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**Thirty-First Meeting of the Parties to
the Montreal Protocol on Substances
that Deplete the Ozone Layer**
Rome, 4–8 November 2019

Report of the Thirty-First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

Introduction

1. The Thirty-First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer was held at the headquarters of the Food and Agriculture Organization of the United Nations, Rome, from 4 to 8 November 2019.

Part one: preparatory segment (4–6 November 2019)

I. Opening of the preparatory segment

2. The preparatory segment was opened by its Co-Chairs, Mr. Alain Wilmart (Belgium) and Ms. Laura-Juliana Arciniegas (Colombia), on Monday, 4 November 2019 at 10.10 a.m.

3. Opening remarks were delivered by Mr. Roberto Morassut, Undersecretary of State at the Ministry of the Environment and Protection of Land and Sea of Italy; Mr. René Castro-Salazar, Assistant Director-General, Climate, Biodiversity, Land and Water Development of the Food and Agriculture Organization of the United Nations (FAO); and Ms. Tina Birmpili, Executive Secretary of the Ozone Secretariat.

4. In his opening statement, Mr. Morassut welcomed participants to Italy and to Rome. Recalling that the Fourteenth Meeting of the Parties had been held in that city in 2002, he said that his country was honoured to once again host the highest decision-making body of the first international environmental treaty to achieve universal ratification, which had proved to be a successful model of international cooperation and multilateralism. He wished to thank in particular the Ozone Secretariat and FAO for their cooperative efforts to make the meeting possible, and to stress the important role that FAO would play in a world increasingly concerned with the relationship of food security and the sustainability of rural systems to broader issues of peace and stability and the 2030 Agenda for Sustainable Development.

5. Italy had made every effort to promote and implement the provisions of the Montreal Protocol at the global and national levels as part of its role as a founding member of the European Union. It had complied with all its obligations to reduce and eliminate the production and consumption of ozone-depleting substances and was a major donor to the Multilateral Fund for the Implementation of the Montreal Protocol and a bilateral supporter of projects being implemented with assistance from the Fund. The Thirty-First Meeting of the Parties was the first since the entry into force of the Kigali Amendment, which, in conjunction with the Paris Agreement on Climate Change, showed that global policies for the protection of the ozone layer and international action to combat climate change were

now intrinsically and inseparably linked. Italy was committed to accelerating the process of its national ratification of the Kigali Amendment.

6. In conclusion, he wished to reaffirm his country's strong commitment to working with other members of the international community to put in place, in a synergistic and strategic manner, all the skills and resources necessary to ensure the transition to a sustainable world for present and future generations. The Montreal Protocol had demonstrated that human society, faced with the urgency of taking action to protect the human species and the planet, could harness the power of science to develop new paradigms of cooperation to achieve global aims.

7. In his opening statement, Mr. Castro-Salazar said that the Montreal Protocol had proved its value not only for protecting the ozone layer but also for demonstrating how multilateralism and international cooperation could deal with major environmental challenges, using all the tools and instruments available and basing action firmly on science. The results-based approach of the Protocol had focused policy and investment to achieve significant recovery of the ozone layer. There was great potential for further cooperation between the Montreal Protocol and FAO in such areas as climate change and biodiversity. The Kigali Amendment had raised awareness of the need to develop sustainable solutions in the refrigeration sector, especially for addressing the demand for cooling systems for food preservation. That was particularly important for tackling food loss, which would in turn improve the use of natural resources and help lower greenhouse gas emissions per unit of food consumption. It was essential to work together to address pressing global environmental issues.

8. In her opening statement, Ms. Birmpili highlighted the progress to date under the Montreal Protocol in ensuring the recovery of the ozone layer, with accompanying benefits for human health, economies, ecosystems and the climate. Protection of the ozone layer reduced damage to agriculture, fisheries and forests, and holding the meeting at FAO headquarters offered an opportunity for further cooperation with that organization. The Climate Action Summit held in September 2019 had underscored the importance of the Kigali Amendment, whose climate benefits could be significantly increased through improvements in the energy efficiency of cooling equipment. Indeed, the importance of cooling was the focus of the high-level round table at the current meeting, which would examine the Montreal Protocol's contribution to sustainable cold chains, with a view to reducing food loss.

9. Regarding the meeting agenda, she said that the issue of unexpected emissions of trichlorofluoromethane (CFC-11) would again be under discussion. It was vital, in addressing environmental threats, to understand and learn from past events, and in that regard the data from atmospheric monitoring had provided important information on CFC-11 emissions. However, significant gaps in global observational and research capabilities remained, and a greater number of strategically placed stations were needed in order to gather additional data to enable effective targeting of actions. She welcomed the efforts being made by the Government of China to address the issue of CFC-11 emissions through the inspection of carbon tetrachloride production and supply chains and the establishment of monitoring systems. It was important for the international community to remain vigilant and to work together to address all aspects of illegal emissions and resolve challenges in a spirit of mutual trust and cooperation.

10. While welcome progress had been made, there were still questions to be answered: Were there any other unrecognized emissions of CFC-11? Were they in other places in the world? Could other banned chemicals be produced and emitted? Continued vigilance would help answer those questions. It was important to recognize and act before small issues became big problems, and to be ready to make adjustments as circumstances changed and new opportunities or problems arose. As another example of how the past could be relevant to the future, the interconnectedness of the ozone layer with other elements of the global system necessitated a broad approach, as had been the case with hydrofluorocarbons (HFCs). An increase in the use of HFCs, and the resulting threat of climate forcing, had been an unintended consequence of the phase-out of ozone-depleting substances. Fortunately, the Montreal Protocol community had been agile enough to recognize a new opportunity to mitigate global warming by agreeing to a phase-down of HFCs. She urged the parties to the Protocol to consider the twin responsibilities of accountability and implementation in ensuring that the institutions and processes of the Protocol were robust enough to maximize positive effects on humanity and ensure that the planet could thrive for centuries to come.

II. Organizational matters

A. Attendance

11. The following parties to the Montreal Protocol were represented: Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Australia, Austria, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Cyprus, Czechia, Democratic People's Republic of Korea, Democratic Republic of the Congo, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Eswatini, Ethiopia, European Union, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Holy See, Honduras, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Italy, Jamaica, Japan, Jordan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Solomon Islands, Somalia, South Africa, South Sudan, Spain, Sri Lanka, State of Palestine, Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Thailand, Timor-Leste, Togo, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Zambia, Zimbabwe.

12. The following United Nations bodies and specialized agencies were represented: Food and Agriculture Organization of the United Nations, 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, World Health Organization. The Montreal Protocol assessment panels were also represented.

13. The following intergovernmental, non-governmental, industry, academic and other bodies were also represented: ACT Commodities; AGC Chemicals; Agropecuaria Malichita; Air-Conditioning Heating and Refrigeration Institute; Alliance for an Energy-Efficient Economy; Alliance for Responsible Atmospheric Policy; American Society of Heating, Refrigerating and Air Conditioning Engineers; Arkema – Innovative Chemistry; Association des distributeurs, conditionneurs, récupérateurs & retraiteurs de réfrigérants (ADC3R); Association of Ammonia Refrigeration, Basel Agency for Sustainable Energy; Blue Star Ltd.; Carrier Transicold and Refrigeration Systems; Centro Studi Galileo; Climalife; Council on Energy, Environment and Water; Daikin; Danfoss (Denmark); Electrolux – Major Appliances; Energy Studies Institute; Environmental Investigation Agency; European Association of Refrigeration and Air Conditioning Installers; European Environment Agency; European Fluorocarbons Technical Committee; European Partnership for Energy and the Environment; Expert Group; GIZ Proklima; Gluckman Consulting; Green Climate Fund; Gulf Cooperation Council; HEAT International; ICF International; Industrial Technology Research Institute; Institute for Governance and Sustainable Development; International Institute of Refrigeration; Japan Association of Refrigeration and Air Conditioning Contractors; Japan Fluorocarbon Manufacturers Association; Japan Refrigeration and Air Conditioning Industry Association; Kigali Cooling Efficiency Program, Lawrence Berkeley National Laboratory; Matthias Meier Technical Consulting; Mexichem UK Ltd.; Manitoba Ozone Protection Association; Natural Resources Defence Council; Navigant Energy Germany; New Energy and Industrial Technology Development Organization; New York University; Nolan Sherry and Associates Ltd.; Petra Engineering Industries; Pollet Environmental Consulting; Quimobásicos S.A.; Refrigerant Gas Manufacturers Association; Refrigerants Australia; Refrigeration and Air Conditioning Manufacturers Association; Shaffie Law and Policy LLC; Shecco; SRF Ltd.; Stockholm Environment Institute; Sun Yat-Sen University; Sustainable Energy for All; The Energy and Resources Institute; Tradewater; Trans-Mond Environment Ltd.; United Technologies Climate, Controls and Security; United Technologies Corporation; University of California–Los Angeles; University of Southern California; Vertis Environmental Finance Ltd.; Wagner Consulting International; Walton Hi-Tech Industries Ltd.; World Refrigeration Day secretariat; World Resources Institute; Zhejiang Juhua Co. Ltd.; Zhejiang Quhua Fluor-Chemistry Co. Ltd.. Öko-Recherche.

B. Officers

14. The preparatory segment was co-chaired by Mr. Wilmart and Ms. Arciniegas.

C. Adoption of the agenda of the preparatory segment

15. The following agenda for the preparatory segment was adopted on the basis of the provisional agenda contained in document UNEP/OzL.Pro.31/1, with the Rome Declaration to be considered under item 19 (other matters):

1. Opening of the preparatory segment:
 - (a) Statement(s) by representative(s) of the Government of Italy;
 - (b) Statement(s) by representative(s) of the United Nations Environment Programme.
2. Organizational matters:
 - (a) Adoption of the agenda of the preparatory segment;
 - (b) Organization of work.
3. Administrative matters:
 - (a) Budget of the Trust Fund for the Montreal Protocol and financial reports.
 - (b) Consideration of the membership of Montreal Protocol bodies for 2020:
 - (i) Members of the Implementation Committee;
 - (ii) Members of the Executive Committee of the Multilateral Fund;
 - (iii) Co-chairs of the Open-ended Working Group.
4. Terms of reference for the study on the 2021–2023 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.
5. Potential areas of focus for the 2022 quadrennial assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel.
6. Unexpected emissions of trichlorofluoromethane (CFC-11).
7. Ongoing reported emissions of carbon tetrachloride.
8. Issues related to exemptions under Articles 2A–2I of the Montreal Protocol:
 - (a) Nominations for critical-use exemptions for methyl bromide for 2020 and 2021;
 - (b) Stocks of methyl bromide;
 - (c) Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol;
 - (d) Process agents.
9. Access of parties operating under paragraph 1 of Article 5 of the Montreal Protocol to energy-efficient technologies in the refrigeration, air-conditioning and heat-pump sectors.
10. Terms of reference, composition, balance, fields of expertise and workload of the Technology and Economic Assessment Panel.
11. Membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.
12. Request by Azerbaijan to be included among the parties to which the phase-down schedule for hydrofluorocarbons, as set out in paragraphs 2 and 4 of Article 2J of the Montreal Protocol, applies.
13. Safety standards.

14. Initial assessment by the Scientific Assessment Panel and the Technology and Economic Assessment Panel of five volatile fluoroorganic and related compounds found in the Arctic.
15. Consideration of nominations to the assessment panels.
16. Compliance and data reporting issues: the work and recommended decisions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol.
17. Risk of non-compliance with hydrochlorofluorocarbon reduction targets for 2019 by the Democratic People's Republic of Korea.
18. Status of ratification of the Kigali Amendment to the Montreal Protocol.
19. Other matters.

D. Organization of work

16. The parties agreed to follow their customary procedure and to establish contact groups as necessary.

III. Administrative matters

A. Budget of the Trust Fund for the Montreal Protocol and financial reports

17. Introducing the item, the Co-Chair drew attention to the background information set out in paragraphs 10–15 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2), the note by the Secretariat on proposed budgets for 2020 and 2021 of the Trust Fund for the Montreal Protocol (UNEP/OzL.Pro.31/4), the note by the Secretariat on the financial report for the trust funds for the Vienna Convention for the Protection of Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer for the fiscal year 2018 (UNEP/OzL.Pro.31/5), and information notes on the proposed budget for 2020 of the Trust Fund for the Montreal Protocol (UNEP/OzL.Pro.31/INF/1) and the updated indicative financial report for the fiscal year 2019 (UNEP/OzL.Pro.31/INF/2).

18. The parties agreed to follow their standard practice and establish a budget committee to review the proposed budget for the Montreal Protocol trust fund and the financial reports for the Vienna Convention and Montreal Protocol trust funds and to prepare a draft decision on financial matters for the Protocol. It was later decided that the committee's work would be facilitated by Ms. Nicole Folliet (Canada).

19. Subsequently, after the committee had discussed the matter, the facilitator introduced the draft decision, which included the proposed budget for 2020 and 2021 agreed on after discussions in the budget committee.

20. The parties agreed to forward the draft decision for consideration and possible adoption during the high-level segment.

B. Consideration of the membership of Montreal Protocol bodies for 2020

21. Introducing the item, the Co-Chair said that the parties needed to decide on the membership of the Implementation Committee, the Executive Committee of the Multilateral Fund and the Co-Chairs of the Open-ended Working Group for 2020. Information on the positions to be filled was presented in document UNEP/OzL.Pro.31/2, and draft decisions on the membership of the three bodies were contained in document UNEP/OzL.Pro.31/3.

22. Subsequently, the representative of the Secretariat reported that, upon receipt of the names of the nominations from the regional groups, the relevant draft decisions had been included in the compilation of decisions for the parties' consideration and adoption during the high-level segment.

IV. Terms of reference for the study on the 2021–2023 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol

23. Introducing the item, the Co-Chair drew attention to the information contained in paragraphs 26–29 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2) and a draft decision

forwarded by the forty-first meeting of the Open-ended Working Group, held in Bangkok in July 2019, to the current meeting and contained in document UNEP/OzL.Pro.31/3.

24. The parties agreed to reconstitute the contact group that had discussed the matter at the forty-first meeting of the Open-ended Working Group, entrusting it with a mandate to develop a final proposal for consideration at the current meeting. The contact group would be co-chaired by Mr. Leslie Smith (Grenada) and Mr. Ralph Brieskorn (Netherlands).

25. Subsequently, after discussions in the contact group, the co-chair of the contact group introduced a draft decision on the matter.

26. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

V. Potential areas of focus for the 2022 quadrennial assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel

27. Introducing the item, the Co-Chair drew attention to the information contained in paragraphs 30–36 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2) and in a note by the Secretariat on synthesis of the 2018 assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel (UNEP/OzL.Pro.31/8). She recalled that the European Union had introduced a conference room paper on potential areas of focus at the forty-first meeting of the Open-ended Working Group as a basis for further discussion. The resulting draft decision had been forwarded to the current meeting and was contained in document UNEP/OzL.Pro.31/3.

28. The representative of the European Union recalled that after the forty-first meeting of the Open-ended Working Group, bilateral discussions had been held with various parties to determine what should be included in the draft decision, with the aim of providing the assessment panels with sufficiently detailed guidance for preparing the 2022 quadrennial assessment reports. Potential areas of focus included such emerging issues as the linkages between emissions of carbon tetrachloride and CFC-11, new volatile fluororganic compounds discovered in the Arctic regions, and the relationship between stratospheric ozone and solar radiation management.

29. Several representatives proposed additional matters for consideration in the quadrennial assessment reports, including destruction of banks of ozone-depleting substances, replacement technologies and equipment, issues pertaining to low-global-warming-potential alternatives in the phase-down of HFCs, energy efficiency, and emissions of short-lived ozone-depleting substances.

30. The parties agreed to establish a contact group, co-chaired by Mr. Samuel Paré (Burkina Faso) and Ms. Cynthia Newberg (United States of America), to further discuss potential areas of focus for the 2022 quadrennial assessment reports with a mandate to develop a final proposal for consideration by the parties at the current meeting, using the text proposed by the European Union as a basis for discussions.

31. Subsequently, after discussions in the contact group, the co-chair of the contact group introduced a draft decision on the matter.

32. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

VI. Unexpected emissions of trichlorofluoromethane (CFC-11)

33. Introducing the item, the Co-Chair recalled that at the forty-first meeting of the Open-ended Working Group the Scientific Assessment Panel and the Technology and Economic Assessment Panel had presented their preliminary reports on CFC-11 as requested in decision XXX/3. The preliminary report of the Scientific Assessment Panel had included new scientific information and a summary of the proceedings of the international symposium on the unexpected emissions of CFC-11 held in March 2019. The final report of the symposium had since been published in the SPARC newsletter and was available on the meeting portal. The preliminary report of the Technology and Economic Assessment Panel had covered the potential sources of emissions of CFC-11 and related controlled substances from potential production and uses, as well as from banks, in the relevant regions.

34. The meeting of the Open-ended Working Group had discussed those reports, as well as the document prepared by the Secretariat outlining the procedures by which the parties reviewed and ensured continuing compliance with obligations under the Montreal Protocol and the terms of agreements under the Multilateral Fund. A contact group had been established to consider technical and scientific issues, with a view to identifying the information that needed to be enhanced; institutional matters and processes under the Vienna Convention and the Montreal Protocol; and any other matters it deemed necessary to discuss. The report of the work of the contact group was set out in document UNEP/OzL.Pro.31/2.
35. Since the meeting, the Technology and Economic Assessment Panel had, in accordance with decision XXX/3, prepared its final report (summarized in document UNEP/OzL.Pro.31/2/Add.1), and China had published a note on the progress it had made in the monitoring and management of ozone-depleting substances (contained in document UNEP/OzL.Pro.31/INF/9).
36. Mr. Paul Newman, co-chair of the Scientific Assessment Panel, and Mr. Steve Montzka, a member of the Panel, presented their interim report on increased emissions of CFC-11. Ms. Helen Tope and Ms. Helen Walter-Terrinoni, co-chairs of the Technology and Economic Assessment Panel task force on unexpected emissions of CFC-11 established under decision XXX/3, presented a summary of their final report of September 2019. A summary of the presentations is set out in sections A and B of annex II to the present report.
37. All representatives who took the floor thanked the assessment panels for their reports, saying that they contained extremely useful information, and expressed satisfaction at the preliminary data showing reductions in emissions of CFC-11 in 2018 and 2019.
38. Responding to questions, Mr. Newman explained that emissions of HCFC-141b had appeared to peak in 2012 and had subsequently fallen. It was not possible to say whether that had been related to CFC-11 production. The rate of decline of atmospheric concentrations of CFC-11 appeared to have returned nearly to its pre-2012 level in 2018 and 2019, though further study of the data and further investigations of atmospheric dynamics would be necessary to confirm that. The trend would not become clear for another two years or so.
39. The monitoring stations in Japan and the Republic of Korea were sensitive to emissions arising from up to 1,000 kilometres away. They had therefore been capable of detecting emissions from the north-eastern Chinese provinces of Shandong and Hebei, so the Panel was confident in assigning 40 to 60 per cent of total CFC-11 emissions to that area. It was not possible to assign the remaining emissions to particular geographic sources, though it was clear that they did not emanate from North America, Europe or the southern hemisphere. In many parts of the globe the Panel was in effect scientifically blind because of the lack of monitoring stations.
40. Responding to a question about whether there could be natural sources of CFC-11 emissions, Mr Newman explained that CFC-11 was entirely anthropogenic; it did not occur naturally. Emissions had been monitored for many years and could always be related to industrial production. Ice cores from Greenland and Antarctica showed no evidence of CFC-11 – or other CFCs – from pre-industrial times.
41. Mr. Newman and Ms. Walter-Terrinoni then explained the difference between the two sets of estimates of emissions. The Scientific Assessment Panel derived its top-down estimates from measurements of CFC-11 in the atmosphere; while these could be expected to fall by about 2 per cent a year as a result of normal photolytic destruction, observations indicated that the fall was in fact about 1 per cent a year, making it clear that additional emissions were being released. The Technology and Economic Assessment Panel had produced bottom-up estimates of emissions by analysing CFC-11 production, use, banks and emissions at the global and regional levels, eliminating unlikely emissions sources, identifying likely emissions sources and estimating the quantity of newly produced CFC-11 needed to supply them.
42. Ms. Walter-Terrinoni explained that releases of CFC-11 tended to be uneven over time, leading to peaks and troughs in the graph of emissions. When foam was taken out of equipment or buildings at the end of its life, the blowing agent stayed within the foam matrix and was very difficult to remove; one party had reported that as much as about 15 per cent of the foam-blowing agent could be expected to be released at that point, but if the foam was crushed or shredded, the maximum release was likely to be up to 50 per cent.
43. Responding to questions about why CFC-11 should be used for foam blowing, Ms. Walter-Terrinoni explained that globally the production of closed-cell foams for insulation was increasing – for example, for use in refrigeration and buildings. The availability of HCFC-141b was falling, and its price was rising, because of efforts to encourage conversion away from the substances

as part of its ongoing phase-out. The other main alternatives were HFCs and hydrofluoroolefins, which could be three to four times as costly. In some cases, non-fluorocarbon alternatives such as hydrocarbons could be used – for example, in refrigerators – and they were comparatively cheap, so one would not expect CFC-11 to be used in those instances. In most cases, however, CFC-11 was likely to be the cheapest option, especially for spray foam. She agreed that the same price structure had been observed both in other parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 parties) and in parties not so doing (non-Article 5 parties), or the price differential could be even higher, as in cases where import duties were levied on HFCs. In other use sectors, such as refrigeration, air-conditioning and aerosols, other alternatives were available at a lower cost, so the incentive to use CFC-11 was much smaller.

44. Responding to a question on the repurposing of HFC-32 plants to produce CFC-11, Ms. Tope explained that the process was not difficult: it would take about a week to flush the pipes and equipment and make adjustments to the operating conditions so as to be able to use carbon tetrachloride rather than methylene chloride as feedstock. In theory, HCFC-22 plants could be repurposed to produce CFC-11, but the Task Force had considered that less likely because of the higher degree of compliance monitoring of hydrochlorofluorocarbon (HCFC) plants. Plants producing HFCs other than HFC-32 could also in theory be repurposed, but that was not likely to be economically viable because of the different production processes involved, such as those involving vapour phase reactors.

45. Answering questions about the likely availability of carbon tetrachloride as feedstock for CFC-11, Ms. Tope said that globally, about 220,000 tonnes of carbon tetrachloride feedstock had been produced in 2016 and about 260,000 tonnes in 2017. Total capacity from co-production of carbon tetrachloride with chloromethanes in 2016 after existing local supplier commitments had been met was estimated at about 305,000 tonnes. Spare global capacity to produce carbon tetrachloride in perchloroethylene/carbon tetrachloride plants was estimated to be between 50,000 and 100,000 tonnes per year. In addition, a site that integrated production of chloromethanes, perchloroethylene and fluorochemicals offered opportunities for the liberation of carbon tetrachloride from chloromethane production and potential concealment of on-site diversion of carbon tetrachloride into CFC-11 production by using mixed chloromethanes feedstock in perchloroethylene production. Overall, from chloromethane production, only China possessed enough spare capacity to produce carbon tetrachloride in the volumes estimated to be necessary to produce the estimated production of CFC-11.

46. The Task Force had not looked at the volume of fugitive carbon tetrachloride emissions from estimated production volumes, but it could be assumed to be about 0.5 per cent of production. Mr. Newman added that atmospheric observations did not reveal any increase in carbon tetrachloride emissions up to 2016; the trend had remained relatively flat in recent years.

47. With regard to whether CFC-12 could be used as a feedstock, Ms. Tope said that it was theoretically possible but unlikely in practice, as more technically and commercially viable options were available; further details were available in the Task Force report. With regard to whether micro-scale plants were known to be used to produce ozone-depleting substances, the Task Force had considered that such facilities might be constructed as pilot-scale plants for process or market development or to supply very small quantities to service particular local markets; however, the only evidence that they had actually existed to produce CFC-11 derived from enforcement actions in China and investigations by the Environmental Investigation Agency.

48. Mr. Peter Sleight, a member of the Task Force, added that the Task Force had initially been sceptical about how such micro-scale plants could work in practice, particularly as production of CFC-11 from carbon tetrachloride typically also produced CFC-12, and increased emissions of CFC-12 had not been observed. However, on the basis of the available information regarding those micro-scale plants, the Task Force had theorized that if the CFC-11 was taken out of the reactor vessel as soon as it was produced, CFC-12 production would be minimized. The CFC-11 thus produced would be contaminated with small volumes (1–2 per cent) of CFC-12 and would thus not be suitable for use in refrigeration and air-conditioning, for example, but could certainly be used for foam blowing.

49. Responding to a question about appropriate measures that could be taken to control unexpected production and emissions, Ms. Tope said that the Task Force report responding to decision XXX/3 also enumerated a number of areas that parties could investigate, such as better monitoring of trade in polyol blends.

50. Mr. Newman, Ms. Walter-Terrinoni and Ms. Tope all said that they would welcome the chance to discuss the issue bilaterally with interested parties.

51. Opening the floor for discussion, the Co-Chair drew attention to a report by the Secretariat on unexpected emissions of CFC-11 presenting an update to the overview provided at the forty-first meeting of the Open-ended Working Group (UNEP/OzL.Pro.31/6) and to a report by China on progress made in the monitoring and management system of ozone-depleting substances in that country (UNEP/OzL.Pro.31/INF/9, annex).
52. Most representatives who spoke thanked the Technology and Economic Assessment Panel and the Scientific Assessment Panel for their work to provide greater clarity regarding the unexpected emissions of CFC-11, with many also thanking the Ozone Secretariat for its work on the issue.
53. Many representatives thanked the Government of China for the activities undertaken in that country to address the CFC-11 emissions and the information provided in that regard, including in its report and at a side event held in the margins of the current meeting. One representative said that such information demonstrated the party's commitment to bringing the situation under control. Another expressed the hope that China would continue to report on the results of its activities at future meetings. A third urged other parties to support China in its efforts. A fourth said that the sharing of such information was useful for strengthening the sustainability of the Montreal Protocol. Some parties expressed their commitment to working collaboratively to end the production and use of CFC-11.
54. The representative of China then summarized the information set out in document UNEP/OzL.Pro.31/INF/9. She said that, although her Government had invited interested parties to visit China in order to better understand the situation on the ground, that invitation had unfortunately not been taken up by international experts owing to their heavy workloads. She described some of the actions that China had taken to deal with the issue, including strengthening legislation and building capacity, including through improved access to monitoring equipment, inspections of plants and establishment of a monitoring plan. Noting that her country remained the largest producer and consumer of ozone-depleting substances, she emphasized its commitment to achieving the objectives of the Montreal Protocol and expressed the hope that the international community would support it to that end. China had a zero-tolerance approach to illegal production, which had a negative impact on the environment, on markets and on the legitimate interests of businesses operating legally in the country. She stressed that work to resolve the issue of CFC-11 emissions should go hand in hand with accelerated efforts to achieve the overall objectives of the Protocol.
55. One representative said that the information provided by China showed that much-needed improvements had taken place in its national enforcement system for dealing with the substantial amount of unexplained emissions of CFC-11. Preliminary data provided by the Scientific Assessment Panel indicated that the party had made progress in changing the trajectory of the higher emissions, and he looked forward to updates to that preliminary data from the Panel in due course. He had drawn three main conclusions from the report of the Technology and Economic Assessment Panel: it was unlikely that past production and historical use could account for the increase in CFC-11 emissions; it was likely that there had been a resumption of use of newly produced CFC-11 in closed-cell foams; and expected emissions from the CFC-11 foam banks in North-East Asia were insufficient to account for the atmospheric-derived emissions from eastern mainland China. Thus, while there was some positive news, it was troubling that, for at least five years, there had been substantial amounts of unexplained emissions of CFC-11 that were not consistent with actions taken under the Montreal Protocol. Whether intended or unintended, and whether illegal or not at the national level, the production of CFC-11 was subject to controls under the Protocol. Each party was responsible for ensuring that it had phased out the production of CFC-11 in accordance with the provisions of the Protocol. He asked whether the party intended to revise its historical reporting of CFC-11 production under Articles 2 and 7 of the Protocol based on the discovery of illegal production facilities.
56. Another representative, while acknowledging that the data indicating a recent decrease in CFC-11 emissions was preliminary, said that it was nevertheless a positive signal. He emphasized the need for the decrease to be quantified and for the trend to be demonstrated over a longer period. Expressing concern regarding the continued threat posed to the ozone layer by CFC-11 emissions, he said that the quantity involved represented substantial illegal production and consumption. Given that, according to the Technology and Economic Assessment Panel report, the emissions seemed to be linked to the production and use of CFC-11 in closed-cell foams during the period 2012–2017, he suggested that, without excluding other possibilities, it might be useful to focus continuing investigations on that sector.
57. One representative, noting that the phase-out of HCFC-141b might have led some companies to use CFC-11 for foam blowing, said that some parties might therefore unwittingly be importing foam made using CFC-11. Parties might need to rethink the approach to the phase-out of HCFC-141b, given

the perverse incentives that action might have caused. Another representative stressed the need to install traditional monitoring stations in areas generating CFC-11 emissions and increase the number and quality of inspections.

58. One representative said that the issue of CFC-11 emissions had foregrounded a problem hitherto not fully considered by parties, namely the risk of renewed production and use of substances already phased out under the Montreal Protocol. Urging all parties to remain vigilant about illegal production, consumption and trade, he expressed support for holding a broader discussion on ways in which the institutions of the Protocol could be strengthened to effectively address the potential for illegal activities and ensure the sustained phase-out of ozone-depleting substances. Consideration of that issue could be undertaken in a re-established contact group on unexpected emissions of CFC-11, whose mandate as established at the forty-first meeting of the Open-ended Working Group was broad enough to consider both sets of issues.

59. Several representatives, including one speaking on behalf of a group of countries, expressed support for the re-establishment of the contact group. They suggested that, at the current meeting, the re-established contact group should consider what were the next steps to take in tackling CFC-11 emissions. A number of representatives expressed the hope that the representatives of Australia and Chile who had previously chaired the contact group would continue in that role.

60. Several representatives called for the adoption of a decision on CFC-11 at the current meeting. One said that he would submit a conference room paper containing a draft decision on the matter, while another said that his delegation reserved the right to do likewise. A third, stressing that the CFC-11 emissions undermined the work of the global community over the previous 30 years to protect the ozone layer, said that the Thirty-First Meeting of the Parties should adopt a decision that built on decision XXX/3, on unexpected emissions of CFC-11, to send a strong signal to the world on the seriousness of the issue and the resolve of the international community to address it. Several representatives emphasized the need to bring the discussions on unexpected emissions of CFC-11 to a close at the current meeting and to chart a way forward, including by adopting a decision on the matter.

61. Several representatives, including one speaking on behalf of a group of countries, drew attention to the many sources of important information on the CFC-11 emissions, including the most recent report by China, the side event held at the current meeting, the updated information provided by the Secretariat, the report of the contact group on unexpected emissions of CFC-11 at the forty-first meeting of the Open-ended Working Group (UNEP/OzL.Pro.WG.1/41/5, annex II), the recommendations¹ of the Multilateral Fund for the Implementation of the Montreal Protocol, the report in the Stratosphere-Troposphere Processes and Their Role in Climate (SPARC) July 2019 newsletter of the international symposium on the unexpected increase in emissions of ozone-depleting CFC-11, and the conference room paper containing a proposed draft decision on carbon tetrachloride introduced by the representative of Switzerland at the forty-first meeting of the Working Group. One representative said that the SPARC report set out important related short- and long-term actions, including the organization of focused, internationally recognized measurements campaigns in priority areas that could improve knowledge about the location of production, improved emissions estimates, and the identification and analysis of “pinch points” where emissions might be more likely to occur.

62. One representative said that more information was required from the panels and the Ozone Secretariat, and that specific information was needed from China on sources of emissions and the reporting of production and consumption from illegal production activities, along with a description of ongoing and planned future activities to address the issue at the national level.

63. One representative, speaking on behalf of a group of countries, said that the previous mandate of the contact group had been divided into two main themes, namely the science on the one hand and the institutional matters and processes on the other. In his view, the scientific part of the discussion had run its course, and future work should focus on the second issue. Recalling the opening statement made by Ms. Birmpili at the current meeting, he stressed the importance of adapting approaches in the light of facts and of continuing work for the next 30 years to protect the ozone layer. There was a need to review the processes of the institutions of the Montreal Protocol, possibly in a smaller group, or initially in the contact group and thereafter in a smaller group.

64. One representative expressed support for the proposal of providing the contact group with a mandate that would focus on formulating actions to be adopted with a view to ensuring the future

¹ As contained in annex II to the overview of the procedures under the Multilateral Fund by which the parties review and ensure continuing compliance with the terms of agreements under the Fund (originally UNEP/OzL.Pro/ExCom/83/38).

sustainability of the Montreal Protocol, rather than focusing on specific cases of CFC-11 emissions. She said that any decision adopted on CFC-11 should not impede the work under the Montreal Protocol to achieve its phase-out objectives for the 2020 target date.

65. One representative, deeming it regrettable that his questions regarding the unexpected emissions of CFC-11 had gone unanswered, said that according to the Technology and Economic Assessment Panel data the level of emissions corresponded to 40,000–70,000 tonnes of CFC-11 produced. Clarification was needed from China regarding whether its historical CFC-11 production and consumption data were being revised and regarding the relationship of that data to the party's obligations under articles 2 and 7 of the Protocol. Noting that numerous cases of illegal production facilities had been found in China and reported repeatedly, he asked what had been done to identify the downstream users of CFC-11 and what it was being used for, particularly given the apparently large volumes of CFC-11 being used in closed-cell foam.

66. One representative, speaking on behalf of a group of countries, drew attention to the importance of comprehensive and effective licensing systems and domestic enforcement systems as described in the report of the contact group on CFC-11 at the forty-first meeting of the Open-ended Working Group. Any decision on the matter to be adopted at the current meeting could include a reference to the meeting of the Ozone Research Managers to be held in the second quarter of 2020. The purpose of such a draft decision would be to avoid the emergence of a problem similar to the CFC-11 problem and to ensure that the current situation had been resolved. Recalling that, in its decision XXX/3, the Thirtieth Meeting of the Parties had requested the Scientific Assessment Panel to provide a final report on CFC-11 emissions to the Thirty-Second Meeting of the Parties, he said that it was important to consider the responsibilities of the various bodies under the Montreal Protocol, including the Meeting of the Parties and the Executive Committee. The prospect of commissioning third-party experts to review processes should be treated with caution.

67. Several representatives expressed support for the formation of a small group in addition to the contact group to discuss specific relevant issues.

68. Following the discussion, the parties agreed to re-establish the previously established contact group on unexpected emissions of CFC-11, with a modified mandate, namely to define further steps to address the situation of unexpected emissions of CFC-11, and to identify the institutional processes to be enhanced or strengthened to avoid recurrence and similar situations. The Co-Chair urged parties with specific proposals for draft decisions to hold informal discussions with a view to merging their proposals into a single draft decision for consideration and possible adoption by the Thirty-First Meeting of the Parties. It was later decided that the contact group would again be chaired by Ms. Annie Gabriel (Australia) and Mr. Osvaldo Álvarez-Pérez (Chile).

69. Subsequently, the representative of the European Union introduced a conference room paper containing a draft decision on the matter. The parties agreed to consider the draft decision in the contact group.

70. Subsequently, the co-chair of the contact group introduced the draft decision that had been agreed on after lengthy discussions in the contact group. Another representative, thanking the co-facilitators and all the participants in the contact group for their hard work, nevertheless said that further consideration was needed of how to avoid such problems in the future. He proposed that the item be included on the agenda of the next meeting of the Open-Ended Working Group, and that it be considered in the light of, inter alia, the forthcoming report on related issues from the Implementation Committee.

71. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment, and to include the item on agenda of the next meeting of the Open-ended Working Group.

VII. Ongoing emissions of carbon tetrachloride

72. 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 as a result of the findings on carbon tetrachloride emissions and their sources that had been presented to the Thirtieth Meeting of the Parties by the Scientific Assessment Panel as part of the 2018 quadrennial assessment. That report had included new findings that had contributed to reducing the discrepancy between the top-down and bottom-up estimates of emission levels, and to a better understanding of emission sources.

73. Discussion at that meeting had highlighted the need to address the issue, as well as the linkages with the issues of CFC-11 emissions, feedstock uses of carbon tetrachloride and unregulated industrial

emissions of it. Suggested actions had included extended atmospheric monitoring, mitigation measures for emission sources, and relevant research, with guidance from the assessment panels.

74. Switzerland had subsequently introduced a proposal for a draft decision containing a list of possible actions. The contact group that had discussed the draft decision had agreed that any further work on the matter should take place in the framework of the mandate and control obligations of the Montreal Protocol and should take into account the workloads of the assessment panels. It had also agreed that clarity was needed about which gaps in knowledge needed to be closed and what work the panels and the parties could undertake to close those gaps. The draft decision had been forwarded to the Thirty-First Meeting of the Parties for further consideration and was set out in document UNEP/OzL.Pro.31/3.

75. The representative of Switzerland said that he welcomed the resumption of discussions on the matter, noting that 35,000 tonnes of carbon tetrachloride entered the atmosphere every year from sources that were still not fully understood. Stopping those emissions would accelerate the recovery of the ozone layer. Expressing thanks to all the parties that had contributed to the discussions at the most recent meeting of the Open-ended Working Group and thereafter, he said that a revised version of his proposed text was in preparation and that it contained, among other elements, a request to the assessment panels to consider the matter further, a call for parties to provide all relevant information, and a reference to the need to improve global monitoring capacity. Acknowledging that the issue overlapped with other items on the agenda, and that it was desirable to avoid duplicating efforts, he suggested that informal discussions continue, with the understanding that the contact group could subsequently be reconstituted.

76. All representatives who took the floor thanked Switzerland for raising the issue, agreed that it remained important, and expressed their desire to discuss it further. They also congratulated the assessment panels on their work to reduce data discrepancies with regard to carbon tetrachloride emissions. The draft decision was said to be comprehensive and cover most of the main topics; other topics that could be added included the use of carbon tetrachloride as a feedstock, its production as a by-product, and a request for more information on sources, users and end-uses. Some representatives thought that the contact group could be re-established right away, while others were of the view that, in the light of the overlaps with other items on the agenda, it would be preferable to continue informal discussions for the time being.

77. The meeting agreed to continue informal discussions on the topic until agenda items 5 (on potential areas of focus for the 2022 quadrennial assessment reports) and 6 (on unexpected emissions of CFC-11) had been fully discussed. After that, discussion of the way forward with regard to carbon tetrachloride emissions could resume in the plenary session.

78. Subsequently, the representative of Switzerland reported that participants in the informal discussions had agreed that it would be useful to give parties more time to consult with each other, with industry and with the Technology and Economic Assessment Panel to determine what additional information could usefully be collected to support mitigation measures.

79. He proposed that the text of the revised draft decision be annexed to the report of the current meeting and included in the documentation for the next meeting of the Open-ended Working Group as background material for discussion of the topic at that meeting. A number of representatives objected to the proposal to annex the draft decision to the report of the meeting, arguing that that would set an unhelpful precedent and that it would be preferable simply to reflect the contents of the draft decision in the report.

80. The representative of Switzerland therefore requested the inclusion of the item on the agenda of the next meeting of the Open-ended Working Group. He suggested that interested parties having any production or consumption of carbon tetrachloride might wish to gather the following information on their domestic industrial processes as a basis for further discussion of what information might be needed to address the issue of carbon tetrachloride emissions: the locations where such processes took place and the transport chains between them; the volumes of substances that were part of the production and consumption chain of carbon tetrachloride; and the monitoring arrangements in place for the surveillance of substance flows and/or emissions.

81. The parties took note of the information provided and agreed to include the item on the agenda of the next meeting of the Open-ended Working Group.

VIII. Issues related to exemptions under Articles 2A–2I of the Montreal Protocol

A. Nominations for critical-use exemptions for methyl bromide for 2020 and 2021

82. Introducing the sub-item, the Co-Chair recalled that at the forty-first meeting of the Open-Ended Working Group, the Methyl Bromide Technical Options Committee had presented its initial evaluation of the six critical-use nominations received from four parties. Following bilateral discussions with the nominating parties during and after the meeting, the Committee had finalized its evaluation, taking into account the additional information provided by the nominating parties. The Committee's final report on its evaluation of critical-use nominations for methyl bromide for 2019 was contained in volume 2 of the September 2019 report of the Technical and Economic Assessment Panel, with a summary provided in document UNEP/OzL.Pro.31/2/Add.1.

83. The co-chairs of the Methyl Bromide Technical Options Committee, Ms. Marta Pizano and Mr. Ian Porter, gave a presentation on the Committee's final assessment of critical-use nominations for methyl bromide. A summary of the presentation is set out in section C of annex II to the present report.

84. During the ensuing discussion, the representative of South Africa said that, owing to elections in his country, his delegation had been unable to attend the forty-first meeting of the Open-Ended Working Group and thus to interact with the Methyl Bromide Technical Options Committee before it finalized its assessment. The Committee's final recommendations were for lower exemptions than those requested by his Government. For pest control in mills, the recommendation allowed only one fumigation per year per mill, even though his Government had repeatedly pointed out that, because of specific conditions in the country, two fumigations were required. In addition, the Committee had reduced the nominated exemption for 2020 for houses on the assumption that a significant phase-in of sulfuryl fluoride, a registered alternative, would be possible in 2019 and 2020, despite his Government's contention that additional time was needed for phase-in, market penetration and testing of sulfuryl fluoride to ensure that it worked. While South Africa was not opposing the Committee's final recommendation and would use its existing stocks to offset the shortfall, the points mentioned should be taken into consideration in future evaluations of critical-use nominations.

85. The representative of Australia, speaking about his country's critical-use nomination, confirmed that if methyl iodide or another alternative became available in sufficient time, his Government would issue a permit only for the amount of methyl bromide required in 2021 as part of the transition period. He said that the Australian and Canadian delegations were preparing a draft decision on critical uses and would consult with the Argentinian and South African delegations before submitting the text for consideration.

86. The representative of Canada, referring to his country's critical-use nomination, said that Canada remained committed to phasing out methyl bromide. However, as was indicated in the Committee's report and presentation, for various reasons, chemical fumigant alternatives were no longer available on Prince Edward Island, and technical alternatives were the only potentially feasible option for strawberry runners. While preliminary results from soilless culture trials indicated that good results had been achieved in 2019, several more years of positive results would be needed, the technique still had to be optimized, and technical barriers remained to be overcome.

87. One representative, speaking on behalf of a group of countries, noted that technically and economically feasible alternatives had now been identified for virtually all applications of methyl bromide for pre-plant soil use. It was important for the Committee to continue receiving annual updates of economic information so that it could evaluate the cost of alternatives compared to that of methyl bromide in current uses. South Africa had shown great flexibility in accepting its reduced exemption because it had access to stocks of about 45 tonnes of methyl bromide. He wondered whether other parties with existing stocks could also reduce their nominations accordingly. If parties had more information on stocks, they could know where stocks existed and what they could be used for.

88. Subsequently, the representative of Australia introduced a conference room paper containing a draft decision on the matter. He explained that the text had been amended to include the statement that alternatives to the use of methyl bromide in almost all non-quarantine and pre-shipment uses had been identified, and to list the national commitments adopted by those parties that had had put forward nominations for critical uses.

89. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

B. Stocks of methyl bromide

90. Introducing the item, the Co-Chair drew attention to the background information set out in paragraphs 53–56 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2) and paragraph 14 of the addendum to that document, and to the final report of the Technology and Economic Assessment Panel on critical use nominations. She recalled that at the forty-first meeting of the Open-ended Working Group, the European Union had introduced a conference room paper, co-sponsored by Norway, containing a proposal that parties be invited to provide information on their stocks of methyl bromide, and that the Panel be requested to clarify the distinction between exempted and controlled uses of the chemical. An informal group had been established to discuss the proposal, and the Open-ended Working Group had agreed that the issue be included on the agenda of the current meeting.

91. The representative of the European Union said that the aim of the proposal had been to assist the work of the Methyl Bromide Technical Options Committee in evaluating critical-use nominations, and the deliberations of the parties on related matters, by collating more reliable and comprehensive data on the volume of stocks of methyl bromide globally and what they were used for. He recalled that the proponents of the proposal had decided not to proceed with it at the Open-ended Working Group, but to consult further with parties and reconsider the issue at the current meeting. It could be useful for the matter to be included in the discussions of the informal group dealing with agenda item 8 (a) on nominations for critical-use exemptions for methyl bromide for 2020 and 2021.

92. In the ensuing discussion, there was general recognition that the issues related to the storage and use of methyl bromide merited further discussion. Some representatives spoke in favour of the elimination of methyl bromide and recounted their own countries' efforts to phase out the substance. Several others said that discussion of critical use nominations was best undertaken separately from consideration of stocks. One representative said that only a small number of parties were still requesting critical-use exemptions, while the issue of stocks was of global relevance, so that it was not apparent what could be gained by discussing the two issues together in one group.

93. The parties agreed that informal discussions should continue on the issue of stocks as a separate matter, with the possibility of developing and presenting a draft decision for consideration by the parties, and that the main interested parties should participate in the discussions on critical-use nominations to ascertain whether there was any potential for any aspects of the matter of stocks to be addressed in that group.

94. Subsequently, the representative of the European Union, also on behalf of Chile, Ecuador, Jordan, Norway and Switzerland, introduced a conference room paper containing a draft decision on the matter asking parties to report, on a voluntary basis, on methyl bromide stocks to facilitate the work of the Technology and Economic Assessment Panel. Another representative, questioning the need to begin reporting stocks of methyl bromide after a long period of not doing so, wondered whether the request would be easy for parties to implement. A number of representatives highlighted the voluntary nature of the reporting requested in the draft decision and said that it would benefit all parties. One representative said that it was important to continue and strengthen the search for alternatives to methyl bromide and that the provisions of the draft decision would support the elimination of methyl bromide use.

95. The parties agreed to hold informal discussions on the draft decision and report back in plenary session on the outcome of those discussions.

96. Subsequently, the representative of the European Union reported that progress had been made in the discussions. He said that the resulting text imposed no new obligations on any party; it simply proposed to invite parties to submit, on a voluntary basis, details on the volumes of all methyl bromide stocks, including those in mixtures, to the Secretariat by 1 July 2020 and requested the Secretariat to post the information on its website.

97. Many representatives agreed, pointing to the need for better information on stocks of methyl bromide to help in drawing up strategies to eliminate its use, as was suggested in the report of the Methyl Bromide Technical Options Committee. They said that the diversity of the sponsors of the draft decision demonstrated a wide degree of support for it. One representative said that the matter was so important that it should be made a mandatory requirement rather than a voluntary action. Another suggested that the draft decision incorporate provisions on the disposal of used containers, which was a problem in his country. A third, however, said that he did not see a reason to approve the draft decision; it was not clear to him what problem the decision was meant to solve.

98. The parties agreed to continue informal discussions on the draft decision.

99. Subsequently, the representative of the European Union reported that a revised text had been proposed by one party in the spirit of compromise. Since there had been insufficient time to reach consensus on the matter, he requested that the item be included on the agenda of the next meeting of the Open-ended Working Group.

100. The parties agreed to include the matter on the agenda of the forty-second meeting of the Open-ended Working Group.

C. Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol

101. Introducing the item, the Co-Chair drew attention to the background information set out in paragraphs 57–61 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2), the report of the Technology and Economic Assessment Panel on laboratory and analytical uses, and section 5.1 of the Panel's May 2019 progress report. He recalled that the discussion of laboratory and analytical procedures at the forty-first meeting of the Open-ended Working Group had included a discussion of the recommendations of the Panel and its Medical and Chemicals Technical Options Committee, which included the removal of nine laboratory and analytical procedures from the existing global exemption.

102. In the ensuing discussion, several representatives spoke in favour of simplifying the framework through which the Montreal Protocol addressed controlled substances for laboratory and analytical uses. One representative said that consultations on the matter had continued intersessionally with the intention of setting out proposals in a conference room paper to be considered by the parties at the current meeting. The parties agreed to establish an informal group to continue discussion of the matter.

103. Subsequently, the representative of Canada introduced a conference room paper containing the draft decision that had been agreed on by participants in the informal group.

104. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

D. Process agents

105. Introducing the item, the Co-Chair drew attention to the background information set out in paragraphs 62–68 and annex II of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2), section 5.3.3 of the Technology and Economic Assessment Panel May 2018 progress report (vol. 3) and section 5.2 of the May 2019 progress report (vol. 1). She recalled that at the Thirtieth Meeting of the Parties, parties had discussed possible actions with regard to table A (list of uses of controlled substances as process agents) and table B (emission limits for process agent uses) of decision X/14 on process agents. The Technology and Economic Assessment Panel had, as requested by decision XXIX/7, provided its full report on the matter, which had been discussed further at the forty-first meeting of the Open-ended Working Group.

106. The representative of the European Union said that his party would present a conference room paper containing a draft decision with the aim of updating the limits outlined for that party in tables A and B of decision X/14 and stressing the importance of reporting on such uses, on emissions and on technological developments to reduce such uses. The party would also continue to engage with other interested parties on the matter of updating the limits in the tables in decision X/14 for other parties with the intention of setting out proposals in a conference room paper to be considered by the parties at the current meeting. Subsequently, when the conference room paper had been introduced, it was agreed that interested parties would consult informally on the matter and report back in plenary session on the outcome of those discussions.

107. Subsequently, the representative of the European Union introduced a conference room paper containing the draft decision that had been agreed on after the informal discussions.

108. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

IX. Access of parties operating under paragraph 1 of Article 5 of the Montreal Protocol to energy-efficient technologies in the refrigeration, air-conditioning and heat-pump sectors

109. Introducing the item, the Co-Chair reminded participants that in decision XXX/5 the Technology and Economic Assessment Panel had been requested to prepare a report on the cost and availability of low-global-warming-potential technologies and equipment that maintained or enhanced energy efficiency, covering various refrigeration, air-conditioning and heat-pump sectors, in particular domestic air conditioning and commercial refrigeration, and taking into account conditions in different geographical regions, including countries with high-ambient-temperature conditions. The Panel had established a task force, which had presented its report at the forty-first meeting of the Open-ended Working Group.

110. The meeting had discussed the report and requested the inclusion of several further elements in an update for the Meeting of the Parties. The new version of the report was available on the meeting portal and an executive summary of it was contained in the addendum to the note by the Secretariat (UNEP/OzL.Pro.31/2/Add.1).

111. Ms. H  l  ne Roachat, co-chair of the Technology and Economic Assessment Panel Task Force on energy efficiency, and Mr. Bassam Elassaad, Mr. Omar Abdelaziz and Ms. Gabrielle Dreyfus, lead chapter authors for the report of the Task Force, presented their report on the cost and availability of low-global-warming-potential technologies that maintain/enhance energy efficiency. A summary of the presentations is set out in section D of annex II to the present report. Other members of the Task Force joined the presenters in responding to questions from representatives.

112. All representatives who took the floor thanked the Task Force for producing its report, welcoming the useful information contained therein. Task Force members then responded to questions about the costs and benefits of particular technologies and substances.

113. Mr. Elassaad described the first stage of the PRAHA programme, which had not been able to test all the possible refrigerant-compressor combinations and had been limited to compressors available on the market at the time. The more recent PRAHA 2 programme had tested units with optimized compressors and heat exchangers for high-ambient-temperature conditions, which had showed improved levels of energy efficiency.

114. Mr. Alaa Olama responded to a question on the not-in-kind project carried out in Kuwait. The system that had been tested – evaporative cooling – had been found to be superior to mechanical vapour compression systems by 40 to 60 per cent. Similar results had been found in split-system equipment and commercial refrigeration in several other countries.

115. Mr. Roberto Peixoto, co-chair of the Task Force, described the benefits of using variable-speed compressors, which depended partly on the temperature profile: the flatter the daily profile, the lower the benefit in terms of energy saving. The high degree of savings demonstrated in tests in Brazil – 30 to 40 per cent – had been found in three cities and was in line with findings from other projects, including some in India, Indonesia and Turkey. Higher savings could be achieved depending on the temperature profile, the thermal load, the thermal inertia and other factors, and further research was under way.

116. Mr. Abdelaziz said that micro-channel heat exchangers could be manufactured in high-ambient-temperature countries, given access to sufficient capital; indeed, one factory was already manufacturing them in Egypt. Compressors in high-ambient-temperature countries were usually more expensive than those in lower-temperature countries, partly because they usually had higher capacities. Nevertheless, they were becoming increasingly available, and several test projects had shown that their energy efficiency levels were higher than those of compressors using HCFCs. Compressors using HFC-32 were already available in high-ambient-temperature countries, and one project in the United Arab Emirates had seen 15,000 units manufactured over four years.

117. Mr. Samir Hamid, commenting on energy efficiency comparisons between different technologies and refrigerants, said that more information on the topic was included in the previous report of the Task Force. A project on not-in-kind alternatives in Jordan had seen a 30 per cent improvement in energy efficiency. The market was generally very dynamic; if demand for energy-efficient equipment increased, costs and prices could be expected to fall. Unfortunately, no data were available on the quantification of the improvements in energy efficiency that had followed the ongoing phase-out of HCFC equipment; it was nevertheless clear that such improvements had occurred. Some of the information requested by representatives appeared in the previous report of the

Task Force, including definition of which HFCs had high global warming potential and information about the costs of maintenance and servicing.

118. Regarding the difference between the availability and the accessibility of alternative technologies and substances, Ms. Rochat said that it was difficult to assess. The mix of products on the market changed all the time; the only way to accurately judge accessibility was to purchase the product in question. A top-down analysis could never fully assess it. However, accessibility could be increased by increasing demand for particular products – for example, through bulk purchases or by grouping purchasers together. Task Force members also explained that the definition of “widely available” used in the report meant that a product was available from more than one supplier in more than one country. The Task Force had not analysed in detail market penetration in any particular country.

119. Replying to several questions about “environmental dumping”, Ms. Dreyfus said that the activity, while legal, had clearly negative environmental and economic impacts. While at the time of the report’s preparation limited information had been available on the extent and impact of the practice, more information was emerging. Environmental dumping tended to be correlated with the absence of national energy efficiency policies, with a lack of properly trained servicing technicians and familiarity with new substances, with a lack of safety standards, with a lack of policies designed to phase down high-global-warming-potential HFCs, and with an absence of market signals promoting demand for alternative low-global-warming-potential products. The report included two examples of programmes that had involved replacement of old equipment and recovery and destruction of the refrigerants it contained. The programme had thus stimulated demand for new equipment, an effect that could be enhanced through rebates and tax incentives. Another benefit was that the old equipment had been prevented from entering the second-hand market and undercutting new products in terms of price.

120. Task Force members drew attention to the ways in which some parties had implemented policies and regulations that had driven substantial improvements in energy efficiency during the transition to low-global-warming-potential alternatives. While it had not always been clear whether the policies or the transition had come first, both measures clearly worked together to promote positive outcomes.

121. Replying to a question about the situation in Saudi Arabia, Mr. Maher Mousa said that the programme of minimum energy performance standards had started as a voluntary one in 2007 and had become a mandatory requirement in 2012; the report contained a full account. The Gulf Mark (“G-mark”) set of safety regulations applied across the Gulf Cooperation Council region; the timing of implementation of the standard for heating, ventilation, and air-conditioning equipment was decided by individual countries. In Saudi Arabia, the standard had been introduced in 2018 to limit the refrigerant charge in residential air conditioners.

122. Mr. Ashley Woodcock, co-chair of the Task Force, acknowledging the importance of a question on the cost of inertia – not doing anything – said that, while unfortunately the issue was outside the remit of the Task Force report, clearly any delay in addressing energy efficiency issues would mean continued imports of inefficient equipment. That would result in higher demand for electricity and a substantial economic cost for the lifetime of the equipment, which could be two decades.

123. After the question-and-answer session, the Co-Chair invited representatives to discuss the way forward. All who spoke underlined the importance of the linkages between the phase-down of high-global-warming-potential substances and technologies and the need to improve energy efficiency. One representative noted that more than 80 per cent of the climate impact of refrigeration and air-conditioning equipment derived from the electricity it consumed. Another cited encouraging evidence that the transition to low-global-warming-potential alternatives was being accompanied by improvements in energy efficiency in the refrigeration and air-conditioning sector.

124. Several representatives commented on the challenges facing high-ambient-temperature countries, which had few available alternatives for refrigerants and equipment components, particularly for the high-capacity residential air conditioning common in those countries. The future availability of substances and equipment was also very uncertain. Some alternatives, such as hydrocarbons, worked acceptably in refrigeration but not in air conditioning. The incremental costs of the transition to low-global-warming-potential alternatives needed to be carefully assessed on a case-by-case basis. Some representatives said that their countries might face a choice between installing energy-efficient equipment and complying with the requirements of the Kigali Amendment. It was observed that other Article 5 parties – for example, small island developing States – faced

similar challenges concerning the accessibility of low-global-warming-potential GWP alternatives, as well as issues such as the toxicity and flammability of some substances.

125. One representative observed that parties had been on a steep learning curve over the last few years, thanks in part to three Technology and Economic Assessment Panel Task Force reports, a workshop and several discussions at meetings of the parties; those efforts had laid firm foundations for future progress. Given the growing impacts of climate change, it was no exaggeration to say that those efforts were life-saving, and the parties needed to continue their work and make further progress. As the technologies in question were changing rapidly, the Task Force should be invited to produce further updates on newly available technologies and the market penetration of energy-inefficient equipment. Also useful would be information on the impact of the ratification of the Kigali Amendment on the introduction of low-global-warming-potential alternatives; on the effects of measures to phase down HFCs in conjunction with improving energy efficiency; and on the potential for early replacement programmes to enhance the availability and accessibility of low-global-warming-potential alternatives.

126. Several representatives, including one speaking on behalf of a group of countries, highlighted the valuable role of policy measures such as minimum energy performance standards and labelling, not only at the national but also the international level. More broadly, international cooperation, including information and technology exchange and cooperation in the formulation of standards and labelling policies and performance tests, was vital to success, as had been highlighted in the Task Force report. Building capacity in the servicing and maintenance sector was just as important as replacing equipment and represented an opportunity to create green jobs and enhance skills and prosperity. There were also opportunities in encouraging not-in-kind alternatives through modal shifts – for example, providing air-conditioning systems for whole buildings rather than rooms, or through district cooling systems.

127. Several representatives mentioned the need to provide financial support for the introduction of technologies with greater energy efficiency and to establish linkages with other national and international programmes and institutions supporting work on energy efficiency. It was recalled that both points had been identified in decision XXX/5, and that the work under the Montreal Protocol to develop synergies with energy partners had been recognized at the Fourth Meeting of Pacific Regional Energy and Transport Ministers, held in Samoa in September 2019. One representative highlighted the valuable role that industry-led programmes could play in supporting the transition, while another stressed the need to address intellectual property constraints. Several mentioned the issue of dumping of inefficient equipment, which risked driving up the demand for energy.

128. Some representatives supported the proposal to invite the Task Force to continue its work, pointing to the need for further information and data. They suggested that a contact group be established to discuss that and other options. One representative, however, observed that the Executive Committee of the Multilateral Fund had met only once since the adoption of decision XXX/5 and had not had time to implement all the steps mentioned in the decision. It had decided to prioritize the supporting of enabling activities in low-volume-consuming countries and would continue to work on other measures at future meetings. The decision had not been intended as a comprehensive solution but an initial set of steps to address a complex issue. While the topic merited further discussion, the Executive Committee should be given time to implement the steps agreed on in 2018 before further measures were proposed.

129. The meeting agreed that informal discussions should continue on the topic and the agenda item would remain open to allow any further suggestions to be made.

130. Subsequently, the representative of the Federated States of Micronesia introduced a conference room paper containing a draft decision that had been agreed on after the informal discussions.

131. The parties agreed to forward the draft decision for further consideration and possible adoption during the high-level segment.

X. Terms of reference, composition, balance, fields of expertise and workload of the Technology and Economic Assessment Panel

132. Introducing the item, the Co-Chair drew attention to paragraphs 73 to 76 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2), a review of the terms of reference, composition, balance, fields of expertise and workload of the Technology and Economic Assessment Panel (UNEP/OzL.Pro.WG.1/41/4), the terms of reference of the Technology and Economic

Assessment Panel under decision XXIV/8, and the matrix of needed expertise on the Technology and Economic Assessment Panel and its technical options committees (UNEP/OzL.Pro.31/2, annex III).

133. She recalled that at the forty-first meeting of the Open-ended Working Group, parties had considered how to strengthen the process of nomination and selection of members of the Technology and Economic Assessment Panel, its technical options committees and other subsidiary bodies. Informal discussions had been held on the matter, after which Saudi Arabia had introduced a draft decision on behalf of a group of parties. The draft decision had been discussed and amended by an informal group and forwarded to the Thirty-First Meeting of the Parties and was set out in document UNEP/OzL.Pro.31/3. The informal group had also suggested that the Technology and Economic Assessment Panel and the Ozone Secretariat consider whether the form for nominating experts should be updated to reflect current circumstances.

134. The meeting agreed to reconstitute the informal group as a contact group co-chaired by Mr. Philippe Chemouny (Canada) and Ms. Lara Haidar (Lebanon).

135. Subsequently, after the contact group's deliberations, the co-chair of the contact group introduced a conference room paper setting out a draft decision on the matter.

136. The parties agreed to forward the draft decision for consideration and possible adoption during the high-level segment.

XI. Membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

137. 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 a conference room paper on behalf of parties in Eastern Europe and Central Asia containing a draft decision to add to the membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol one additional member from an Article 5 party and one additional 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, as opposed to the arrangement, based on a four-year rotation, that had been adopted in decision XVI/38. The proponents had stressed the equal right of all regions to participate in the work of the Executive Committee. An informal group established to discuss the draft decision had been unable to reach agreement. The proposed draft decision had been forwarded to the Thirty-First Meeting of the Parties and was set out in document UNEP/OzL.Pro.31/3.

138. The representative of Armenia, speaking on behalf of a group of parties in Eastern Europe and Central Asia, said that the principle underlying decision XVI/38, under which parties participated once every four years, was unclear. Any decision on the matter should be based on one of the principles in articles 1 and 2 of the Charter of the United Nations, namely the principle of the sovereign equality of all its members. All United Nations forums, including the Meeting of the Parties, should be guided by that principle, and objections to the adoption of the draft decision would equate to votes against the Charter.

139. Several other representatives expressed their support for the position expressed by the representative of Armenia. One suggested that the parties take a long-term view, saying that the ratification of the Kigali Amendment would give rise to broad projects requiring substantial funding, and that the countries of Eastern Europe and Central Asia wished to participate in the related discussions.

140. Several representatives raised concerns regarding the proposed draft decision and the characterization of the issue by the representative of Armenia. Two were reluctant to change the existing structure of the Executive Committee, which worked well in assisting countries with implementation of the Protocol, and a third said that the Executive Committee was based on geographical representation and had always worked transparently, providing financial and technical assistance to countries without distinction, in line with United Nations principles of equity and justice. One, noting that several issues had been raised during the discussion on the matter at the forty-first meeting of the Open-ended Working Group, pointed out that Eastern Europe and Central Asia was not a United Nations regional group, and that treating it as such might lead to confusion that could cause other countries to reconsider how they might seek greater representation on the Executive Committee. That view was echoed by another representative, while a third asked for more information on how the countries involved had attempted to address the situation and in what ways they believed that the current situation was affecting them negatively.

141. The representative of Armenia, supported by two other representatives, asked that a contact group be established to discuss the matter further, but two other representatives said that they preferred to hold informal discussions as a first step. Given the lack of consensus on the establishment of a contact group, the parties agreed to hold informal discussions on the matter.

142. Subsequently, the representative of Sweden reported that, while the informal discussions had helped to resolve some of the questions raised by parties, their original positions remained unchanged. The proposers of the draft decision had again requested the establishment of a contact group.

143. At a later stage of the meeting, the representative of Armenia thanked those parties that had participated in informal discussions and repeated her request for the establishment of a contact group in line with rule 26 of the rules of procedure. She believed that there was one fundamental question before those parties opposing the proposal: was the principle of equality, as stated in the Charter of the United Nations, legally binding on them?

144. The Co-Chair suggested that, since no consensus had been reached either on the issue itself or on the establishment of a contact group, the topic should be deferred for further consideration at the forty-second meeting of the Open-ended Working Group, in 2020.

145. The representative of Armenia said that she had not heard any party object to the establishment of a contact group, and that she was prepared to continue discussions in any format, formal or informal. Another representative, however, said that, as far as he knew, there was no consensus on the establishment of a contact group. A third added that it was his understanding that any contact groups formed at the current meeting would lapse at the conclusion of the meeting, and it would be up to the next meeting of the Open-ended Working Group to decide whether to establish a new contact group.

146. Responding to a request for clarification, the representative of the Secretariat confirmed that it had always been the practice of meetings of the parties to take decisions by consensus. How to proceed when there was no consensus was a matter for the parties to resolve.

147. The meeting agreed to defer the matter for further discussion at the next meeting of the Open-ended Working Group.

XII. Request by Azerbaijan to be included among the parties to which the phase-down schedule for hydrofluorocarbons, as set out in paragraphs 2 and 4 of Article 2J of the Montreal Protocol, applies

148. Introducing the item, the Co-Chair recalled that at its forty-first meeting the Open-ended Working Group had considered a request by Azerbaijan to be included in a group of five non-Article 5 parties – Belarus, Kazakhstan, the Russian Federation, Tajikistan and Uzbekistan – that would follow a phase-down schedule starting slightly later than the schedule for the other non-Article 5 parties. Azerbaijan had submitted a proposal on the matter and, after a discussion in plenary and bilateral discussions with interested parties, had indicated that it would amend the proposal to improve the version being forwarded to the Thirty-First Meeting of the Parties. The party had later informed the Secretariat that it would be unable to send a delegation to the current meeting. The parties had before them the original text, set out in document UNEP/OzL.Pro.31/3.

149. The parties agreed not to discuss the item at the meeting and to let Azerbaijan decide whether it wished to present the matter for consideration at a future meeting.

XIII. Safety standards

150. Introducing the item, the Co-Chair recalled that at its forty-first meeting the Open-ended Working Group had discussed the tabular overview of safety standards for flammable low-GWP refrigerants prepared by the Secretariat pursuant to decision XXIX/11. Parties had expressed appreciation for an online tool also developed by the Secretariat, had encouraged parties to continue providing information on safety standards to the Secretariat, and had requested the Secretariat to continue to update and develop the online tool. Several issues had been raised during the discussion, mainly regarding the importance of the review and revision of standards that would facilitate the expanded use of low-global-warming-potential refrigerants, but also regarding the need to consolidate information on standards, the appropriateness of certain standards to be used in specific regions, and the need of Article 5 parties for training and capacity-building. It had been agreed to defer further consideration of the issue to the Thirty-First Meeting of the Parties.

151. One representative, speaking on behalf of a group of countries, said that his party had been interested in safety standards for a number of years and had recently been working closely with

another party on the matter. Commending the Secretariat for setting up the interactive online tool, he encouraged other parties to share information on their standards and ensure that the platform was as complete and up-to-date as possible, which was the only way to publicize policy measures being taken to ensure that alternatives were available. Standards allowing broad, safe use of low-global-warming-potential refrigerants were essential to meeting the goals of the Kigali Amendment. As was indicated in the Technical and Economic Assessment Panel report on energy efficiency, it was clear that safe appliances had to be designed, built and installed when using natural refrigerants. He noted recent progress made by the International Electrotechnical Commission (IEC) in amending the IEC 60335-2-89 standard to raise the charge limit for refrigeration equipment in the commercial refrigeration sector and stressed the importance of moving forward with IEC 60335-2-40 for split air-conditioning equipment to ensure swift continued progress. Noting that setting international standards was only part of the process, he urged all parties to ensure that amended standards were taken into account in national, local and regional legislation and requirements in order to facilitate the installation of equipment using low-global-warming-potential alternatives.

152. Another representative, echoing the comments made by the previous speaker, expressed the hope that the IEC standard for household electrical appliances would also be amended, creating the enabling conditions to make products with low-global-warming-potential refrigerants more broadly available and facilitate the adoption of such products.

153. The parties agreed to conclude discussion on the agenda item.

XIV. Initial assessment by the Scientific Assessment Panel and the Technology and Economic Assessment Panel of five volatile fluoroorganic and related compounds found in the Arctic

154. Introducing the item, the Co-Chair recalled that in 2018 the representative of Norway had informed the Thirtieth Meeting of the Parties that a screening survey conducted by the Norwegian Institute for Air Research had resulted in the detection of five volatile fluoroorganic compounds in the Arctic atmosphere for the first time. Wishing to learn more about those anthropogenic substances, the Norwegian Government had sought guidance and help of other parties, the assessment panels, the scientific community and intergovernmental organizations, and had subsequently submitted a notification to the Secretariat and requested that appropriate action be taken in accordance with decision IX/24. The Secretariat had forwarded the information to the Scientific Assessment Panel for an assessment of the ozone-depleting potential of the substances and to the Technology and Economic Assessment Panel for an evaluation of the extent of use or potential use of any new substances considered by the Scientific Assessment Panel to have significant ozone-depleting potential and, if necessary, of the potential alternatives, along with recommendations for actions that the parties should consider taking.

155. Mr. Newman then made a presentation on the matter on behalf of both assessment panels. A summary of the presentation is set out in section E of annex II to the present report.

156. Replying to a question about where the substances were being emitted, he said that it was impossible to determine that on the basis of data from a single station.

157. Members of the Technology and Economic Assessment Panel then replied to questions about the function of the chemicals detected. Ms. Tope said that the Panel had used publicly available information and the members' expert knowledge of the chemicals market to determine their function, adding that the three chemicals used as solvents were specialty products and quite expensive. Mr. Ohnishi said that the two chemicals classified as perfluorocarbons were typically used to cool supercomputers, an application that had recently regained popularity because it was more energy efficient than cooling by air; that said, the demand created by that niche market was minimal. The chemical classified as a chlorofluorocarbon was a relatively new chemical that, according to the relevant scientific literature, was used as a solvent medium for special reactions such as fluorination and as an intermediate for hexachlorobutadiene, used for etching or cleaning in the semi-conductor manufacturing process. The remaining two chemicals were halogenated aromatics currently used as intermediates, in one case for herbicides, for which there was a relatively large market, and in the other case for a pharmaceutical ingredient, for which the market size was unknown.

158. The representative of Switzerland, noting that the chemicals could find their way into product development and calling for vigilance, informed the parties that his country had initiated a study to measure the levels of the newly detected substances in a suburban setting to learn more about their sources. He invited those interested to discuss the matter further in the margins of the meeting. A member of the Technology and Economic Assessment Panel, Mr. John Pyle, echoed the call for

vigilance; while such gases were not a threat to the ozone layer or the climate at their current low concentrations, they should be monitored to ensure that concentrations did not increase.

159. One representative said that he wished to thank the members of the Scientific Assessment Panel and the Technology and Economic Assessment Panel, and other scientists, for their contribution to knowledge on the five volatile fluoroorganic and related compounds found in the Arctic. While the quantities concerned were small, continued vigilance was warranted and necessary. Further monitoring activities needed to be undertaken to resolve uncertainties and fill knowledge gaps, and additional information on the status of the substances could be usefully provided in the next quadrennial report.

160. The parties agreed to conclude discussion on the item.

XV. Consideration of nominations to the assessment panels

161. Introducing the item, the Co-Chair recalled that, at its forty-first meeting, the Open-ended Working Group had considered the issue of nominations for positions on the Technology and Economic Assessment Panel. She outlined the relevant information set out in the note by the secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2, paras. 93–98) and the addendum thereto (UNEP/OzL.Pro.31/2/Add.1, paras. 22–23), noting that the Secretariat had received two nominations prior to that meeting: the nomination by Algeria of Mr. Sidi Menad Si-Ahmed to continue serving as a senior expert on the Panel for a period of four years and the nomination by Japan of Mr. Keiichi Ohnishi to continue serving as a co-chair of the Medical and Chemicals Technical Options Committee for an additional four-year period. The Technology and Economic Assessment Panel had provided information on the members whose terms would expire at the end of 2019, and the list was available in the Panel's May 2019 progress report and in the note by the Secretariat (UNEP/OzL.Pro.31/2, table 1).

162. At the forty-first meeting of the Open-ended Working Group, parties that were interested in the nominations or intended to nominate experts had been requested to engage in informal consultations with a view to preparing nominations to be considered at the Thirty-First Meeting of the Parties, and to consult the Panel to ensure that nominations would meet its requirements. Since then, the Secretariat had received an additional nomination, that by China of Mr. Jianjun Zhang, currently a co-chair of the Medical and Chemicals Technical Options Committee, to continue serving for an additional period of four years. A nomination had also been received at the current meeting: the nomination by Brazil of Ms. Suely Machado Carvalho, currently a senior expert on the Technology and Economic Assessment Panel, to continue serving for an additional four-year period.

163. Noting that the Environmental Effects Assessment Panel's two co-chairs, Mr. Nigel Paul and Mr. Min Shao, would soon retire, she said that they would need to be replaced. They were to be thanked for their tremendous contribution to the work of the Panel and to the achievement of the objectives of the Montreal Protocol.

164. The Co-Chair urged parties, when making their nominations, to take into account the matrix of needed expertise provided by the Technology and Economic Assessment Panel. Parties intending to nominate experts or interested in the nominations were encouraged to hold informal consultations in the margins of the meeting with a view to preparing nominations for consideration and possible adoption during the high-level segment.

165. Subsequently, the representative of the United States introduced a draft decision on the membership changes on the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel, set out in a conference room paper submitted by Algeria, Brazil, China, Egypt, India, Japan, the United Kingdom of Great Britain and Northern Ireland and the United States.

166. The parties agreed to forward the draft decision for consideration and possible adoption during the high-level segment.

XVI. Compliance and data reporting issues: the work and recommended decisions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol

167. The President of the Implementation Committee, Mr. Patrick McInerney (Australia), presented a report on the outcomes of the sixty-second and sixty-third meetings of the Committee, including an overview of the draft decisions approved by the Committee for consideration by the Thirty-First Meeting of the Parties. As had been the trend in recent years, the agenda of both meetings had been light – a result of the continued high level of compliance by parties with their obligations under the

Montreal Protocol. All the parties subject to decisions on reporting obligations had returned to compliance, and all the parties subject to plans of action were in compliance with those plans.

168. He drew attention to a conference room paper setting out two draft decisions for consideration by the Thirty-First Meeting of the Parties. The first, on data and information provided by the parties in accordance with Article 7 of the Montreal Protocol, noted that all parties that should have reported such data had done so. That was a commendable effort, he said, and parties and the implementing agencies should be congratulated for meeting the reporting deadline. The second draft decision related to the requirement for each party that had ratified the Kigali Amendment to establish an HFC licensing system within three months of the entry into force of the Amendment for that party, and to report to the Secretariat on the establishment and operation of the system. Any Article 5 party that decided it was not in a position to establish and implement a licensing system by 1 January 2019 could delay taking those actions until 1 January 2021. The decision noted with appreciation that to date 41 parties to the Kigali Amendment to the Montreal Protocol had reported the establishment of licensing systems, as required by the Amendment, and that five other parties that had not yet ratified the Amendment had also reported the establishment of such systems.

169. He said that at the end of the first year of implementation of the Kigali Amendment it might be wise, despite the high levels of compliance with obligations, to take stock and ensure that the non-compliance mechanism was sufficiently well equipped to deal with future challenges. To that end, the Implementation Committee at its sixty-third meeting had considered a report prepared by the Secretariat at the Committee's request on possible ways of dealing with 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. The Committee had agreed that the information was relevant for all parties and that the report would therefore be annexed to the report of the Implementation Committee on the work of its sixty-third meeting. It had also agreed to recommend to the Thirty-First Meeting of the Parties that the matter be included on the agenda for the forty-second meeting of the Open-ended Working Group.

170. In the ensuing discussion, one representative thanked the Implementation Committee for its excellent work, while another highlighted minor drafting inconsistencies in the text of the draft decisions. It was agreed that an item dedicated to the issues covered in the above-mentioned report by the Secretariat would be added to the agenda of the forty-second meeting of the Open-ended Working Group.

171. Subsequently, the Co-Chair, noting that the previously presented conference room paper on compliance and data reporting had contained two draft decisions, the first addressing data and information provided by the parties in accordance with Article 7 of the Montreal Protocol and the second dealing with the establishment of licensing systems under paragraph 2 bis of Article 4B of the Protocol, informed participants that the second draft decision had been edited and set out in a new conference room paper. The representative of the United States then introduced the conference room paper in question.

172. After a brief discussion, the parties agreed to hold informal discussions on both draft decisions and report back in plenary session on the outcome of those discussions.

173. Subsequently, the parties agreed to forward both draft decisions for further consideration and possible adoption during the high-level segment.

XVII. Risk of non-compliance with hydrochlorofluorocarbon reduction targets for 2019 by the Democratic People's Republic of Korea

174. Introducing the item, the Co-Chair outlined the relevant information set out in the note by the secretariat (UNEP/OzL.Pro.31/2, paras. 101–105), recalling that, at its forty-first meeting, the Open-ended Working Group had considered the risk of non-compliance with HCFC reduction targets for 2019 by the Democratic People's Republic of Korea. At that meeting, the party had notified the Working Group that it faced the risk of being in non-compliance with its obligations with respect to HCFC owing to its inability to embark on a HCFC phase-out management plan and related activities as a consequence of restrictions arising from Security Council sanctions. At the same meeting, the Open-ended Working Group had considered a draft decision submitted by the Democratic People's Republic of Korea on the matter. Owing to a lack of support for the proposed draft decision, the discussions on the agenda item had been closed. At the same meeting, the President of the Implementation Committee had described the outcome of the consideration of the matter by the Committee – namely, agreement that any work undertaken by the Committee with respect to the Democratic People's Republic of Korea should comply with the applicable Security Council

resolutions, and that the Committee would discuss the matter further in the event of any future non-compliance by the party with its obligations under the Protocol (UNEP/OzL.Pro.WG.1/41/5, paras. 191–199). Subsequently, the Secretariat had received a request from the party to place the issue on the agenda of the Thirty-First Meeting of the Parties.

175. The representative of the Democratic People's Republic of Korea, introducing a conference room paper containing a draft decision on the matter, drew attention to the situation in her country and its risk of non-compliance with HCFC reduction targets from 2019 despite the efforts undertaken at the national level to meet the reduction targets. In the draft decision, the Executive Committee of the Multilateral Fund was requested, among other things, to exclude any condition or restriction irrelevant to the implementation of the Protocol when it considered granting assistance to parties operating under paragraph 1 of Article 5. She called on all parties to assist her country by resuming the provision of technical assistance and training to it in order that it might meet its HCFC-related obligations under the Protocol, and to permit it to exceed the limits laid down by the Montreal Protocol with regard to HCFC production and consumption until confirmation of the provision of such assistance and training.

176. One representative said that he could not accept the draft decision, which would have parties to the Montreal Protocol act in direct contravention of Security Council resolutions. Stressing that the Executive Committee had to take into account Security Council resolutions as well as applicable international law and rules, he noted that a series of sanctions by the Security Council, including in resolution 1718 of 2006, limited the types of financial and technical assistance that could be provided to the Democratic People's Republic of Korea. To ensure compliance with such sanctions, proposed projects needed to be approved by the Security Council Committee established pursuant to resolution 1718 before being approved by the Executive Committee. Parties must ensure that funding spent in the Democratic People's Republic of Korea did not contribute to programmes relating to missiles and weapons of mass destruction, especially because, as was noted in relevant resolutions of the Security Council, the country had a history of diverting economic assistance and the proceeds of trade and economic activity to support such programmes. His Government could not, therefore, support the draft decision proposed by the Democratic People's Republic of Korea. If the party reported non-compliance with its obligations under the Montreal Protocol, the matter would again be taken up by the Implementation Committee and brought the attention of the parties.

177. In the ensuing discussion, a number of representatives, including one speaking on behalf of a group of countries, expressed support for the position whereby, in accordance with international law, it was not possible for the Multilateral Fund to disburse any further funding for projects in the Democratic People's Republic of Korea until the party had met all the requirements stipulated in the relevant Security Council resolutions. The representative of the Democratic People's Republic of Korea repeated that the suspension of funding from the Multilateral Fund would place the party at risk of non-compliance with the provisions of the Montreal Protocol. One representative, speaking on behalf of a group of countries, said that any matter of non-compliance should be dealt with in the appropriate forum, namely the Implementation Committee.

178. The parties agreed to close discussion on the matter.

XVIII. Status of ratification of the Kigali Amendment to the Montreal Protocol

179. Introducing the item, the Co-Chair drew attention to the background information set out in paragraphs 106–108 of the note by the Secretariat on issues for discussion by and information for the attention of the Thirty-First Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.31/2) and the note by the Secretariat on the status of ratification, acceptance, accession or approval of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP/OzL.Pro.31/INF/3). As was the custom of the Montreal Protocol, the Meeting of the Parties would take decisions recording the status of ratification of the Kigali Amendment, and urging those parties that had not already done so to consider ratifying it, until universal ratification was achieved. A draft decision on the matter was accordingly contained in document UNEP/OzL.Pro.31/3.

180. During the ensuing discussion, a number of representatives reported on their parties' progress towards ratification of the Kigali Amendment. Several expressed their commitment to the provisions of the Amendment and described national actions being undertaken to phase down production and consumption of HFCs. Some representatives called for further resources to be mobilized to ensure that parties had the means to implement the Amendment.

181. The parties agreed to forward the draft decision for consideration and possible adoption during the high-level segment of the current meeting.

XIX. Other matters: Rome Declaration on the Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development

182. Introducing the item, the Co-Chair said that, as had been decided during the adoption of the agenda, the Rome Declaration on the Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development would be discussed under the agenda item. The text was contained in annex V of document UNEP/OzL.Pro.31/2.

183. The representative of Italy said that his Government attached great importance to the Declaration, and he urged parties to endorse it. The Declaration aimed to highlight the role that the Montreal Protocol could play in supporting the development of sustainable cold chains to counteract food loss, thus contributing to a number of the Sustainable Development Goals, including Goal 2, on ending hunger; Goal 7, on affordable and clean energy; Goal 12, on responsible consumption and production; and Goal 13, on climate action. The Declaration complemented the theme of the high-level round-table discussion on the contribution of the Montreal Protocol to food loss reduction through sustainable cold chain development, which would take place during the high-level segment of the current meeting. Signature of the Declaration by parties was voluntary and non-binding.

184. During the ensuing discussion, many parties expressed support for the Declaration. One representative said that the initiative was very timely, given that the current meeting was being hosted by FAO, which had just launched the 2019 edition of its report *The State of Food and Agriculture*, focusing on food loss and waste reduction. Some representatives stressed the particular importance of cold chains in countries with high ambient temperatures, though one said that reference could have been made to the issue of safety in refrigeration and air-conditioning systems, as well as the efficiency and sustainability of those systems.

185. The representative of Italy said that he appreciated the widespread endorsement of and support for the Rome Declaration. The Co-Chair described the modalities by which parties could sign the Declaration either at the current meeting or during the intersessional period before the Thirty-Second Meeting of the Parties. It was agreed that the Declaration would be annexed to the report of the meeting along with the names of those parties that had endorsed it by the end of the meeting.

186. The Declaration is set out in annex I to the present report.

Part two: high-level segment (7 and 8 November 2019)

I. Opening of the high-level segment

187. The high-level segment of the Thirty-First Meeting of the Parties to the Montreal Protocol was opened at 10 a.m. on Thursday, 7 November 2019, by Ms. Liana Ghahramanyan (Armenia), President of the Thirtieth Meeting of the Parties.

188. Opening statements were delivered by Mr. Sergio Costa, Minister for the Environment and Protection of Land and Sea, Italy; Ms. Inger Andersen, Executive Director, UNEP; Mr. Pietro Parolin, Cardinal and Secretary of State, Holy See; Mr. Qu Dongyu, Director General, Food and Agriculture Organization of the United Nations (FAO); and Ms. Ghahramanyan.

189. In his opening address, Mr. Costa said that with the adoption of the Kigali Amendment the parties to the Montreal Protocol had achieved an extraordinary result, linking global policies pertaining to the dual challenges of ozone depletion and of climate change. He was grateful to the Executive Director of UNEP, the Ozone Secretariat and the staff of FAO for their cooperation with his Government to host the current meeting. Their collaboration with his ministry, including on reducing food loss and food waste, was crucial for achieving the 2030 targets of the Sustainable Development Goals. Agriculture, including climate-smart agriculture, provided an essential means of mitigating the impact of and adapting to the challenges of climate change. The theme of the high-level segment, “The contribution of the Montreal Protocol to a sustainable cold chain to reduce food loss”, was of special importance for both FAO and the Montreal Protocol.

190. Recalling the words of the late Secretary-General of the United Nations Mr. Kofi Annan, who had characterized the Montreal Protocol as perhaps the single most successful international agreement to date, he said that the Protocol proved that policymakers could listen to the message of science and successfully and rapidly deploy actions in pursuit of a shared environmental objective, as well as creating an effective and efficient institutional framework that could generate green economic growth.

The Kigali Amendment signalled a historic juncture at which policymakers yet again had to heed the science and act quickly in response.

191. In her remarks, Ms. Andersen said that she was grateful to the Government of Italy for hosting the current meeting in the city of Rome, whose incredible history stretched back thousands of years in comparison to the relatively short existence of the Montreal Protocol. At a time when multiple environmental challenges threatened human existence, agreements such as the Protocol had never been more important. She wished to stress the importance of the Kigali Amendment to the Protocol, whose implementation could avoid global warming of 0.4°C through the phasing down of hydrofluorocarbons (HFCs). On a warming planet, the need for life-saving cooling was growing, but the increased use of such cooling could not come at the expense of the climate. It was necessary, therefore, to explore greater energy efficiency, renewable energy and nature-based cooling solutions. To that end, and to bolster the implementation of the Kigali Amendment, UNEP had launched the Cool Coalition, with many of its members making commitments to reducing the climate impact of the cooling industry while increasing access to life-saving technology. The Kigali Amendment had been ratified by 88 countries to date; nothing short of universal ratification was acceptable.

192. The UNEP *Emissions Gap Report 2019*, to be launched shortly, highlighted the complete lack of progress in cutting global greenhouse gas emissions. Even if all current unconditional nationally determined contributions were implemented, the world would still be headed towards climate warming of 3.2°C over pre-industrial era levels, which would cause fundamental changes in countries across the globe. Urging parties to remain vigilant on the issue of unexpected emissions of CFC-11 until the science confirmed a decline in the reported trend of those emissions, she highlighted the central role of science in vigilance and compliance and in helping governments to design and implement the right policies to address environmental challenges. In that regard, the three assessment panels of the Montreal Protocol were to be commended for so conscientiously and effectively tracking progress and identifying emerging issues over the years. The environmental challenge was a single, global challenge, which all humankind must address together.

193. In his keynote statement, Mr. Parolin, speaking on behalf of Pope Francis, highlighted three lessons to be learned from the international ozone regime. First, the regime had arisen from broad and fruitful cooperation between the scientific community, the political sphere, economic actors and industry, and civil society, demonstrating that humankind could achieve important outcomes to safeguard the planet, promote human development, and care for the common good for the benefit of current and future generations. Second, the regime demonstrated that it was possible to limit and direct technology, putting it at the service of healthier, more humane, more socially aware and integrated progress, providing a reason to hope that, although the post-industrial period might be remembered as one of the most irresponsible periods in history, humanity at the dawn of the twenty-first century would be remembered for having shouldered its responsibilities. Honest, fruitful dialogue, attentive to different needs and free of special interests, with all of humankind working together in a spirit of solidarity and creativity, was essential for building the future of the planet. Finally, the care of the environment needed to be anchored in awareness of the mysterious interconnectedness of all things. The Kigali Amendment highlighted that principle, representing a bridge between ozone depletion and global warming.

194. In his remarks, Mr. Qu Dongyu said that the Montreal Protocol was important for many reasons: in addition to being the most successful multilateral environmental agreement and at the heart of the recovery of the ozone layer, it also contributed to combating climate change and protecting food security. Some 1.3 billion tonnes of food were lost or wasted yearly worldwide, a phenomenon that produced approximately 8 per cent of global greenhouse gas emissions. The *State of Food and Agriculture in the World 2019* report clearly demonstrated that reducing food loss would contribute directly to reducing greenhouse gas emissions per unit of food consumed. Cold chains could help address food loss and ensure that farmers' produce reached markets in good condition and had a longer shelf life, with resulting benefits for the environment, farmers and consumers. More efficient, climate-friendly technology for cooling was critical for phasing out HFCs, extending the shelf life of foodstuffs, and reducing food loss and food waste. Innovation, too, was key to addressing challenges such as the use of plastic in food packaging and food culture.

195. In her remarks, Ms. Ghahramanyan said that it was difficult to overestimate the significance of the ozone layer and the vital role it played for life on Earth. She questioned whether the current efforts of the international community as it strove to meet the targets of the Sustainable Development Goals would have been possible without the joint efforts made in the context of the ozone regime. Saying that the integrity of the ozone layer was a precondition for life on earth, she urged participants, with that in mind, to continue their joint work for the benefit of present and future generations.

II. Organizational matters

A. Election of officers for the Thirty-First Meeting of the Parties to the Montreal Protocol

196. At the opening session of the high-level segment of the meeting, in accordance with paragraph 1 of rule 21 of the rules of procedure, the following officers were elected, by acclamation, to the Bureau of the Thirty-First Meeting of the Parties to the Montreal Protocol:

President:	Mr. Alvin Da Breo (Grenada) (Latin American and Caribbean States)
Vice Presidents:	Mr. Ezzat Lewis Agaiby (Egypt) (African States)
	Ms. Norlin Jaafar (Malaysia) (Asia-Pacific States)
	Mr. Patrick McInerney (Australia) (Western European and other States)
Rapporteur:	Ms. Ramona Koska (Hungary) (Eastern European States)

B. Adoption of the agenda of the high-level segment of the Thirty-First Meeting of the Parties to the Montreal Protocol

197. The following agenda for the high-level segment was adopted, as amended, on the basis of the provisional agenda set out in document UNEP/OzL.Pro.31/1:

1. Opening of the high-level segment:
 - (a) Statement by the representative of the Government of Italy;
 - (b) Statement by the representative of the United Nations Environment Programme;
 - (c) Statement by the representative of the Holy See;
 - (d) Statement by the Director General of the Food and Agriculture Organization of the United Nations;
 - (e) Statement by the President of the Thirtieth Meeting of the Parties to the Montreal Protocol.
2. Organizational matters:
 - (a) Election of officers for the Thirty-First Meeting of the Parties to the Montreal Protocol;
 - (b) Adoption of the agenda of the high-level segment of the Thirty-First Meeting of the Parties to the Montreal Protocol;
 - (c) Organization of work;
 - (d) Credentials of representatives.
3. Presentations by the assessment panels on their synthesis of the 2018 quadrennial assessments.
4. Presentation by the Chair of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol on the work of the Executive Committee, the Multilateral Fund secretariat and the Fund's implementing agencies.
5. Statements by heads of delegation and discussion on key topics.
6. Report by the co-chairs of the preparatory segment and consideration of the decisions recommended for adoption by the Thirty-First Meeting of the Parties.
7. Dates and venue for the Thirty-Second Meeting of the Parties to the Montreal Protocol.
8. Other matters.
9. Adoption of decisions by the Thirty-First Meeting of the Parties to the Montreal Protocol.
10. Adoption of the report.
11. Closure of the meeting.

C. Organization of work

198. The parties agreed to follow their customary procedures.

D. Credentials of representatives

199. The Bureau of the Thirty-First Meeting of the Parties to the Montreal Protocol approved the credentials of the representatives of 114 of the 170 parties represented at the meeting. The Bureau provisionally approved the participation of 2 parties on the understanding that they would forward their credentials to the Secretariat as soon as possible. The Bureau urged all parties attending future meetings of the parties to make their best efforts to submit credentials to the Secretariat as required under rule 18 of the rules of procedure. The Bureau also recalled that the rules of procedure required that credentials be issued either by a head of State or Government or by a minister for foreign affairs or, in the case of a regional economic integration organization, by the competent authority of that organization. The Bureau recalled that representatives of parties not presenting credentials in the correct form could be precluded from participating fully in the meetings of the parties, including with regard to the right to vote.

III. Presentations by the assessment panels on their synthesis of the 2018 quadrennial assessments

200. Before the presentation by the assessment panels, participants were shown a video prepared by the Secretariat in recognition of the valuable role played by the panels in the implementation of the Montreal Protocol.

201. Ms. Birmpili then presented awards to two co-chairs of the Environmental Effects Assessment Panel, Mr. Nigel Paul and Mr. Min Shao, who were retiring from the Panel. On behalf of the ozone family, she thanked them both for their hard work in supporting the work of the parties over many years.

202. Mr. John Pyle, co-chair of the Scientific Assessment Panel, Ms. Bella Maranion, co-chair of the Technology and Economic Assessment Panel, and Mr. Paul, co-chair of the Environmental Effects Assessment Panel, gave a presentation covering the document “Twenty Questions and Answers about the Ozone Layer: 2018 Update”, the synthesis of the 2018 quadrennial assessment reports (contained in document UNEP/OzL.Pro.31/8) and a 2019 update on Antarctic ozone depletion. A summary of the presentation is set out in section F of annex II to the present report.

203. The President thanked the co-chairs of the assessment panels for their presentation and all the panel members for the assessment work they had been carrying out and for all their efforts to aid in the protection of the ozone layer. He said that the co-chairs and members of the panels would be present at the meeting until its conclusion and encouraged participants to take advantage of their presence to follow up on any questions directly with them.

204. The parties took note of the information presented.

IV. Presentation by the Chair of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol on the work of the Executive Committee, the Multilateral Fund secretariat and the Fund’s implementing agencies

205. The Chair of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Mr. Philippe Chemouny, reported on the work of the Executive Committee, the Multilateral Fund secretariat and the implementing agencies of the Fund since the Thirtieth Meeting of the Parties, summarizing the information provided in document UNEP/OzL.Pro.31/10. His statement is set out in annex III to the present report.

206. The parties took note of the information presented.

V. Statements by heads of delegation and discussion on key topics

207. Under the agenda item, the parties, in addition to hearing statements by heads of delegation and their representatives, engaged in a 90-minute round-table discussion.

A. Statements by heads of delegation

208. Statements were made by the heads of delegation or their representatives of the following parties: Angola, Argentina, Bahamas, Bahrain, Bangladesh, Benin, Brazil, Cambodia, China, Congo, Costa Rica, Côte d'Ivoire, Cuba, Ethiopia, European Union, Fiji, Gambia, Grenada, Guatemala, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Kenya, Lebanon, Malawi, Malaysia, Mongolia, Myanmar, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Philippines, Russian Federation, Seychelles, Solomon Islands, Sri Lanka, Timor-Leste, Togo, Tunisia, Uganda, United Republic of Tanzania, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of) and Viet Nam. A statement was also delivered by the representative of the International Institute of Refrigeration.

209. Representatives of many parties who spoke expressed thanks to the Government and people of Italy for their hospitality in hosting the meeting in the iconic city of Rome, and to the Food and Agriculture Organization of the United Nations for its logistical and other support to the meeting. Many also thanked the Ozone Secretariat, the secretariat and Executive Committee of the Multilateral Fund, the United Nations Environment Programme, the implementing agencies, donor partners, the assessment panels, international organizations and other stakeholders for their role in ensuring the success of the meeting in particular and of the Montreal Protocol in general.

210. Many representatives paid tribute to the success of the Montreal Protocol and its parties in controlling and phasing out ozone-depleting substances and assisting the recovery of the ozone layer, thereby contributing enormously to the safety and well-being of humanity. The Protocol, along with its London, Copenhagen, Montreal, Beijing and Kigali amendments, was widely recognized as a model instrument that had achieved universal ratification and united commitment to a common cause, namely protection and restoration of the ozone layer. Parties regularly achieved a very high rate of compliance with their treaty commitments, and many achieved their targets well ahead of the designated deadlines.

211. A number of factors contributing to that success were alluded to, including the strong political commitment and will of governments; work conducted in a spirit of unity and partnership, guided by the rules and norms of the Protocol's governing instruments and bodies and by the best scientific knowledge available; the involvement of a wide range of partners, including the institutions of the Protocol, political bodies, implementing agencies, the private sector and civil society; the application of a consensus approach in making decisions; and the solidarity and financial support provided by developed countries to developing ones to ensure the transition to more ozone--and climate-friendly alternatives.

212. Many representatives described the continuing work being undertaken in their own countries, with assistance from the Multilateral Fund and implementing agencies, to phase out ozone-depleting substances and to implement the various stages of their HCFC management plans and achieve compliance with the provisions of the Protocol, including through legislative, policy, institutional and programmatic measures. A wide range of activities were outlined, including the development of national programmes to eliminate ozone-depleting substances and convert existing technologies to more environmentally friendly alternatives; the strengthening of legal and policy frameworks; the introduction of import controls and monitoring mechanisms and quota and licensing systems to combat illegal trade; training and capacity-building for customs officers, as well as for service technicians in the refrigeration and air-conditioning sectors; educational and awareness-raising campaigns, including in the area of safety; the establishment of institutional and organizational structures to support national ozone units in policy formulation, information gathering and oversight; intersectoral collaboration involving a range of stakeholders, including through public-private partnership ventures; the recovery and recycling of refrigerants in the air-conditioning sector; the implementation of national standards and guidelines for refrigerants and for equipment using refrigerants; and the promotion of alternative substances and new technologies, particularly in the refrigeration, air-conditioning and foam sectors, with a focus on climate benefits and energy efficiency. Some representatives alluded to methyl bromide as a harmful substance requiring further efforts to achieve its global elimination.

213. With regard to the Kigali Amendment, many representatives emphasized its significance for the future direction of the Montreal Protocol and its critical role in global efforts to combat climate change through reduced greenhouse gas emissions. There was widespread recognition by parties of the urgent need to phase out the consumption and production of HFCs. Several highlighted the 0.5°C of global warming that could be avoided by the year 2100 through successful implementation of the Amendment, which would contribute significantly to the Paris Agreement's objective of keeping the global temperature rise well below 2°C. Several representatives, including those from small island developing States and other vulnerable States, gave examples of extreme climate events that had caused significant damage to the environment and infrastructure, and even loss of life, in their

countries. Several representatives alluded to the wider benefits to be derived from the phase-down of HFCs under the Amendment, including the achievement of a number of the Sustainable Development Goals, such as Goal 7, on affordable and clean energy, Goal 9, on sustainable industry and infrastructure, and Goal 13, on climate action. A number of representatives stated that their countries were among the 88 that had ratified the Amendment as at 3 November 2019, thus enabling its entry into force, while several others reported on the status of their national processes towards ratification. Parties that had not yet ratified the Amendment were urged to do so. One representative said that the new stage of development of the Montreal Protocol marked by the adoption of the Kigali Amendment entailed undertaking new, ambitious tasks, which required a review of some old approaches rooted in the past practice and decisions of the parties to the Protocol.

214. A number of representatives described the actions being undertaken in their countries to implement the Kigali Amendment and to introduce climate-friendly technologies, including demonstration projects for converting manufacturing lines to environmentally friendly alternatives; the gathering of data on the current status of HFC use to support policy formulation; legislative measures, including regulating the import and disposal of HFCs; the implementation of safety measures for toxic and flammable substances, including by establishing standards and codes of practice; the inclusion of Amendment-related actions within wider environment and climate protection programmes and strategies; the introduction of Harmonized System codes for ozone-depleting substances and their substitutes, including HFCs and HFC-containing mixtures; the establishment of minimum energy performance standards and energy efficiency labelling standards; training for businesses and technicians on good practices in the refrigeration and air-conditioning sectors, supported by certification; the organization of capacity-building workshops and the development and dissemination of educational materials; and incentive programmes, including fiscal incentives, to promote energy efficiency.

215. The significant funding and other support provided by the Multilateral Fund and the implementing agencies was widely acknowledged. However, a number of representatives commented on the need for a reliable, sufficient flow of technical and financial assistance in order for parties to comply with their commitments under the Montreal Protocol, including the Kigali Amendment. One representative said that reducing the consumption and production of HFCs was a greater challenge than the preceding elimination of CFCs and HCFCs, and that the international community needed to consolidate efforts to reduce greenhouse gas emissions, including through support for effective capacity-building projects, with a particular focus on countries with low and very low consumption. Another called for greater commitment from the parties operating under Article 2 of the Protocol in spearheading implementation of the Kigali Amendment, given their earlier phase-down schedule. Yet another said that the principle of common but differentiated responsibility should continue to serve as a model for international cooperation in addressing emerging environmental challenges.

216. One representative said that the addition of financial support for the phase-down of HFCs to the continuing funding for the phase-out of ozone-depleting substances placed a significant extra burden on the principal funding partners. At the same time, the economic standings of parties had changed significantly in the three decades since the Multilateral Fund had first begun providing financial support to Article 5 parties, as a consequence of which a smaller percentage of non-Article 5 parties were increasingly supporting a larger and growing share of Article 5 parties. A review was therefore needed of the fairness and sustainability of the financial mechanism of the Montreal Protocol.

217. The market availability of affordable and cost-effective alternatives was viewed as a significant factor in compliance with the provisions of the Kigali Amendment. A number of representatives recognized the challenge faced by manufacturers in adopting new technologies, given safety and competitiveness considerations. Technology transfer, research and capacity-building needed to be enhanced to assist enterprises in that regard. Conversion technologies needed to be environmentally sound, energy efficient, affordable and safe. One representative said that the recently developed online tool for safety standards served as a useful reference for national implementation of standards. Another said that innovative building design was vital for energy efficiency. A third said that a revolution in the global market was starting to take place, with increased availability of a new generation of refrigeration equipment with low or no global warming potential and with proven energy efficiency, a development that demonstrated synergy between ozone and climate measures. Some representatives highlighted the continuing challenge faced by countries with high ambient temperatures in identifying appropriate and affordable technologies for the refrigeration and air-conditioning sectors.

218. A number of emerging challenges faced by the Montreal Protocol were likewise identified. Several representatives highlighted the unexpected increase in emissions of CFC-11 as a matter of

particular concern. One said that the development was a wake-up call for parties, indicating the importance of continued vigilance and monitoring in order to identify such challenges at an early stage and the need to improve the regulatory capacity of developing countries to deal with those challenges at inception. The development also indicated that compliance under the Protocol was a long-term process requiring trust and cooperation among parties in order to ensure sustainable implementation. Another representative, speaking on behalf of a group of countries, said that the recent unexpected emissions of CFC-11 had demonstrated that the success of the Protocol in protecting the ozone layer could not be taken for granted. It was important to consider how all parties could achieve improved enforcement of the Protocol and comply with their commitments in order to ensure continued recovery of the ozone layer. There was a need to review existing monitoring, verification and reporting systems and consider opportunities for enhanced and improved vigilance, with the end goal of ensuring sustained compliance.

219. One representative said that a further challenge requiring the attention of all parties was how to dispose of or manage stocks of unwanted ozone-depleting substances, including refrigerants. Another said that it was time to review the composition of the Executive Committee of the Multilateral Fund in line with the United Nations principle of fair geographical representation in the governing bodies of the organizations of the United Nations system. A third proposed a new initiative for the life-cycle-based management of fluorocarbons, including proper management of leaked and discarded fluorocarbons with a view to further reducing emissions.

220. Several representatives expressed their interest in the theme of the Rome Declaration on the Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development. A number stressed the need for efficient cooling technologies to ensure well-articulated cold chains that reduced food loss, which in turn had significant implications for reducing food insecurity and poverty in developing countries, especially those with high ambient temperatures or agriculture-based economies. One representative said that the matter was very timely, given the recent launch of the 2019 edition of the FAO report *The State of Food and Agriculture*, which focused on food loss and waste reduction and pointed to the importance of advancing technologies that helped to reduce food loss without harming the environment. Some representatives, including one speaking on behalf of a group of countries, said that cooling in the food industry was a cross-cutting issue that could aid the attainment of a number of Sustainable Development Goals. The representative of the International Institute of Refrigeration said that the Rome Declaration was in line with the work of the Institute to help countries develop national cooling action plans to ensure food safety and health. Some representatives spoke of initiatives in their own countries to develop such plans.

221. A number of representatives placed the actions to protect the ozone layer under the Montreal Protocol in the wider context of efforts to protect human health and the environment and promote sustainable development. Such efforts included reversing deforestation and increasing forest cover, promoting clean and renewable energy, sustainable transportation, smart cities, green growth, waste management, environmentally aware agricultural practices, and inclusive policies in such areas as a healthy environment, job creation and employment, and social equality. Improvements in health and nutrition, food supply, distribution of resources and general well-being would help ensure that no one was left behind, which was one of the basic principles of the Sustainable Development Goals. Some representatives outlined a holistic, integrated paradigm whereby humanity lived in harmony with, and cared for, the planet Earth, protecting its natural resources for the benefit of all peoples. One representative spoke of the need to balance economic growth with environmental sustainability to ensure the preservation of natural capital and the quality of life of citizens.

222. Pursuant to such ideals, a number of representatives stressed the importance of cooperation and collaboration in undertaking activities at the national, regional and international levels for the betterment of the planet and humanity. The Montreal Protocol itself was an acknowledged success story of global cooperation and provided an example of how the international community could engage multiple partners in working together to identify and implement solutions to global challenges for a sustainable future.

223. In conclusion, many representatives reiterated their commitment to the objectives of the Protocol and its amendments and their continued ambition to fulfil their obligations under the instrument for the benefit of the environment and humankind.

B. Round-table discussion on the contribution of the Montreal Protocol to food loss reduction through sustainable cold chain development

224. The round-table discussion was moderated by Mr. Jim Walker, Director for Partnerships, Sustainable Energy for All, and the panellists were Ms. Krista Mikkonen, Minister for the Environment and Climate Change, Finland; Ms. Geeta Menon, Joint Secretary, Ministry of

Environment, Forests and Climate Change, India; Mr. Roberto Morassut, Undersecretary of State at the Ministry of the Environment and Protection of Land and Sea, Italy; Mr. Bintony Kutsaira, Minister for Natural Resources, Energy and Mining, Malawi; Ms. Khadeeja Naseem, Deputy Minister for the Environment, Maldives; Mr. René Castro-Salazar, Assistant-Director-General, Climate, Biodiversity, Land and Water Development, FAO; Mr. Jose Raul Rios Villarreal, Manager of New Projects for Agropecuaria Malichita, a vegetable producer and exporter based in northern Mexico; Mr. David Appel, President, Carrier Transicold and Refrigeration Systems, and a co-chair of the Global Food Cold Chain Council; Ms. Liz Goodwin, Director of Food Loss and Waste, World Resources Institute, and a representative of Champions 12.3, a cross-sector coalition for driving action on food waste; and Ms. Inger Andersen, Executive Director, UNEP.

225. Mr. Walker began by providing an overview of the linkages between the Montreal Protocol and the 2030 Agenda for Sustainable Development and their importance in addressing food waste and hunger. He said that 820 million people were still malnourished across the world. Meanwhile, one third of food produced globally was either lost or wasted each year, accounting for 10 per cent of greenhouse gas emissions and costing the global economy \$1 trillion per year. Achieving a more sustainable cold chain would help feed a growing population, reduce the impact of climate change, boost wages and create jobs. The Kigali Amendment in particular presented an opportunity for the Montreal Protocol to contribute significantly to the goals of ending hunger, reducing food loss and waste, and providing sustainable energy for all.

1. Actions being taken by Governments

226. Mr. Walker then asked those panellists representing parties to describe the actions their Governments were taking domestically and internationally to support the development of sustainable cold chains; the opportunities they saw for their Governments to do so; and the benefits that would accrue to people from the achievement of a sustainable cold chain.

227. Mr. Morassut highlighted two objectives to be pursued in line with Sustainable Development Goal 9, on industrial innovation and infrastructure development. Those two objectives could be supported by instruments of the Montreal Protocol, in particular the Multilateral Fund, which provided resources for technological innovation and the creation of high-quality new jobs. National strategies could also make a contribution in that regard. The Italian Government, for instance, was set to adopt tax incentives aimed at encouraging business to invest in industrial innovation to introduce new technical services, enhance performance, create jobs and support sustainable development. The market was beginning to recognize the success of businesses that aimed for sustainable development, which augured well for the introduction of cooling techniques that both prevented food waste and avoided ozone depletion and global warming.

228. Ms. Menon spoke about the India Cooling Action Plan recently introduced in her country. A four-fold increase in cold chain infrastructure was anticipated over the next 30 years. The cold chain was crucial for achieving the Government's goal of doubling farmers' incomes by improving access to markets, and it would have major implications for the country's immunization programme. The Government of India aspired to develop a sustainable cold chain infrastructure that took into account the need to prevent global warming, improve energy efficiency, and reach those to whom the cold chain mattered most, namely farmers. It had identified the central challenges as being technology and refrigerant choices, energy efficiency and skills development.

229. Ms. Mikkonen said that Finland, and indeed the European Union as a whole, had been prioritizing a circular economy, which meant maximizing the value of materials and products by keeping them in use for as long as possible. In the European Union, legislation and regulation had proved to be efficient tools for controlling CFC and other fluorinated greenhouse gases (F-gases); thanks to European Union regulations in place since 2006, F-gas levels were set to fall significantly by 2030, with a corresponding increased market penetration of more environmentally friendly refrigerants. Technology had also proved to be an effective tool, leading to better energy efficiency. Regarding food waste, she said that it should be minimized but could also be used to produce biogas. It was important to remember that food loss manifested itself differently in different countries, occurring at an earlier stage in the food chain in developing countries and in households in developed countries. Tools for reusing such food waste were needed, such as collection systems for household food waste.

230. Mr. Kutsaira described the situation in Malawi, which, like most sub-Saharan developing countries, had inadequate cold chain infrastructure. The existing infrastructure was concentrated in the urban areas and often used older, inefficient technologies. Post-harvest food loss tended to occur in the rural areas. The Government recognized the critical role of the cold chain, and local refrigeration experts had been introduced to the use of energy-efficient, low-global-warming-potential technologies

to support a sustainable cold chain. The Government was also introducing policies that encouraged communities to switch to more energy-efficient cooling technologies, and it was expanding its rural electrification programme in a bid to improve the cold chain, cut post-harvest losses, and improve producers' incomes.

231. Ms. Naseem, noting that Maldives was a small island developing State with a population of 400,000 scattered across 190 islands, said that in her country food distribution was a difficult task, and that food quality and food waste in turn were heavily influenced by the efficiency of the food distribution system. An unbroken cold chain was crucial for food security, the health of the population and the economy of the tourism-dependent nation. Having access to appropriate technology and implementing a national cooling plan like that of India would help reduce food loss and support livelihoods, particularly given the strong impact of climate change on the island nation.

2. Actions being taken by international bodies and the private sector

232. Mr. Walker then invited the remaining panellists to share their thoughts about what needed to be done by 2030 to achieve sustainable cold chains, and how the synergies between the Montreal Protocol and the other organizations and initiatives working on food waste could be enhanced.

233. Mr. Castro-Salazar said that two key elements were better cooperation between United Nations entities and the private sector accompanied by an immediate massive scaling up of technologies and approaches whose effectiveness had been demonstrated in pilot projects. Multilateral Fund resources could be supplemented with financing from the Green Climate Fund and other funds, and the relationships of FAO with government, the farming and fishing industries, and fruit and vegetable producers could be a useful contribution.

234. Ms. Andersen, recalling that concern for climate change had led the Secretary-General to convene the recent Climate Action Summit, spoke about the Cool Coalition, whose 80 or so partners were considering smart buildings as well as the cold chain. The goal was to bring together the various actors from industry, science, government and international organizations. The role of UNEP was to provide norms and guidance that countries and regional entities would then adapt to their contexts. Just over a month old, the Coalition had already secured commitments from 20 countries to include cooling in their nationally determined contributions, along with additional commitments from the C40 Cities Climate Leadership Group and industry.

235. Ms. Goodwin drew attention to *Creating a Sustainable Food Future*, a World Resources Institute report that explored the question of how to feed 10 billion people by 2050 without using more land or generating more emissions. The most relevant action proposed in the report was to reduce demand and the single biggest action area was to tackle food loss and waste. Champions 12.3 was a coalition of leaders from the public and private sectors and civil society committed to tackling food loss and waste to achieve Sustainable Development Goal target 12.3. Champions 12.3 promoted a simple "target, measure, act" strategy for countries and companies: set targets consistent with Sustainable Development Goals, measure food loss and waste, and take action based on those measurements. A sustainable cold chain was of fundamental importance for addressing food loss.

236. Speaking from the perspective of food producers, Mr. Raul Rios said that in agribusiness improved quality meant increased income for producers, and the best tool for improving quality was the cold chain. Cooling processes had enabled his company to expand its reach to the eastern United States and even Canada, halve its waste, and create more than 12,000 well-paying jobs. The most important input in the cold chain, power, represented up to 80 per cent of costs, and his company was interested in energy efficiency projects; it had implemented a photovoltaic project, with funding from the World Bank, to supply 10 per cent of its power requirements. Financial support for such projects had, however, diminished considerably in recent years, and the company had been obliged to turn its attention to projects with tangible short-term profits. It was worth noting that agricultural production in general could be 30 per cent higher if consumers accepted produce that, while not meeting their aesthetic expectations, retained its physical properties and taste.

237. Speaking from the perspective of the food chain industry, Mr. Appel said that, even though a sustainable cold chain could eliminate more than half of all perishable food waste, only 15 per cent of the perishable food produced worldwide was currently refrigerated. Opportunities for investment included pre-cooling facilities that allowed perishable food to be put into controlled environments immediately after having been harvested, in order to reduce spoilage; transport refrigeration equipment used to maintain proper temperature and humidity control during transport; and real-time temperature monitoring and tracking devices to help safeguard the safety and quality of perishable food as it moved along the cold chain. From a policy-setting perspective, reducing food loss was the only policy that both fed more people and reduced greenhouse gas emissions. By clearly establishing the

connection between food loss and climate change, the Montreal Protocol community could help countries gain access to United Nations climate funding for the development of their respective cold chains.

3. Calls to action

238. The panellists representing international bodies and the private sector, when asked how the Montreal Protocol community could accelerate the adoption of sustainable cold chains, suggested setting more ambitious goals; including the cold chain in upcoming nationally determined contributions for the Paris Agreement; engaging in more private-public partnerships; making the 2020s a decade of implementing cold storage; creating national cooling plans that were in line with the Kigali Amendment and included the cold chain; establishing national strategies for reducing food loss and waste, as called for in United Nations Environment Assembly resolution 4/2; providing incentives and financing for technology conversion to ensure that the practice was profitable; providing training to support the adoption of sustainable technologies; and demonstrating the economic viability of a sustainable cold chain.

239. The panellists representing Governments asked what steps the latter needed to take in order to achieve a sustainable cold chain, suggested setting incentives that discouraged the use of HCFCs and HFCs and encouraged the adoption of alternative technologies in general; linking existing incentives for cold-chain infrastructure development with the adoption of energy-efficient technologies and low-global-warming-potential refrigerants; ensuring access to electricity in rural areas; increasing awareness of the importance and availability of energy-efficient, low-global-warming-potential technologies; updating regulations to permit the adoption of sustainable cold chain technologies; developing new cold-chain infrastructure using energy-efficient cooling systems based on low-global-warming-potential refrigerants and retrofitting existing cold storage infrastructure to enable a switch to such systems; developing safety standards for flammable and toxic refrigerants; standardizing the design, construction and specifications of cold chain infrastructure components across segments; providing specialized training facilities for cold chain professionals and technicians; considering non-refrigerant-based technologies; adopting national plans for the prevention of food waste; and developing national, regional and international synergies, including through the sharing of best practices.

240. Asked to sum up their messages, the panellists said that tackling food waste and food loss was important and possible, and that a sustainable cold chain was central to that ambition. A sustainable cold chain would reduce greenhouse gases, cut food loss and food waste, and feed the planet's growing numbers of inhabitants. The Kigali Amendment was crucial for achieving a sustainable cold chain and should be ratified by all parties.

VI. Report by the co-chairs of the preparatory segment and consideration of the decisions recommended for adoption by the Thirty-First Meeting of the Parties

241. The Co-Chair of the preparatory segment reported that the work of the segment had concluded successfully, and that draft decisions had been approved for consideration and possible adoption during the high-level segment. The parties had agreed to defer further discussion of a number of issues to the forty-second meeting of the Open-ended Working Group, in 2020, including on item 7 (ongoing reported emissions of carbon tetrachloride); item 8 (b) (stocks of methyl bromide); and item 11 (membership of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol). They had agreed to close discussion on item 12 (request by Azerbaijan to be included among the parties to which the phase-down schedule for hydrofluorocarbons, as set out in paragraphs 2 and 4 of Article 2J of the Montreal Protocol, applies) and item 17 (risk of non-compliance with HCFC reduction targets for 2019 by the Democratic People's Republic of Korea).

242. On item 13 (safety standards), the parties had had constructive discussions but had agreed not to take any decision at the current meeting. On item 14 (initial assessment by the Scientific Assessment Panel and the Technology and Economic Assessment Panel of five volatile fluororganic and related compounds found in the Arctic), the parties had, after listening to the reports of the two assessment panels, concluded that there was no immediate reason for concern. Finally, all parties had been invited to sign the Rome Declaration proposed by the Government of Italy. In closing, she wished, on behalf of her Co-Chair and herself, to thank all those involved for their hard work and for the spirit of cooperation that had characterized the negotiations.

VII. Dates and venue for the Thirty-Second Meeting of the Parties to the Montreal Protocol

243. The representative of Uzbekistan, expressing his country's desire to contribute to the development of international cooperation to protect the ozone layer, combat climate change, and implement the Sustainable Development Goals, presented the proposal of his Government to host the Thirty-Second Meeting of the Parties in Tashkent in November 2020. He gave a short audiovisual presentation on the merits of Uzbekistan as a venue for that meeting.

244. Subsequently, the parties adopted a decision on the matter.

VIII. Other matters

245. The Thirty-First Meeting of the Parties took up no other matters during the high-level segment.

IX. Adoption of decisions by the Thirty-First Meeting of the Parties to the Montreal Protocol

246. The Thirty-First Meeting of the Parties adopted the decisions approved during the preparatory segment, as set out in document UNEP/OzL.Pro.31/9/Add.1.

X. Adoption of the report

247. The parties adopted the present report on Saturday, 9 November 2019, on the basis of the draft report set out in documents UNEP/OzL.Pro.31/L.1 and UNEP/OzL.Pro.31/L.1/Add.1. The Ozone Secretariat was entrusted with the finalization of the report.

XI. Closure of the meeting

248. Following the customary exchange of courtesies, the meeting was declared closed at 12.30 a.m. on Saturday, 9 November 2019.

Annex I

Rome Declaration on the Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development*

We, the ministers and heads of delegation of the following parties to the Montreal Protocol on Substances that Deplete the Ozone Layer Angola, Argentina, Australia, Austria, Bangladesh, Belarus, Belgium, Belize, Brazil,¹ Bosnia and Herzegovina, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Croatia, Czech Republic, Denmark, Ecuador, El Salvador, Estonia, European Union, Fiji, Finland, France, Gambia (Republic of the), Germany, Grenada, Guinea, Guinea-Bissau, Hungary, Iran (Islamic Republic of), Italy, Jordan, Kyrgyzstan, Liberia, Libya, Lithuania,¹ Luxembourg, Maldives, Micronesia (Federated States of), Montenegro, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Panama, Paraguay, Philippines, Poland, Qatar, Republic of Moldova, Rwanda, Saint Lucia, Senegal, Slovakia, Solomon Islands, South Sudan, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Tunisia, Uganda, United States of America, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam,

Considering the discussions at the round table opening the high-level segment of the Thirty-First Meeting of the Parties to the Montreal Protocol at the headquarters of the Food and Agriculture Organization of the United Nations, which has a prominent role in reducing food losses,

Recalling that about one-third of all food produced globally for human consumption is either lost or wasted, which has severe impacts on farmers' incomes and precious resources such as land, water and energy and generates greenhouse gases,

Reaffirming the cooperation among parties in implementing the Montreal Protocol and recognizing that the Montreal Protocol and its Kigali Amendment have raised awareness of the need to develop sustainable and efficient solutions in the refrigeration and air-conditioning sector to meet future cooling demand, including cold-chain initiatives for food preservation,

Aware of the key role of the cold chain in the implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals related to, inter alia, ending hunger and poverty, food security, improved nutrition, climate action, sustainable agriculture and fisheries, health and well-being,

1. *Stress* the importance of pursuing national action and international cooperation to promote the development of the cold chain, including by using sustainable and environmentally friendly refrigeration to reduce food loss;

2. *Underscore* the multiple benefits of promoting the exchange of information on the contribution of the cold chain to the Sustainable Development Goals and encourage the ongoing work under the Montreal Protocol to this end;

3. *Call for* strengthening cooperation and coordination between Governments, the institutions of the Montreal Protocol, the specialized agencies of the United Nations, existing private and public initiatives and all relevant stakeholders to exchange knowledge and promote innovation of energy-efficient solutions and technologies that reduce the use of substances controlled by the Montreal Protocol in the development of the cold chain, thereby contributing to the reduction of food loss and waste.

Rome, 8 November 2019

* The Rome Declaration is presented as received, without formal editing.

¹ Endorsed the Declaration after the meeting had ended.

Annex II

Summaries of presentations by members of the assessment panels and technical options committees*

A. Interim report of the Scientific Assessment Panel on increased emissions of CFC-11

1. Dr. Paul A. Newman, Prof. John Pyle, and Prof. Bonfils Safari (Scientific Assessment Panel co-chairs) with Dr. Stephen Montzka (NOAA, USA) gave a presentation on the “SAP interim report on increased emissions of CFC-11.” In response to recent observational findings concerning CFC-11, the Parties to the Montreal Protocol approved “Decision XXX/3: Unexpected emissions of CFC-11.” This decision formally asked the Scientific Assessment Panel (SAP) to provide a summary report on this “... unexpected increase of CFC-11 emissions ...”, with an interim report is required for the 31st MOP.

2. The SAP presentation had 6 elements:

- Report Status
- CFC-11 observations and global network
- What’s in WMO/UNEP [2018]?
- Rigby et al. [2019] showing regional emissions
- Preliminary updated results for 2018-2019
- Summary

3. The SAP has worked with the science community to push forward work on the CFC-11 issue. Two events have been completed in 2019: 1) the March 2019 Symposium on CFC-11 in Vienna, Austria; and 2) the publication of the SPARC Report in July 2019, “Report on the International Symposium on the Unexpected Increase in Emissions of Ozone-Depleting CFC-11.” In December 2019 there will be a CFC-11 Special Session at AGU Fall meeting in San Francisco, USA.

4. The Report on CFC-11 for the 32nd MOP is in development. The SAP reported that the outline, and revised (extended) outline of the report is now complete, and the Author and Advisory Committee has been established. The Advisory Group includes: Paul Fraser (Australia), Neil Harris (UK), Jianxin Hu (China), Michelle Santee (USA), Paul A. Newman (SAP), David Fahey (SAP), Bonfils Safari (SAP), and John Pyle (SAP). The outline and their authors will cover five CFC-11 topics along with an Introduction and Summary:

1. **Introduction:** Advisory Group
2. **Observations:** Stefan Reimann (Switzerland), Bo Yao (China)
3. **Global emissions:** Steve Montzka (USA), Sunyoung Park (South Korea)
4. **Regional emissions:** Matt Rigby (UK), Andreas Stohl (Norway).
5. **Scenarios:** Guus Velders (Netherlands), Helen Walter-Terrinoni (USA).
6. **Modeling:** Martyn Chipperfield (UK), Michaela Hegglin (UK)
7. **Summary:** All

5. The SAP also recalled their discussion at the 41st OEWG. The foundation for global and regional ODS emissions determinations is based upon the precise, accurate, long-term measurements from two ground-based networks (NOAA and AGAGE). CFC-11 atmospheric levels and trends are estimated from the averages of these network observations. Derivation of the magnitude and trends of global emissions use time series of the average global abundance, and ODS atmospheric lifetime. Magnitude and trends of regional emissions are derived from network measurements combined with meteorological information of prevailing winds from source(s) to measurement sites (back trajectories).

6. In published studies available at the present time, measured CFC-11 levels continued to decline through 2017, but at a much slower rate than observed a few years prior (from 2002-2012). Monthly averaged observations were shown from around the world, along with maps of station locations. The global averaged observations were derived from 5 AGAGE stations, and 12 NOAA background sites.

* The summaries are presented as received, without formal editing.

7. The CFC-11 main findings from the Executive Summary of the “Scientific Assessment of Ozone Depletion: 2018” were again reiterated to the 31st MOP. Most particularly, there was an unexpected increase in global total emissions of CFC-11 in recent years, confirming the initial paper by Montzka et al. [2018]. Global CFC-11 emissions derived from measurements by two independent networks increased after 2012, thereby slowing the steady decrease in atmospheric concentrations that had been observed in the decade prior to 2012 and which was reported in previous Assessments. The global concentration decline over 2014 to 2016 was only two-thirds as fast as it was from 2002 to 2012. While the observations also indicated that emissions of CFC-11 from eastern Asia had increased since 2012, the contribution of this region to the global emission rise was not well known. The country or countries in which emissions had increased was not identified in these earlier reports.

8. The presentation also included a slide from the peer-reviewed paper by Rigby et al. in *Nature*, “Increase in CFC-11 emissions from eastern China based on atmospheric observations.” This study extended our understanding of global emissions through 2017 (emissions were also elevated in this year) and also used high-frequency atmospheric observations from Gosan, South Korea, and Hateruma, Japan and atmospheric chemical transport models to show that emissions from eastern mainland China had increased concurrently with the rise in global emissions; they were determined to be 7.0 ± 3.0 ($\pm 1s$) Gg yr⁻¹ higher in 2014–2017 than in 2008–2012. This emission increase was found in and around the northeastern provinces of Shandong and Hebei.

9. Dr. Stephen Montzka of the SAP provided preliminary NOAA measurement results for the 2018-2019 period and he also provided new preliminary AGAGE results courtesy of Dr. Sunyoung Park (Kyungpook Nat. Univ., Republic of Korea). These new 2018-2019 results showed: 1) an accelerating global concentration decline, 2) a decreasing Northern-Southern hemispheric concentration difference, 3) a decrease of concentrations in pollution plumes reaching Hawaii, and 4) decreased concentrations in pollution plumes reaching Jeju Isl., ROK. These new results imply that CFC-11 emissions have declined both globally and from eastern China since the 2014-2017 period.

10. In summary, the SAP showed that based on published data through 2017: 1) that atmospheric CFC-11 levels had continued to decline, but at a much lower rate than in earlier years than was expected, 2) there had been an unexpected increase of CFC-11 emissions, and 3) new research (published in Rigby et al., although not yet fully assessed by the SAP) had determined that 40-60% of these global emission increases had originated in eastern China. Drs. Montzka and Park used preliminary data in 2018-2019 (not published and not assessed by SAP) to show multiple lines of evidence implying that CFC-11 emissions have declined both globally and from eastern China since the 2014-2017 period. The SAP finally noted that the CFC-11 Report is in preparation and will be presented next year at the Meeting of the Parties.

B. Final report of the Technology and Economic Assessment Panel task force on unexpected emissions of CFC-11

11. Ms. Helen Walter-Terrinoni first reiterated Decision XXX/3: Unexpected Emissions of CFC-11:

Noting the recent scientific findings showing that there has been an unexpected increase in global emissions of trichlorofluoromethane (CFC-11) since 2012, after the consumption and production phase-out date established under the Montreal Protocol consequently requesting that the Technology and Economic Assessment Panel provide the parties with information on potential sources of emissions of CFC-11 and related controlled substances from potential production and uses, as well as from banks, that may have resulted in emissions of CFC-11 in unexpected quantities in the relevant regions; a preliminary report should be provided to the Open-ended Working Group at its forty-first meeting and a final report to the Thirty-First Meeting of the Parties.

12. Ms. Walter-Terrinoni noted that a submission was received from China for the preliminary report. Following the OEWG, additional information was submitted by China, the European Union, Japan, Mexico, Russia, and the United States for the final report. Ms. Walter-Terrinoni then shared the list of 22 Task Force members including 9 members from A5 parties and 5 female members.

13. Ms. Walter-Terrinoni then provided an overview of the Final Report of Unexpected CFC-11 Final Report noting that the Final Report builds on the Preliminary Report using additional information to complete the analysis, and to confirm or update assumptions. The report includes analyses CFC-11 production, usage, banks and emissions at the global and regional levels, eliminates unlikely additional emissions sources, identifies likely emissions sources and estimates the quantity of newly produced CFC-11 to supply them. It provides additional information on marketing and illicit international trade and considers questions raised at the 41st OEWG.

14. Ms. Walter-Terrinoni then provided additional background stating that CFC-11 was used as a foam-blowing agent (for open and closed cell foams), aerosol propellant, refrigerant (largely for centrifugal chillers), and in smaller uses, e.g., asthma inhalers, tobacco expansion. Alternatives replaced former uses. She then stated that CFC-11 production/consumption in non-A5 parties was phased out in 1996, with some production for basic domestic needs. She then noted that while CFC-11 production/consumption in A5 parties was phased out in 2010. Some A5 parties were funded to complete their phase-out earlier and then stated that over time, CFC-11 is released into the atmosphere from banks of CFC-11 produced prior to the phase-out. These banks are made of CFC-11 remaining in closed cell foams and centrifugal chillers.

15. Ms. Walter-Terrinoni then briefly provided background on the work of the scientists detecting the unexpected emissions mentioning both the Montzka *et al.* (Nature, May 2018) report of an unexpected, global increase in CFC-11 emissions of $13,000 \pm 5,000$ tonnes/year after 2012 cf. 2002-2012 from the northern hemisphere. She stated that the study suggests that there is a concurrent increase in CFC-11 emissions from eastern Asia, although the regional contribution to the global increase was not quantified, and that the increase in CFC-11 emissions arises from new post-2010 production that has not been reported to the Ozone Secretariat. She also mentioned the Rigby *et al.* (Nature, May 2019) reported increased CFC-11 emissions from eastern mainland China of $7,000 \pm 3,000$ (± 1 standard deviation) tonnes/year in 2014-2017 compared with 2008-2012. She stated that these arise primarily from Shandong and Hebei provinces, accounting for at least 40-60% of the global increase in CFC-11 emissions and that there was no evidence for any significant increase in CFC-11 emissions for those other countries or regions that were adequately monitored by atmospheric measurements.

16. Ms. Walter-Terrinoni then stated that Pre-2010 production and usage is unlikely to account for CFC-11 emissions noting that a wide range of scenarios was developed to investigate the broadest possible quantities of potential emissions from pre-2010 production and usage. She then stated that the Task Force was able to identify a reasonable set of plausible assumptions for a “most likely” bottom-up emissions scenario, based on pre-2010 CFC-11 production, prior installation of foams/RAC, existing foams/RAC banks, and end-of-life management and that the emissions scenarios estimated from pre-2010 production, usage, and banks do not account for the increased atmospheric-derived emissions. She went on to say that based on Task Force analysis of CFC-11 production, usage, emissions and comparison against atmospheric-derived emissions, it is unlikely that pre-2010 production and usage can account for the unexpected CFC-11 emissions without new CFC-11 production and usage.

17. Ms. Walter-Terrinoni then showed the graph of the “Most likely” scenario of bottom-up CFC-11 emissions (Figure 6.10 in the Final Report) which includes the “global atmospheric-derived emissions” representing the range from 2018 SAP Assessment Report, and the “most likely” scenario estimate of expected global emissions from past production, usage and existing banks. She then reiterated that the task force had examined a broad range of possible scenarios and none of them aligned with the derived atmospheric emissions after 2012.

18. She then explained that the Montzka *et al.* (2018) describes a change in atmospheric derived emissions in different time periods, from 2014-2016 compared to 2002-2012. In contrast, she stated the Task Force report describes the difference between the “most likely” expected emissions (the line) compared to the atmospheric-derived emissions from SAP Assessment Report (2018) in the same time period.

19. Ms. Walter-Terrinoni then went on to explain that the Final Report examined CFC-11 usage in closed-cell foam by region prior to 2010 stating that prior to 2010, most closed-cell foams were produced and used in Europe and North America (prior to 1996). Consequently, most of the global CFC-11 emissions occurred during foam manufacturing and installation, and during the lifetime of products containing those foams, within Europe and North America, the majority of the closed-cell foams in these regions was landfilled or destroyed locally at end-of-life, with low emissions, and that there are significant quantities of CFC-11 closed-cell foams still in buildings in Europe and North America as banks.

20. She went on to state that the Final Report includes analysis of CFC-11 emissions from closed-cell foams at their end of life based on available information in all regions, which includes extreme and unlikely scenarios. She then showed a pie chart of the foams produced by region and reiterated that 70% of foams produced prior to 2006 were produced, used and disposed of in Europe and North America.

21. Ms. Walter-Terrinoni went on to say that the CFC-11 emissions from regional foam banks are insufficient to explain atmospheric-derived emissions repeating that further analysis of regional banks

was completed for the Final Report, incorporating the duration of foam use and the subsequent timing of emissions from dismantling foams. She went on to explain that the Task Force found that expected emissions originating from the pre-2010 foam banks in every region are insufficient to explain the unexpected CFC-11 emissions and, more specifically, that the Task Force concluded that the expected emissions from the pre-2010 CFC-11 foam banks in Northeast Asia are insufficient to account for the atmospheric-derived CFC-11 emissions from eastern mainland China estimated by Rigby *et al.*

22. Ms. Walter-Terrinoni then explained that resumption of newly produced CFC-11 usage in closed-cell foams is likely and then expanded on the conclusion stated at the Open-ended Working Group in 2019 saying that it is unlikely that there has been a resumption of newly produced CFC-11 usage in refrigeration and air-conditioning, flexible (open-cell) foams, aerosols, solvents, feedstock, tobacco expansion and other miscellaneous applications. She then repeated that it is likely that there has been a resumption of newly produced CFC-11 usage in closed-cell foams and stated that this will result in a combination of immediate CFC-11 emissions from foam installation and CFC-11 production and an increase in the foam banks, from which CFC-11 will be released over time.

23. Ms. Walter-Terrinoni then commented on the technical and economic factors could have facilitated reversion to CFC-11 in closed-cell foams including Increased demand for closed-cell foams for insulation, reduced availability of HCFC-141b due to the phase-out, price increases of HCFC-141b and prices of HFCs, and finally that reversion from other fluorocarbons to CFC-11 in closed-cell foam manufacture can be made with technical ease.

24. Ms. Walter-Terrinoni went on to say that mislabelling of polyol blends for foams could facilitate unintended usage and international trade specifying that parties use and/or import polyol blends labelled as containing HCFC-141b and HFCs. A5 parties import up to 7,500 tonnes per year HCFC-141b in polyol blends. She clarified that polyol blends could be mislabelled, intentionally or unintentionally, and then used by a recipient without knowing which blowing agent is actually in the blend resulting in CFC-11 emissions during foam installation in parties receiving CFC-11 polyol blends without their knowledge.

25. Ms. Tope stated that the Task Force estimates that 40,000 to 70,000 tonnes per year of CFC-11 production is required to account for the unexpected emissions in each year from 2013 to 2017. She noted that some of this CFC-11 production will be emitted during the production process, some during the manufacture of closed-cell foams, while the remainder will be banked in foams, from which CFC-11 will be released over time.

26. Ms. Tope explained that the Task Force considered the technical and economic feasibility of 22 potential CFC-11 production routes. She stated that one of the most likely routes used to produce the CFC-11 is carbon tetrachloride to CFC-11/12 produced on a large-scale in an existing HCFC-22 and/or an HFC-32 liquid-phase plant. She indicated that for these types of plants, spare capacity to produce CFC-11 on a large-scale would have been available in the period after 2012, where utilisation of spare capacity lowers total production costs. She added that another likely route is carbon tetrachloride to CFC-11 on micro-scale plants, which have capacities in the 100 to 2,000 tonnes per year range, using minimal equipment to make low-grade CFC-11 for foam blowing use. She noted that while some micro-scale plants could be contributing to production, it seems unlikely that a large number of micro-scale plants would be solely responsible for the estimated annual CFC-11 production of 40,000 to 70,000 tonnes per year. She stated that a range of between 45,000 to 120,000 tonnes per year of carbon tetrachloride would be required to supply the estimated 40,000 to 70,000 tonnes per year of estimated CFC-11 production, depending on the proportion of co-produced CFC-12. She noted that the carbon tetrachloride quantity required for CFC-11 production is expected to be at the lower end of this range if, as expected, the objective is to make CFC-11 to supply closed-cell foams. She explained that the quantity of CFC-12 co-produced with CFC-11 is dependent on the production route chosen, and how the plant is set up and operated, and that with CFC-11 as the expected target chemical, the range of CFC-12 co-production is up to 30% of total CFC-11/12 production for the most likely production routes. She noted that the Task Force had modelled estimated bottom-up emissions of CFC-12 but that the assumptions used to model CFC-12 emissions indicated high underlying uncertainty, and therefore estimates of bottom-up CFC-12 emissions and comparison against atmospheric-derived CFC-12 emissions are inconclusive. She outlined the possible fate of co-produced CFC-12, which includes destruction by thermal oxidation, usage as a refrigerant and/or aerosol propellant, usage as a feedstock, and/or release to the atmosphere.

27. In concluding, she reiterated that pre-2010 CFC-11 production and usage is unlikely to explain the increased CFC-11 emissions; newly produced CFC-11 usage in closed-cell foams is likely to explain the unexpected CFC-11 emissions; newly produced CFC-11 usage in closed-cell foams will result in an immediate increase of CFC-11 emissions and a long-term increase of emissions from

CFC-11 foam banks; the expected emissions from the pre-2010 CFC-11 foam banks in Northeast Asia are insufficient to account for the atmospheric-derived emissions from eastern mainland China that are reported in Rigby et al.; an estimated 40,000 to 70,000 tonnes/year CFC-11 production would be required to supply the post-2010 foams usage and other associated emissions; and 45,000 to 120,000 tonnes/year carbon tetrachloride would be required to supply the estimated CFC-11 production, which is likely to be at lower end of that range.

C. Final assessment by the Methyl Bromide Technical Options Committee of critical-use nominations for methyl bromide

28. On behalf of TEAP, the Methyl Bromide Technical Options Committee co-chairs, Marta Pizano and Ian Porter presented an overview of the trends and outcomes for the CUN nominations submitted in 2019 for use in 2020 and 2021.

29. In opening the presentation, Ms. Pizano provided an overview of the stock amounts reported by four parties at the end of 2018 (<1.0 t), indicating that only parties requesting CUNs are required to report on stocks, therefore total stocks are unknown. As in past opportunities, MBTOC did not adjust CUE recommendations to account for stocks, this being a decision to be taken by parties.

30. She then provided an overview of the outcome of the final assessments for CUE recommendations of MB (t) for 2020 and 2021, showing that of the six requests for CUNs for a total amount of 111.441t, MBTOC was recommending 89.161 t.

31. For the Australian strawberry runners the full amount nominated by the party of 28.98 t was recommended, as the party provided further substantive justification for needing this amount. MBTOC acknowledged that the party provided a transition plan for phasing-out MB, based on methyl iodide (MI), showing that if registration and availability is achieved by 2021, then the Australian Government will reduced the nominated amount by 50%.

32. Co-chair Ian Porter then indicated that MBTOC recommended the full amount of 5.261 t for the Canadian strawberry runners in 2019. He stated that regulations unique to PEI prohibit the use of all feasible chemical fumigant options, and that soilless culture, i.e. substrates, are the only option presently suitable for this nomination. Also, after the OEWG, the party had provided information justifying that substrates were not yet suitable for adoption, so the reduction made in the interim recommendation could not be met. The reason was that yields of nursery plants grown in substrates were delayed by 3 weeks compared to field grown plants and this was presently uneconomical.

33. Interim recommendations presented at the OEWG for CUNs requested by Argentina for the tomato and strawberry for 2020 had been accepted by the party and therefore were not reassessed. For strawberries, the nomination was reduced based on a dosage that met MBTOCs standard presumption for the uptake of barrier films. For tomatoes, the final recommendation was 12.79 t and for strawberry fruit production was 7.83 t.

34. Mr. Porter then indicated that the interim recommendations for pests in commodities and structures for 2019 from South Africa (RSA) had received no request for reassessment by the party after the OEWG and that these amounts were now final recommendations. For mills, MBTOC recommended 0.3 t, based on a reduction for allowance of only one fumigation per year at a 20 g/m³ dose rate for the three mills nominated, to allow time for adoption of integrated pest management practices and sulfuryl fluoride, now a registered alternative. For houses, MBTOC recommended a 15% reduction based on adoption of heat as a key alternative.

35. In closing the presentation, Mr. Porter reminded the parties about the timelines for submission of CUNs in 2020, as required under Decision Dec XVI/6 1, bis.

D. Report of the Technology and Economic Assessment Panel on the cost and availability of low-global-warming-potential technologies that maintain/enhance energy efficiency

36. Ms. Hélène Rochat, co-chair of the energy efficiency task force (EETF), presented the EETF report prepared for the MOP 31. Ms. Hélène Rochat began by elaborating the mandate in sub-paragraph XXX of decision XXX/5, which requested the Technology and Economic Assessment Panel (TEAP) “to prepare a report on the cost and availability of low-global-warming-potential technologies and equipment that maintain or enhance energy efficiency, inter alia, covering various refrigeration, air-conditioning and heat-pump sectors, in particular domestic air-conditioning and commercial refrigeration, taking into account geographical regions, including countries with high-ambient-temperature conditions”. The final report built on the preliminary report presented in the 41st OEWG in July, taking into account questions from parties and discussion in the margins.

Ms. Rochat presented the list of the 20 members of the task force and noted that 60% of the task force were from A5 Parties and 30% were female. The report had 5 chapters; Chapter 1 Introduction, Chapter 2 Availability (Lead Mr. Bassam Elassaad), Chapter 3 Cost (lead Dr. Omar Abdelaziz), Chapter 4 Markets (lead Dr. Gabrielle Dreyfus), and Chapter 5 Summary. The chapter lead author presented their own chapter.

37. Mr. Bassam Elassaad started by defining “availability” in terms of presence in the different regions and climatic zones of the world. The report did not cover “Not-in-Kind” (NIK) technologies as they were not part of the EETF mandate, and they have recently been reviewed in the RTOC assessment report. Mr. Elassaad presented updated tables showing the availability of technologies, with more detail on countries and regions. He concluded that medium and low GWP refrigerants for energy efficient appliances are widely available, while the products using these refrigerants are available to varying degrees. He noted that research & development (R&D) to increase energy efficiency (EE) is focusing on lower GWP technologies, although some development is still taking place on the high GWP HFCs. There is no new research and development to increase the EE of HCFCs as these are already phased-out in many countries and being phased-out in the remainder. The availability of components to build AC products, like variable speed compressors and microchannel condensers, was also discussed. For commercial refrigeration products, energy efficiency is determined by equipment design and the majority of technical options for improved energy consumption are currently in use and do not depend on the refrigerant being used. Mr. Elassaad presented novel findings of the PRAHA-1 and PRAHA-2 projects that assessed air conditioner performance in HAT regions. He finished by describing a project on transcritical CO₂ systems for commercial refrigeration in Jordan which has been shown to significantly improve EE.

38. Mr. Omar Abdelaziz presented on the capital and operating costs associated with the conversion towards energy efficient and low-GWP technologies. He indicated that the EETF force has identified the required additional capital and operating costs to convert manufacturing lines for ACs to accommodate transition to low GWP refrigerants, whilst improving EE at the same time. He then presented a table containing detailed information on the range of capital costs associated with conversion of a typical manufacturing line (~100,000 units/year) for a lower GWP room air conditioner with higher energy efficiency. The conversion cost to accommodate low GWP refrigerants was in the range USD 300,000 – 535,000, with an additional USD 1,000,000 – 2,000,000 to accommodate microchannel heat exchangers, for a total of USD 1.3 to 2 million. He noted that smaller diameter tubes and microchannel heat exchangers can reduce refrigerant charge, improve system efficiency and enable equipment to meet safety standards. Mr. Abdelaziz summarized the availability, potential energy efficiency improvement, and impact on product cost. He showed that using a variable speed compressor can improve the system efficiency by up to 30% but would result in 20% increase in unit cost. On the other hand, microchannel heat exchangers may improve system efficiency by up to 15% with no impact on the unit cost. He noted that microchannel heat exchangers are especially known for the impact they have on the refrigerant charge reduction of up to 40%. Finally, Mr. Abdelaziz discussed the concept of life cycle cost analysis for policy making, presenting a case study from the U.S. Department of Energy during the rulemaking process for the minimum efficiency performance standard for self-contained commercial refrigeration. This case study depicted the correlation between initial cost, performance, and life cycle cost, and demonstrated that the lowest life cycle cost of equipment is not necessarily the most efficient equipment.

39. Ms. Gabrielle Dreyfus presented the Chapter on the role of markets and policies in determining the availability of energy-efficient refrigeration and air-conditioning equipment containing low-GWP refrigerants. She stated that policies shape the market by creating an enabling environment for market development. Manufacturers respond to positive policy signals that promote energy efficiency and refrigerant transition by investing in research and development. She highlighted that a simultaneous transition toward lower-GWP and higher energy-efficiency equipment, reduces overall costs to manufacturer for research and development and capital investment cycles. In contrast, weak or absent energy-efficiency policies are associated with market dominance of inefficient and HCFC technologies in some regions.

40. She observed that the price that the consumer pays does not correlate well with energy efficiency, but with other characteristics, such as brand reputation influencing the retail price to a greater extent. Global experience in regional and institutional cooperation has demonstrated benefits in speed, scale, spending, and sustainability that could be applicable to improving energy efficiency during HFC phase-down. She noted that if this principle were expanded so that governments adopted common standards and metrics, where markets and climates are similar, the demand for products meeting those standards would go up, increasing scale and availability, and reducing price. For these reasons it would be important for developing countries to develop regional strategies to improve EE alongside regulatory support to move to low GWP refrigerants. Individual developing countries that

have weak or absent MEPS, run the risk of importing low EE and high GWP AC equipment (“environmental dumping”).

41. Ms Helene Rochat then summarised the EETF overall findings by stating that countries can use market policies and incentives to drive up energy efficiency during the phasing down of high-GWP HFCs in commercial refrigeration and air conditioning. This will bring environmental and economic benefits. The principles presented apply to other RACHP sectors as well. She concluded that international and regional cooperation will be important for market transformation and that A5 Parties could benefit from capacity building, support for market transformation including MEPS and/or labelling.

E. Initial assessment by the Scientific Assessment Panel and the Technology and Economic Assessment Panel of volatile fluoroorganic and related compounds found in the Arctic

42. Dr. Paul A. Newman, Prof. John Pyle, Prof. Bonfils Safari (Scientific Assessment Panel co-chairs) with Dr. Helen Tope and Dr. Keiichi Ohnishi (Technology and Economics Assessment Panel, MCTOC co-chairs) gave a presentation on the “New evidence for five synthetic chemicals reported by the Norwegian Institute for Air Research (NILU).”

43. The Norwegian government brought to the attention of the Parties (under Decision IX/24) the NILU-Norwegian Institute for Air Research 2018 report revealing the detection of five human-produced chemicals in air by filter-sampling at the Zeppelin station, Ny-Ålesund, Svalbard, Norway (79°N, 12°E). This report, “Screening Programme 2017 – AMAP Assessment compounds” (hereafter referred to as NILU [2018]) was funded by the Norwegian Environment Agency. It is a follow-up study during a summer 2017 campaign and followed from the Arctic Monitoring and Assessment Programme (AMAP), which had “identified 25 chemicals with physicochemical properties that raised concerns with respect to Arctic environments”.

44. These five detected chemicals are:

- PFPHP Perfluoroperhydrophenanthrene (Vitreon, Flutec PP 11), CAS 306-91-2, C₁₄F₂₄
- PFTBA Tris(perfluorobutyl)-amine (FC-43), CAS 311-89-7, C₁₂F₂₇N
- TCHFB 1,2,3,4-Tetrachlorohexafluorobutane, CAS 375-45-1, C₄Cl₄F₆, CFC-316lbb
- DCTFP 3,5-Dichloro-2,4,6-trifluoropyridine, CAS 1737-93-5, C₅Cl₂F₃N
- DCTCB 1,2-Dichloro-3-(trichloromethyl)benzene, CAS 84613-97-8, C₇H₃Cl₅

45. In the SAP/TEAP presentation, information was provided on available chemical properties of these compounds, as well as usages and estimates of market size.

46. The presentation summarized that:

47. The five chemicals detected by NILU [2018] (PFPHP, PFTBA, TCHFB, DCTFP and DCTCB) occur in the Arctic atmosphere at very low concentrations (e.g., **the observed 0.51 ppq value of TCHFB is about 450,000 times smaller than the 2017 global CFC-11 mean value** of 229 ppt).

48. **PFTBA is a powerful GHG**, while the other four are likely to be powerful GHGs. Three (TCHFB, DCTFP, and DCTCB) are ODSs. However, at their current very low atmospheric concentrations, **these substances are not currently threats to the ozone layer and are likely to have a miniscule impact on climate.**

49. The measurement techniques provide only lower-limit quantitative estimates with large uncertainties, and the NILU [2018] report has not yet appeared in the peer-reviewed literature. These data therefore cannot be used for future trend studies.

50. NILU researchers are currently refining their observations to fill the gap in sampling and measurement of chemicals with vapor pressure between the very volatile greenhouse gases and the classical semi-volatiles like PCBs and chlorinated pesticides. Analyses of some of these chemicals (PTPHP, TCHFB, and DCTFP) for their atmospheric properties are in progress, but are not presently published.

F. Synthesis of the 2018 quadrennial assessment reports of the Scientific Assessment Panel, the Technology and Economic Assessment Panel and the Environmental Effects Assessment Panel

51. The presentation which summarized the synthesis of the 2018 Assessment Reports of the EEAP, TEAP and SAP was presented on behalf of those panels by Professor Nigel Paul, Ms. Bella Maranion and Professor John Pyle, Co-Chairs of the EEAP, TEAP and SAP, respectively. The Synthesis Report can be found at UNEP/OzL.Pro.31/8 and the presentation is available on the Ozone Secretariat web portal.
52. The report covered the current status of the Montreal Protocol: its successes, its challenges and the prospects for the future.
53. The successful phaseout of ODS in many sectors (foams, refrigeration, medical, aerosols, solvents, laboratory and analytical uses, agriculture, and fire suppression) was described, including its consequent impact on the continued decline of ODS in the atmosphere. Recovery of stratospheric ozone is now observed in various regions of the atmosphere.
54. Some current challenges were discussed. A very important issue is the unexpected increase in emissions of CFC-11, in part, at least, arising from east Asia. Work from TEAP and SAP (including new work since the publication of their 2018 Assessment reports), highlights the significant discrepancy between the emissions expected on the basis of compliance with the Montreal Protocol and the emissions derived from measurements of CFC-11 in the atmosphere.
55. Other issues which were highlighted included on-going uses of halon 1301 (civil aviation, oil and gas, military), which will require halon beyond when it is projected to be available from the existing bank, as well as the continued QPS use of methyl bromide.
56. The benefit to climate already achieved by the Montreal Protocol's phase out of ODS, many of which are also potent greenhouse gases, is well known. The future benefit of the Kigali Amendment, amounting to about 0.4°C avoided warming this century, was presented.
57. By protecting the stratospheric ozone layer and the climate, and by stimulating technical innovation across multiple sectors, the Montreal Protocol is contributing to the delivery of many of the United Nations Sustainable Development Goals (SDGs). These include SDG 2 (Zero hunger), SDG 3 (Good health and well-being) and multiple SDGs relating to environmental protection and sustainable economic growth.
58. Assuming compliance with the Montreal Protocol recovery of the stratospheric ozone layer to its 1980 levels is expected in the coming decades, with recovery over Antarctica projected for late this century.
59. The continued success of the Montreal Protocol in protecting stratospheric ozone, and consequent benefits for the SDGs, depends on continued compliance with the Protocol provisions.
60. In addition to the Synthesis Report, the SAP also reported on the 2019 Antarctic Ozone Hole. The **2019 hole** was the **smallest since 1983**. This small hole primarily resulted from **unusual stratospheric weather patterns** with higher temperatures over Antarctica. The SAP noted that this year's unusual conditions are **not** caused by climate change, but that the **Antarctic ozone hole will continue** until late in this century because of the continued high levels of ODS in the atmosphere.
61. The presentation also included information on the recently published "Twenty Questions and Answers About the Ozone Layer: 2018 Update." The 20Q&A document is the outreach and communication document of the Scientific Assessment Panel. The motivation behind this scientific publication is to tell the story of ozone depletion, ozone-depleting substances and the success of the Montreal Protocol. Electronic files of the 20 Questions/Answers booklet can be found at:

<https://ozone.unep.org/20-questions-and-answers>

<https://www.esrl.noaa.gov/csd/assessments/ozone/2018/twentyquestions>

Annex III

Statement by the Chair of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol on the work of the Executive Committee, the Multilateral Fund secretariat and the Fund's implementing agencies*

Mr. President, distinguished delegates,

On behalf of the Executive Committee of the Multilateral Fund, I am pleased to report to the Parties on the relevant decisions taken since the Thirtieth Meeting of the Parties in 2018.

In my report I will present some of the significant achievements focusing on ongoing work related to HCFC phase-out; on matters related to monitoring, reporting, verification and enforceable licensing and quotas systems, including the increase in global emissions of CFC-11; and further development of the policies in respect to the Kigali Amendment. I draw your attention to document 31/9 which includes full information on policy matters; projects, their implementation and monitoring; and business planning, financial and administrative matters.

In the period under review, the largest part of the Executive Committee's work continued to be focused on monitoring the implementation of HCFC phase-out management plans, referred to as HPMPs, and an HCFC production phase-out management plan, referred to as an HPPMP. The ongoing HPMPs for 144 Article 5 countries¹ will address approximately 61.5 per cent of the HCFC consumption baseline, including the conversion of almost all of the foam-manufacturing enterprises and a significant number of the air-conditioning manufacturing enterprises, mainly to low-GWP technologies. Through their approved HPMPs, all countries are continuing to address the refrigeration-servicing sector.

The Executive Committee allocated a considerable amount of time of its meetings to in-depth discussions of the issue of monitoring, reporting, verification and enforceable licensing and quotas systems, as well as the increase in global emissions of CFC-11.

Following the Parties' discussions and in response to their decision XXX/3, the Executive Committee discussed a document that outlined the related Fund policies and procedures with emphasis on the regulatory framework established by Article 5 countries under the Multilateral Fund; the relevance of the institutional strengthening projects through which funding has been provided to the national ozone units; the mandatory reporting on consumption and production of controlled substances and the consistency of the reported levels of consumption and production; the monitoring and evaluation activities; the conditions in multi-year agreements that need to be met before releasing funding tranches; the roles and responsibilities of the bilateral and implementing agencies; the implications of non-compliance with the Agreements; and the role of the UNEP's Compliance Assistance Programme in providing compliance assistance to Article 5 countries, and the tools, products and services that it has developed for customs and enforcement officers.

The Committee further considered a document which contained an overview of current monitoring, reporting, verification and enforceable licensing and quota systems, including the requirements and practices of the systems for reporting back to the Executive Committee that had been developed with support from the Multilateral Fund as well as ways to further strengthen the relevant procedures, systems and frameworks.

The two documents were made available to the Parties at their Forty-first meeting of the Open-ended Working Group, and the Committee will consider this matter again at its 84th meeting, taking into account any decisions that the Parties might take at this Meeting.

Mr. President, at its 83rd meeting, the Committee extensively discussed the issue of unexpected emissions of CFC-11 based on a series of reports including in relation to monitoring, reporting, verification and enforcement systems in China. The Committee welcomed a number of regulatory and enforcement actions to be undertaken by the Government of China, and noted that the Government would undertake additional steps in support of its enforcement actions and consider a number of suggestions intended to supplement and augment its regulatory and enforcement actions. These suggestions include engaging a non-governmental consultant to carry out a study to determine the

* The statement is presented as received, without formal editing.

¹ Except the Syrian Arab Republic.

regulatory, enforcement, policy or market circumstances that might have led to the illegal production and use of CFC-11 and CFC-12. The Government of China undertook to report to the 84th and 86th meetings on the progress in implementing these activities.

With regard to the development of the policies related to the implementation of the Kigali Amendment, the Executive Committee focused its deliberations on the further development of draft cost guidelines for funding the phase-down of HFCs, energy efficiency, enabling activities for the phase-down of HFCs, the consideration of HFC investment project proposals to gather information on incremental costs, key aspects related to HFC-23 by-product control technologies and the level and modalities of funding for HFC phase-down in the refrigeration servicing sector.

- In continuing its deliberations on the cost guidelines, the Executive Committee focused on the starting point for sustained aggregate reductions in HFCs for the consumption and production sectors, the units to be used to measure the reductions and the methodology for setting the starting point, as well as how the interim use of high-global-warming potential technologies should be treated in the relation to the starting point for reduction in consumption. The Committee agreed on a basis for continuing its discussions on the cost guidelines at the 84th and future meetings, including on the matter of disposal of controlled substances, in light of the final report on the evaluation of pilot demonstration projects on ODS disposal and destruction.
- The Committee discussed a number of matters related to energy efficiency, such as: the way to operationalize paragraph 16 of decision XXVIII/2 and paragraph 2 of decision XXX/5, where the discussions resulted in a well-advanced draft recommendation as the basis for further consideration at its meeting in December; information on relevant funds and financial institutions mobilizing resources for energy efficiency that might be utilized when phasing down HFCs; and a report of the Technology and Economic Assessment Panel on issues related to energy efficiency. The Committee will continue its deliberations at its 84th meeting.
- The Committee has so far approved funding for enabling activities in 131 Article 5 countries, noting that those countries that had not yet ratified the Kigali Amendment submitted a letter indicating the intent of the Government concerned to make best efforts to ratify the Kigali Amendment as early as possible. In implementing these activities, the Committee provided flexibility for Article 5 countries to also undertake a number of activities related to energy efficiency using the funding already approved, as was decided by the Parties in decision XXX/5. It is expected that these activities will be completed by June 2020 and final reports submitted to the Committee within six months of the project completion highlighting lessons learned.
- In addition to the six HFC investment projects approved at previous meetings, at its 82nd meeting, the Committee approved three projects to convert enterprises manufacturing products and equipment in the foam and refrigeration sectors.
- The Committee had several discussions on options for controlling HFC-23 by-product emissions. At its 83rd meeting, the Committee started the discussion of one investment project proposal to control HFC-23 by-product emissions, and approved funding for preparation of a project proposal for the control of HFC-23 by-product emissions in the HCFC production sector. The two project proposals will be discussed at the 84th meeting.
- Discussions on the level and modalities of funding for HFC phase-down in the refrigeration servicing sector, which started at the 80th meeting, continued. At its 82nd meeting, the Committee discussed a preliminary document on all aspects related to refrigeration servicing sector that support the HFC phase-down and requested the Secretariat to prepare, for the 85th meeting, an analysis of the level and modalities of funding, taking into account the flexibility that Article 5 countries had in implementing their servicing sector activities and the activities in their HPMPs.
- With regard to the fast-start support for the implementation of the Kigali Amendment, provided voluntarily by 17 non-Article 5 parties, I am pleased to report that all of them had paid their contributions, totalling approximately US \$25.5 million, by the 82nd meeting, and that all the funds had been disbursed by the 83rd meeting mainly for implementation of enabling activities for Article 5 group 1 countries, and for a few stand-alone HFC investment projects.

Work of implementing agencies

I would like to briefly address the main achievements of the implementing agencies of the Multilateral Fund during this reporting period, which were requested by the Committee to apply their corporate gender policies in the preparation and implementation of projects funded by the Multilateral Fund.

UNDP

UNDP has continued assisting 47 countries with the implementation of HPMPs. With regard to the Kigali Amendment, UNDP has provided support to 16 countries with their enabling activities and to another five countries to develop HFC investment projects. UNDP has also continued to enhance the capacity building of Article 5 countries. For example, in May 2019, UNDP organized a workshop on HFC alternatives, which brought together participants from 20 Article 5 countries and experts to discuss challenges, opportunities and solutions to effectively implement the Kigali Amendment.

UNEP

UNEP, through its OzonAction Compliance Assistance Programme, assists all Article 5 Parties with meeting and sustaining their Montreal Protocol commitments. It assisted 102 countries with the implementation of HPMPs, 104 countries with institutional strengthening projects, and 90 countries with HFC enabling activities in support of the Kigali Amendment. UNEP's current focus includes strengthening of national monitoring, reporting, verification and enforcement systems through policy measures, training of customs and enforcement officers, as well as regional networking. UNEP continues supporting the refrigeration servicing sector to safely and smoothly transition to new technologies. UNEP also builds the capacity of new national ozone officers to efficiently assume their new responsibilities.

UNIDO

UNIDO is currently implementing HPMPs in 72 countries, institutional strengthening projects in eleven countries and HFC enabling activities in 31 countries, as a result of which, a number of Article 5 parties have already ratified the Kigali Amendment. Furthermore, UNIDO is implementing four HFC investment projects. Seven country-level projects and two regional projects are undertaken to demonstrate climate friendly and energy-efficient alternative technologies to HCFCs, trans-critical CO₂ refrigeration technology for supermarkets, refrigerant quality and feasibility study on district cooling. UNIDO organized a workshop "Kigali in action" that brought together national ozone units and provided an opportunity for sharing experiences and learning from each other.

World Bank

The World Bank is currently assisting its partner countries in implementing their HPMPs, valued at nearly US \$190 million, to reduce, as a priority, HCFC consumption at the enterprise level. A key goal in the World Bank country engagement is sustainable phase-out, which is why the Bank continues to focus on project design and preparation where country context and desired results are framed by due diligence, quality assurance, and risk management requirements. This establishes a system for countries to track and monitor project progress through completion. The Bank has also delivered technical assistance and advisory services for ratification of, and initial compliance with, the Kigali Amendment in three countries, through enabling activity funding.

Mr. President, distinguished delegates.

I would like to thank the Parties for their strong commitment to the implementation of the Montreal Protocol, and in particular their efforts to bring forward the activities aimed at the implementation of the Kigali Amendment. I would also like to take this opportunity to express my sincere appreciation to the Chair and members of the 2018 Executive Committee and my fellow members of the 2019 Executive Committee, the Fund Secretariat, and the bilateral and implementing agencies, for their continued hard work and dedication to our common goals.

Thank you.