaziz, the Chapter Lead Authors and Task Force Members for their efforts, with working through virtual meetings.

3. He laid out the EETF key messages in a series of slides related to the Decision request.

4. Decision XXXIII/5 had requested the Technology and Economic Assessment Panel to prepare a report on energy efficient and lower- global- warming- potential technologies and on measures to enhance and maintain energy efficiency during hydrofluorocarbon transition in equipment for consideration by the Open-ended- Working Group at its forty-fourth meeting. The following slides provided the EETF key messages for each paragraph of the request:

5. Paragraph a) asked the EETF to "Update information in the decision 31/7 report where relevant, and address additional subsectors not previously covered such as the heat-pump, large commercial refrigeration and larger air-conditioning system sub-sectors"

6. The EETF found that in all sectors including the additional sectors specified by this decision, RACHP equipment using low and medium GWP refrigerants with enhanced energy efficiency is available but not necessarily accessible in all countries (Chapter 2)

7. The previous 2021 EETF report had defined availability and accessibility in detail:

8. "Availability" is the ability of industry to manufacture products with new technologies

9. "Accessibility" is focussed on the consumer and varies with location within a region, country, or even district within a country

10. Paragraph b) asked the EETF to "assess potential cost savings associated with adoption of the lower global warming potential energy efficient technologies in each sector including for manufacturers and consumers".

11. The EETF found that the wide range of RACHP equipment and refrigerant options makes it necessary to evaluate material cost impact on a case-by-case basis due to the impact of refrigerant characteristics on energy and safety has stated in chapter 3. Furthermore, that cost-benefit analyses can help to maximise benefits to customers and society from energy efficiency improvement as described in chapter 4

12. Paragraph c) asked EETF to "Identify sectors where actions could be taken in the short term to adopt energy efficient technologies while phasing down hydrofluorocarbons";

13. EETF found that the technology developments to improve energy efficiency are proceeding rapidly in all RACHP sectors.

14. Also, that prioritizing sectors for action is context dependent and will benefit from KIPs data

15. However, noting that Low efficiency high GWP HFC equipment continues to be widely accessible and may delay climate benefits due to the long equipment lifetime

16. Paragraph d) requested the EETF to "Identify options to enhance and maintain energy efficiency in equipment through deploying best practices during installation, servicing, maintenance, refurbishment or repair; "

17. EETF found that energy efficient equipment requires a higher level of knowledge and training for safe and effective installation and servicing. And that reducing leakage continues to be a service priority even for optimised systems.

[1] Presented without formal editing.

18. Finally, EETF was asked in paragraph e) to "Provide detailed information on how the benefits of integrating energy efficiency enhancements with the HFC phase-down measures can be assessed. (Chapters 4, 5, and 7)

19. Mr Woodcock stated that first the task force considered which measures could be effective to integrate energy efficiency enhancements with the HFC phase-down such as:

(a) Coordination between National Ozone Units and energy and climate authorities

(b) Integration of refrigerant GWP into energy efficiency standards and labelling policies

(c) Roadmaps for adopting energy-efficient technologies while phasing down HFCs; these would vary based on national circumstances

(d) An illustrative list of enabling standards and policies

(e) Measures to avoid dumping of high-GWP/low-EE equipment into A5 parties

20. Having considered those measures, the EETF then assessed the potential benefits through two sorts of modelling. First detailed equipment level modelling for the development of MEPS/investment decisions. And Second National and Regional forecasting modelling to evaluate pathways to reduce direct HFC emissions and indirect emissions related to RACHP energy use. Modelling can be refined through additional data. EETF concluded that coordinated investment in energy efficiency and refrigerant transition will cost manufacturers and consumers less than if they are made separately

21. Mr. Abdelaziz then presented on the availability of low and medium GWP technologies and equipment that maintain or enhance energy efficiency. He said that the task force found that RACHP equipment using low and medium GWP refrigerants with enhanced energy efficiency is now available but not necessarily accessible in all countries.

22. Mr. Abdelaziz also mentioned that the EETF identified several low and medium GWP options for heat pumps with high energy efficiency. For medium and large air conditioning he presented available options showing comparable energy efficiency for low and medium GWP refrigerants with efforts for them to be further optimised for higher efficiency based on the EETF findings. For medium and large commercial refrigeration, Mr. Abdelaziz presented technology options showing the technology availability with higher energy efficiency for low and medium GWP refrigerants. He also provided an updated on the availability and accessibility for room air conditioning and self-contained commercial refrigeration and the impact of new safety standards.

23. Ms. Dhont discussed the cost of equipment using low and medium GWP refrigerants whilst maintaining or enhancing energy efficiency. She argued that due to the wide range of RACHP equipment and refrigerant options it is necessary to analyse the cost impact on a case-by-case analysis basis. Ms. Dhont presented the EETF conclusions that the cost is influenced by the thermodynamic characteristics, safety characteristics, and material compatibility. She presented an example of thermodynamic factors influencing RACHP material costs and typical safety factors impacting the RACHP material costs due to toxicity, flammability, and higher pressure.

24. Ms. Dreyfus presented on the cost benefit analysis of low GWP technologies and equipment that maintain or enhance energy efficiency. She said that these analyses help to understand the benefits of energy efficiency improvements for consumers, manufacturers, and the environment. She said that currently in-depth cost-benefit analyses are conducted in the EU and the USA and are increasingly used by A5 parties. Ms. Dreyfus presented three examples from India, EU, and Brazil. The example from India showed that higher hours of use/higher electricity prices make energy efficiency more valuable. The example from EU showed that the highest technically feasible EE level may not be the most cost-effective for consumers. And the example from Brazil showed that higher EE equipment can increase manufacturer revenues.

25. Ms. Dreyfus went to describe potential options for short term roadmap for adoption of energy-efficient technologies while phasing down HFCs. She said that these roadmaps would have to account for national and regional variations. She also stressed on the importance of integrating energy performance standards and labelling with refrigerant requirements. Ms. Dreyfus showed an example of how policy can affect accessibility. Finally, Ms. Dreyfus presented an example of national policy options and pointed to the different case studies detailed in Annex 9.5 of the report.

26. Mr. Abdelaziz presented on the options to maintain and enhance energy efficiency through best practices in installation, servicing, and maintenance. He mentioned that a higher level of knowledge and training for safe and effective installation and servicing is required, and that the end-user environmental awareness is increasing, and consequently regular preventive and predictive maintenance is becoming a priority for both operators and service providers. Mr. Abdelaziz

highlighted the role of technicians in the synergy between EE and refrigerant phase-down. He said that it is important to include EE in the technician training and technical school curricula to ensure sustainability of initiatives undertaken during HPMP and KIP. Finally, Mr. Abdelaziz presented on best practices including proper goal setting, establishing, and enforcing codes and standards, and establishing centres of excellence.

27. Mr Gluckman then presented on the potential for modelling. This shows significant variations in the relative importance of direct emissions between different countries, a key driver being the Electricity generation carbon emissions factor. He showed that a country with a lot of coal-fired power stations has a high "grid factor", with the energy related GHG emissions over 85% of the total. In a country with significant levels of hydroelectric power with a low grid factor, energy emissions might be less than 30% of the total. Understanding this balance could help parties when setting national measures.

28. Modelling also shows significant variations in the relative importance of direct emissions between different RACHP technologies. In general, small sealed systems such as residential refrigerators have very low leakage and long hours of use; energy-related emissions can be well over 95% of the total. Site built systems, such in large supermarkets, have historically had very high rates of leakage and energy-related emissions might be less than half the total. The key message is that the RACHP market is complex and different technologies and applications might need their own dedicated. Modelling also shows the significant benefits of replacing fossil-fuel heating with heat pumps, especially in countries with reducing electricity generation carbon factor. In an example from then EU, the avoided fossil fuel emissions through the use of heat pumps will significantly outweigh the direct and indirect emissions from these heat pumps

29. Modelling HFC phase-down pathways and energy efficiency improvements is based on making assumptions about a range of actions that can be used to reduce direct or indirect emissions. By considering how to reduce both direct and indirect emissions together, in the context of other factors such as building design, the greatest overall emissions reductions can be achieved with lowest cost.

30. He finished by stating that for models to be realistic we need good input data – much of which is difficult to collect. Parties may want to consider how the data gathering required during development of Kigali Implementation Plans can be used to improve national and regional models.

31. Mr Woodcock summarised the key messages. He stated that in all RACHP sectors covered in this report, equipment using low/medium GWP refrigerants with comparable or enhanced energy efficiency is now available, but not yet always accessible

32. That Montreal Protocol support for transition to new generation RACHP equipment containing low GWP refrigerants could enable the realisation of the energy efficiency benefits, especially because the new equipment will be designed to be more efficient.

33. And finally that modelling can be a useful tool to evaluate the benefits of integrating energy efficiency enhancements with the HFC phase-down measures

B. Feedback and ideas in response to TEAP report Volume 3 - Decision XXXIII/5: Continued provision of information on Energy Efficiency and Low Global Warming Potential technologies

- How to integrate regular Energy Efficiency updates in the TEAP report
- Further development of modelling with a focus on operationalization of Energy Efficiency during implementation of phase-down of HFCs / pathways / Benefits of HFC phase-down and energy efficiency
- Supplementary information from TEAP
    - Cost Benefit Analysis
    - Consumer Acceptability
    - Insulating foams / enhancing efficiency
    - Enabling Environment / interlinkages
    - Energy Efficiency of R-290/R-32 in High-Ambient Temperature (HAT) areas
    - Safety standards and charge limits

  - Heat pumps
  - Non-halogenated refrigerants
  - Growth and modelling of Energy Efficiency refrigerant friendly ozone and climate in the Mobile Air Conditioning (MAC) sector
  - Availability of renewable energy options
- Capacity building needed for servicing sector
  - Regional training, including equipment installation and maintenance for Energy Efficiency, including gender parity
  - Certification / Assessment of capability
  - Risk analysis of training centers
  - Design and planning sector
- Validation of Energy Efficiency claims / Minimum Energy Performance Standards (MEPS) / labelling schemes / Regional testing facilities
- Cost of new technologies is prohibitive (barriers)
- National Ozone Units / Energy Efficiency / climate change departments linkages: capacity building / coordination with Energy Efficiency authorities
- Need to develop cooling plans and integration into Nationally determined contributions (NDCs)
- Review of cold chain management
- Priority actions / sectors for energy efficiency
- Coupling - Energy efficiency and HFC phasedown / Integration at national levels / to increase climate benefits / inclusion of Energy Efficiency in Kigali HFC Implementation Plans (KIPs)
- Pilot projects – improvement in compressors
- Assistance for phase-out low Energy Efficiency equipment / Waste management
- Take into consideration special situation of Very low volume consuming countries (VLVCs)
- Electrical compatibility of equipment in recipient countries (barriers)
- Req ExCom support for cooling plans, cold chain management and OzonAction
- Promotion of Low Global Warming Potential (LGWP) technologies in the refrigeration and air-conditioning (RAC) sector

C. Presentation by the Technology and Economic Assessment Panel

34. Ms. Marta Pizano, co-chair of the TEAP introduced the presentation on behalf of the twenty members of the Panel. She first gave an overview of current and coming reports of the TEAP for 2022, plus a description of activities since 2020, including preparation of 17 reports, hybrid meetings and coordination with the Scientific Assessment and Environmental Effects Panels (SAP and EEAP).

35. Ms. Pizano then addressed TEAP's response to Decision XXVIII/2, which requires periodic reviews on alternatives to HFCs starting in 2022 and every five years thereafter. The first review aligns with the preparation of TEAP's and its TOCs quadrennial assessment reports under Decision XXXI/2, which are planned to be completed at the end of 2022. Given the coincidental timing of these two decisions in 2022, TEAP is convening a Working Group to prepare a report responding to decision XXVIII/2, drawing from the TOCs 2022 Assessment Reports, for submission to MOP-34. In closing her address, Ms. Pizano provided some comments o per- and polyfluorinated alkyl substances (PFAS). She indicated that some governments are developing regulations related to PFAS which consist of definitions that may include some Montreal Protocol controlled substances and their alternatives and that this is creating uncertainty for industry regarding long-term availability of some alternatives. As a result, some companies and other stakeholders are delaying decisions regarding selection of alternatives with concerns about how "PFAS" might be limited as a result of new regulations. For example, in the Fire Protection sector, this could leave halons or in some cases also HFC-23 as the only viable non-PFAS options, e.g., aviation portable extinguishers: 2-BTP vs

halon 1211; very low temperature oil and gas: HFC-23 vs halon 1301; or explosion suppression for ground combat vehicles: HFC-227ea vs halon 1301.

36. Ms. Helen Walter-Terrinoni, co-chair of the Flexible and Rigid Foams Technical Options Committee (FTOC) then provided an update on TEAP Modelling work. TEAP is working to build a database of models of all controlled substances, estimating regional emissions and banks to better respond to parties' requests, supporting the work of the Assessment Panels. She noted that the 2022 Assessment Report will include initial work on a small number of substances and that the model uses a variety of data to estimate banks and expected emissions from the historic, current, and projected usage of controlled substances. She then commented that the model can be refined over time as this knowledge expands or changes noting that they TEAP would publish a consistent and transparent, methodology to ensure that the best available assumptions and method are incorporated. She then noted that the expected annual emission estimates can be compared to estimated emissions from available atmospheric chemical concentrations, when available, and that the same methodology was used by the TEAP Task Force on the Unexpected Emissions of CFC-11 and TEAP Replenishment Task Force.

37. Ms. Walter-Terrinoni provided results of the modeling of HCFC-141b, as an example noting that the model incorporates production and consumption, estimates of the lifetime of equipment and foams, emissions rates throughout the product lifecycle, and market and economic influences. She also discussed estimated timing of HCFC-141b decommissioning in foams noting that the models include estimates of the timing of decommissioning of various types of foam by region.

38. Ms. Walter-Terrinoni then presented the updates from the FTOC Progress Report. She noted that generally, transitions to non-ozone depleting substances (ODSs) and low global warming potential (GWP) alternatives have been successful and transitions continue to move forward for a number of foam types as examples. She went on to discuss the challenges related to transitions nothing that low-GWP foam blowing agent shortages continue in both A5 and non-A5 parties due to the pandemic-related supply chain issues, supply chain shortages, manufacturing issues, more demand than available capacity and severe weather cited as causes for shortages. She also noted that prices of HFCs have also increased during the pandemic and that patents have restricted options to address local supply chains. Finally, she noted that there has been a significant increase in the use of blends of HFCs and HFC blends in some A5 parties and non-A5 parties.

39. Mr. Adam Chattaway, co-chair of the HTOC the presented that committee's progress report. In the 2018 Assessment report, the HTOC was of the opinion that the initial 10% reduction in HFC production would not have a significant impact on the fire protection sector. In contrast, what we have seen in the United States, is that there has already been significant impact in cost & availability of HFCs.

40. The HTOC think this is for the following reasons: HFCs used for fire extinguishing are high-GWP, so the allocation mechanism in the US which is GWP weighted has had a disproportionate effect on fire extinguishants. Additionally market commercial factors mean that producers may have to decide which HFCs to make. The EU is further ahead in its HFC phase-down and is also seeing impacts. This could reduce commercial viability of some HFC agents in the future, so it is likely that the market will be relying on recovered HFCs sooner rather than later and therefore for longer. This has implications for HFC banking.

41. Mr Chattaway then presented an update on halon 1301 emissions, which have a direct effect on the size of the halon bank and therefore the potential run-out date. He presented a graph showing yearly emissions of halon 1301 in Gg or kilotonnes per year. There are two independent methods to estimate emissions: the first is the HTOC model which takes account of the total amount of recorded production, allows for production losses, destruction and emissions from the bank. The second method is to estimate the emissions derived from atmospheric concentration measurements, in this case measured by the AGAGE network. Historically the agreement between these completely independent methods has been remarkably good. However, since 2010, the emissions derived from atmospheric measurements have been higher than those estimated by the HTOC model.

42. One of the significant components of emissions is thought to be those from the aviation industry. Owing to the Covid-19 Pandemic there was a 60% decrease in civil aviation flight hours in 2020. Emissions of halon 1301 did not go down at all, suggesting most aviation emissions are not occurring during flight operations.

43. The HTOC continues to liaise with ICAO and other aviation stakeholders to better understand the sources of emissions and identify opportunities to reduce them. As part of this, the Halon Recycling Corporation has produced a best practice guidance document on reducing emissions during

servicing of aviation fire extinguishers. The HTOC will be providing an additional update on the future availability of halons to support civil aviation in their 2022 Assessment Report.

44. Continuing with the presentation, Mr. Ian Porter presented the progress report of the Methyl Bromide Technical Options Committee (MBTOC). In summarizing the current situation with the controlled and exempted uses of methyl bromide, he explained that reported MB consumption for controlled uses was only 43.6 t compared to the consumption in 2005 which was 16,050 t. However, substantially higher quantities of stocks may still be in use. Exempted QPS (Quarantine and Preshipment) consumption of MB remains at around 10,000 t/ year, however consumption is increasing in some A5 parties offsetting gains made with reductions in non A5 countries. He indicated that research programs around the world continue finding successful alternatives to MB for QPS. For instance, the recent registration of ethane dinitrile (EDN) on timber in New Zealand and South Korea is providing a successful alternative for major Q uses globally (>600 t). In providing a way forward for parties, MBTOC reports have identified that there are available alternatives for 30-40% (i.e. 3000-4000 t) of QPS use, almost predominantly PS uses. MBTOC suggests that Parties may wish to request TEAP to: better differentiate and quantify use under Q versus PS; provide a list of suitable alternatives for Q and PS uses; provide an estimate of the possible impact on MB phase out over the short to medium term.

45. An issue of concern raised by the co-chair was that sulfuryl fluoride (SF) is a key alternative to MB widely registered and adopted around the world for treatment of empty structures (e.g. flour mills, food premises, etc.). There is however, growing concern about the high 20-year GWP value of SF (7510), although development and adoption of emission reduction technologies may reduce some of this concern.

46. In summarizing the impact of reductions of non-QPS uses of methyl bromide since 1999, substantial phase out of controlled MB uses and their emissions has led to >30% reduction in the concentration of MB in the atmosphere and a similar rapid benefit to its reduction in the stratosphere. In 2020-21, however, atmospheric levels of MB have stopped falling as emissions of MB from reported controlled uses have almost ceased and emissions from QPS and some unreported uses continue. Near-term reduction of atmospheric concentrations of MB in the future now heavily rely on reduction in these emissions.

47. Following the progress report, the MBTOC co-chair Ian Porter, summarized the key issues for the CUN progress report. He reported that only 3 nominations for critical use were submitted in 2022 by Canada, Australia and RSA, for MB user in either 2023 and 2024. He noted that Argentina had not sought any CUNs in this round.

48. An overview of the stock amounts reported by three parties at the end of 2021 (~ 6 t) was presented, indicating that stocks are only presented from parties requesting CUNs. The co-chair stressed that stocks specified are only for CUNs as A5 parties are not required to be reported from all parties. CUE recommendations have not been adjusted to account for stocks as this is done by the parties.

49. In a summary of the outcome of the interim CUN assessment by MBTOC, he then showed that parties had reduced the total amount nominated to 39.507 t in 2022 in this round and that the Australian and Canadian nominations were unable to assess. For the Australian nomination, MBTOC accepted that MI was the only alternative presently available for soil treatment. However as a decision on its registration would only be available in July 2022, the committee considered that it appropriate to wait until after July as time is available to make a final assessment prior to the MOP.

50. For the Canadian strawberry runners the nomination was considered unable to assess. MBTOC considered that more information was required on the National Management Strategy particularly a timeline to phase out MB before a recommendation could be made for the assessment to be finalized. It was noted that Decision XXXII/3 reminded parties that they are required to submit their NMSs in accordance with Decision Ex.I/4 (UNEPb) the National Management Strategy aims to particularly provide information on amongst other things, the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, time when it is estimated that methyl bromide consumption for such uses can be reduced and/or ultimately eliminated.

51. For the nomination from the Republic of South Africa an interim recommendation was made for 19 t. The recommended amount was a 5% reduction (1 t) of the nomination for 2023. MBTOC considered alternatives, such as sulfuryl fluoride are available to preserve structural timber known to be infested by woodboring beetles. The remaining 19.0 t is recommended as it is for use for fumigation of houses being sold that require a Certificate of Compliance. MBTOC acknowledges that the Party has indicated that this is the last year for applying for a CUN for this sector.

52. Continuing the presentation, Mr. Keiichi Ohnishi co-chair of the Medical and Chemical Technical Options Committee addressed the MCTOC progress report. Regarding feedstock use of ODSs, the largest controlled ODS feedstocks in 2020 were HCFC-22 (48% of the total mass quantity), CTC (20%), and HCFC-142b (11%). HCFC-22 and HCFC-142b are mainly used to make tetrafluoroethylene and vinylidene fluoride respectively, both of which are used in fluoropolymer production.

53. He further noted that accurate, consistent, A7 reporting of production, including for feedstock uses, contributes to the understanding of atmospheric burdens. A non-isolated intermediate in a chemical process is not considered as a finished product while it remains within the chemical process, and as such, is not commonly reported as production. However, these intermediates may also be emitted in low quantities and detected by atmospheric monitoring. The issues on challenges with production and chemical supply of low-GWP HCFO and HFO foam blowing agents were also commented with regard to the production side.

54. Mr. Onishi also stated that an assessment of destruction technologies in response to decision XXX/6 will be included in MCTOC's 2022 Assessment Report based on available information although no such information has been submitted yet.

55. MDIs, dry powder inhalers (DPIs), aqueous soft mist inhalers (SMIs), and other delivery systems all play an important role in the treatment of asthma and COPD. New alternative propellant technologies to high-GWP HFC MDIs are under development. DPIs, soft mist inhalers and nebulisers are already available for most molecules and combinations as alternatives to high-GWP MDIs, offering a lower carbon footprint.

56. Mr. Roberto Peixoto then presented the highlights from the RTOC Progress Report. Initially he mentioned that in the last 4 years, 1 new single component refrigerant and 18 refrigerant blends have received a designation/classification from the ASHRAE Standard 34 and/or from the ISO Standard 817. Mr Peixoto said that mitigation of RACHP climate impact, reducing direct and indirect CO2e emissions, is gaining increasing attention during the HFC phase-down, and there is growing importance of the sustainable design and operation of equipment taking into account the strong growth of the equipment base. This is leading to the improvement of the equipment energy efficiency to reduce energy demand; the phasing down of equipment containing high GWP HFCs; and to the training in the servicing and maintenance of RACHP equipment to reduce leaks.

57. Mr Peixoto said that there has been significant progress with the development of safety standards to support the transition towards lower GWP alternative refrigerants, which are mostly flammable.

58. He mentioned that the standard IEC 60335-2-89, applicable to commercial refrigeration, was revised to include larger charges of flammable refrigerants (up to 500 g – 1200 g given certain boundary conditions) and is currently being transferred to national standards.

59. Mr Peixoto said that the new edition of the standard IEC 60335-2-40 was approved in April 2022, and that this new edition will allow HC-290 (propane), and other flammable refrigerants, to be used in many air conditioning systems and heat pumps that were prohibited by the previous version of the standard.

60. He mentioned that the standard new edition allows for the use of a larger charge of flammable refrigerants (up to 988g of HC-290 in a standard split AC), but new equipment with flammable refrigerant must have additional safety requirements to ensure the same high level of safety as equipment that does not use flammable refrigerants. Finally, Mr Peixoto said that the use of flammable refrigerants in AC equipment will lead to a reduction in direct climate emissions compared to equipment using R410A.

61. Ms. Bella Maranion, co-chair of the TEAP, started the presentation on TEAP organisational matters. She noted that the TEAP strives to maintain or have access to the expertise, experience, and capacity to provide the parties with the technical and economic information they need to further the goals and objectives of the Vienna Convention and Montreal Protocol. To achieve this, the TEAP structure and membership continuously evolves, particularly within its TOCs. As an example, in 2015, TEAP evaluated its structure, membership, and future direction and proposed to merge the Medical and Chemicals TOCs forming the MCTOC. Ms. Maranion stated that now, organisational changes to the RTOC and FTOC were necessary to meet the changes taking place in the refrigeration, air conditioning and heat pump (RACHP) and foams sectors in order to: address and integrate trends affecting controlled substances; foster emerging synergies, including system approaches; and maintain or enhance efficient and effective capabilities to support the parties. She noted that evolving trends impact the choice of refrigerants and foam blowing agents and provided examples of these trends

within the cold chain and buildings (space cooling and heating for all building types) applications. The TEAP proposal for a new Building & Indoor Climate Control TOC would include coverage of the following sectors: building air conditioning, heat pumps, building insulation foam, refrigerants, mobile air conditioning. Examples of equipment considered by this TOC include the following: air conditioners, chillers, heat pumps, building insulation foam, mobile air conditioners, not-in-kind technologies. The proposed Cold Chain TOC would cover applications including the following: domestic refrigeration, commercial refrigeration, transport refrigeration, food processing, cold storage (warehouses), industrial process refrigeration, agricultural refrigeration, pharmaceutical refrigeration, foams used in refrigeration products, other non-building foams, fisheries, organic rankine cycles. She provided examples of integration and cross-cutting issues such as foam and refrigerant management, safety standards, servicing practices and equipment.

62. Ms. Maranion noted that if parties agreed to approach with two new TOCs, TEAP had recommended appointment of the current RTOC and FTOC co-chairs as new TOCs co-chairs, ensuring continuity of work and integration of new areas into the new structure, ensuring that the standards for committee reports, presentations, and overall management would be met, and providing these increased capabilities to parties in an effective and efficient manner. She also covered the other recommendations for other TOCs: that the HTOC be renamed as the Fire Protection TOC reflecting its broader scope in assessing halons as well as HFC alternatives and other issues related to the flammability of alternatives; and that the MBTOC be renamed as the Methyl Bromide, Agriculture, and Sustainability TOC reflecting the continued work on MB issues while reflecting the importance of sustainability in food production and food safety with coordination as needed with other TOCs (e.g., cold chain). Ms. Maranion concluded the panel's presentation by noting that the coordination between the TEAP and all of its TOCs would continue, even with the new TOCs, on cross-cutting issues such as modeling emissions, banks, end-of-life reclamation and destruction, economic issues, HFC alternatives, safety and training, etc.