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**United Nations  
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**Twenty-Eighth Meeting of the Parties to  
the Montreal Protocol on Substances  
that Deplete the Ozone Layer**  
Kigali, 10–15 October 2016

## **Report of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer**

### **Introduction**

1. The Twenty-Eighth Meeting of the Parties to the Montreal Protocol was held at the Radisson Blu Hotel and Convention Centre in Kigali from 10 to 15 October 2016.

### **Part one: preparatory segment (10–12 October 2016)**

#### **I. Opening of the preparatory segment**

2. The preparatory segment was opened by its co-chairs, Mr. Paul Krajnik (Austria) and Mr. Leslie Smith (Grenada), at 10 a.m. on Monday, 10 October 2016.

3. Opening remarks were delivered by Mr. Vincent Biruta, Minister of Natural Resources of Rwanda, and Ms. Tina Birmpili, Executive Secretary of the Ozone Secretariat.

#### **A. Statements by representative(s) of the Government of Rwanda**

4. In his remarks, Mr. Biruta welcomed the parties to Kigali and expressed gratitude to the Ozone Secretariat for its tireless efforts to ensure the success of the meeting.

5. The achievements of the Montreal Protocol were widely recognized; built on an exceptional level of international collaboration and commitment, it had brought about the virtually complete phase-out of many ozone-depleting substances. The parties should be proud of their collective efforts, which would have a positive impact on the lives of current and future generations and the very future of humankind. Almost 30 years after the signing of the Protocol, the parties had come together once again, in Kigali, in the spirit of partnership and goodwill that had characterized their work under the Protocol, with the aim of passing an ambitious amendment to the Montreal Protocol to phase out hydrofluorocarbons (HFCs). Doing so would make it possible to avoid some 0.5 degrees Celsius of global warming by the end of the century; and combining such an amendment with strong steps to promote energy efficiency could result in double the climate benefits, avoiding more than 1 degree Celsius of global warming. The case for an amendment was clear, and that clarity was a consequence of unflinching efforts by the parties over previous years. Their ground-breaking work on the Dubai pathway had afforded the parties an opportunity to make history once again, this time in tackling climate change, which, no longer an issue looming on the horizon but an urgent one, had become a reality of daily life with a wide variety of deleterious effects around the globe. He expressed confidence that the parties would apply thoughtful analysis and their collective wisdom to finding solutions to the few remaining outstanding issues in order to reach consensus on an amendment that would be agreeable to all the parties.

6. The adoption in December 2015 of the Paris Agreement on climate change, which was expected to enter into force in November 2016, had demonstrated political will and global momentum to address climate change. Similarly, by agreeing on an amendment to the Montreal Protocol, the parties would send an important signal that Governments were serious about taking action to protect the future of their citizens. In striving to achieve the targets of the Sustainable Development Goals, in particular Goal 13 on climate action, they would show that saving lives and protecting the environment were inextricably linked. An HFC amendment would also build momentum towards the twenty-second session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, to be held in Marrakech, Morocco, in November 2016, as well as ensuring the prosperity of current and future generations of humankind.

7. In closing, he urged the parties to seize the opportunity of the current meeting to protect the climate and secure a brighter future for their citizens. Amending the Montreal Protocol rested on an unshakeable moral obligation and would serve as a building block to consolidate recent gains in addressing climate change. He therefore encouraged all parties to take part in the negotiations in the positive spirit of commitment and collaboration for which the Montreal Protocol had become known.

## **B. Statements by representative(s) of the United Nations Environment Programme**

8. In her opening remarks, Ms. Birmpili stressed the importance of the Twenty-Eighth Meeting of the Parties in relation to the negotiations on the adoption of an amendment to the Montreal Protocol to phase down HFCs. She thanked the Government of Rwanda on behalf of all the parties for hosting the event. In spite of the differing priorities and challenges of individual countries, focusing on what parties had in common rather than their differences could create an incredible force for positive change. There was a clear, shared understanding of the need to move forward at the current meeting, turning the progress made at the resumed thirty-eighth meeting of the Open-ended Working Group into a framework for action and putting the world on a path towards reducing HFCs under the Montreal Protocol. It was a historic moment, long in the making, providing an opportunity to act to protect the global environment, leaving no country behind.

9. The parties would consider the third and final report of the Technology and Economic Assessment Panel's task force on decision XXVII/4, which provided an up-to-date manual of alternatives to ozone-depleting substances covering all major sectors. Also to be considered was a report by the Panel in response to decision Ex.III/1, on the climate benefits and costs of reducing HFCs, which would serve as a starting point for a more refined outcome to accompany a decision on an HFC phase-down. The parties at the current meeting would also finalize the terms of reference for a study on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the period 2018–2021. Given the negotiations on phasing down high-global-warming-potential HFCs, she suggested that the parties might wish to define terms of reference for the study that encompassed an HFC phase-down.

10. She expressed her sincere appreciation to the Technology and Economic Assessment Panel for responding to the parties' requests for information in the face of very short deadlines, and to the Scientific Assessment Panel and the Environmental Effects Assessment Panel for their contributions; the three panels would report during the high-level segment of the current meeting on the progress achieved in their work. The Technology and Economic Assessment Panel would also present its final assessment of the few nominations by parties of critical uses of methyl bromide. She noted in that regard that 99 per cent of controlled uses of methyl bromide – formerly one of the most important chemicals used to control pests and pathogens in agriculture, commodities and structures – had been replaced with effective alternatives that were safer for the ozone layer.

11. She congratulated the parties on another important milestone achieved in 2016, namely, the final phase-out of chlorofluorocarbons, including in metered-dose inhalers, representing a remarkable achievement resulting from over twenty years of coordinated activity with stakeholders including the pharmaceutical industry, healthcare regulators and providers, and patients.

12. In closing she paid tribute, leading a round of applause, to Ms. Aminah Ali of Malaysia and Mr. Blaise Horisberger of Switzerland, both of whom were participating in a meeting of the parties for the last time, thanking them for their tireless efforts as representatives of their countries to further the objectives of the Montreal Protocol. She urged representatives to make the most of the current meeting, uniting and investing in the social, economic and environmental well-being of global citizens through collective action. By turning good intentions into concrete action through the adoption of an amendment to the Protocol, the parties would take a profoundly important step towards a healthier planet and healthier people, balancing global and national goals on the basis of evolving and sometimes imperfect knowledge to deliver effective solutions that were agreeable to all parties.

## II. Organizational matters

### A. Attendance

13. The Twenty-Eighth Meeting of the Parties to the Montreal Protocol was attended by representatives of the following parties: Afghanistan, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Belarus, Belgium, Benin, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Cuba, Czechia, Democratic Republic of the Congo, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, European Union, Fiji, Finland, France, Gabon, Gambia (the), Georgia, Germany, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Holy See, Honduras, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Italy, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Niger (the), Nigeria, Norway, Pakistan, Palau, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Rwanda, Saint Lucia, Samoa, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Slovakia, Somalia, South Africa, South Sudan, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela (Bolivarian Republic of), Viet Nam, Zambia and Zimbabwe.

14. Representatives of the following United Nations bodies and specialized agencies also attended: Secretariat of the United Nations (New York), secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, secretariat of the United Nations Framework Convention on Climate Change, United Nations Development Programme, United Nations Environment Programme, United Nations Industrial Development Organization and World Bank.

15. The following intergovernmental, non-governmental, industry, academic and other bodies were also represented: AGRAMKOW Latin America, Air-conditioning, Heating and Refrigeration Institute, Alliance for Responsible Atmospheric Policy, Asahi Glass Co., Centre for Climate and Energy Solutions, Centre for Science and Environment, Centre for Energy Efficiency and Sustainability, Chemours Company, Christian Aid, Climate Action Network–International, Commercial Refrigeration Services, Council on Energy, Environment and Water, Daikin Europe, N.V., Daikin Industries, Ltd., Edelman India Pvt. Ltd., Energy and Resources Institute, Environmental Investigation Agency, European Climate Foundation, Fotochem, GIZ Proklima, Global Green Growth Institute, Global Strategic Communications Council, Green Africa TV, Greenpeace International, Gujarat Fluorochemicals Limited, HEAT GmbH, Honeywell, Inc., Honeywell Japan, Inc., Industrial Technology Research Institute, Ingersoll Rand, Institute for Governance and Sustainable Development, International Institute of Refrigeration, JEFS Consults Limited, Johnson Controls, JSC HaloPolymer, Lawrence Berkeley National Laboratory, League of Arab States, Lennox International, Mebrom, Mediator Express Company Ltd., Mexichem UK Limited, Midea Group, Natural Resources Defense Council, NGF Consult Ltd., Palfridge Limited, Pan African Climate Justice Alliance, Refrigerant Gas Manufacturers Association, Refrigerants Australia, Rwanda Development Board, Rwanda Environment and Climate Change Fund, Rwanda Green Initiative, Rwandan Patriotic Front Secretariat, Shecco, SRF Limited, United Technologies Climate, Controls & Security, World Avoided Project.

### B. Officers

16. The preparatory segment of the meeting was co-chaired by Mr. Krajnik and Mr. Smith.

### C. Adoption of the agenda of the preparatory segment

17. The following agenda for the preparatory segment was adopted on the basis of the provisional agenda contained in document UNEP/OzL.Pro.28/1:

1. Opening of the preparatory segment:
  - (a) Statements by representative(s) of the Government of Rwanda;
  - (b) Statements 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) Consideration of membership of Montreal Protocol bodies for 2017;
  - (b) Financial report of the trust fund and budgets for the Montreal Protocol.
4. Report by the Technology and Economic Assessment Panel on updated and new information on alternatives to ozone-depleting substances (decision XXVII/4).
5. Report by the Technology and Economic Assessment Panel on assessment of the climate benefits and the financial implications for the Multilateral Fund of the hydrofluorocarbon phase-down schedules in the amendment proposals (decision Ex.III/1).
6. Dubai pathway on hydrofluorocarbons (decision XXVII/1).
7. Issues related to exemptions under Articles 2A–2I of the Montreal Protocol:
  - (a) Nominations for essential-use exemptions for 2017;
  - (b) Nominations for critical-use exemptions for 2017 and 2018.
8. Terms of reference for the study on the 2018–2020 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.
9. Report by the Technology and Economic Assessment Panel and the Scientific Assessment Panel on analysis of the discrepancies between observed atmospheric concentrations of and reported data on carbon tetrachloride (decision XXVII/7).
10. Proposal to establish an ad hoc standards coordination group (UNEP/OzL.Pro.WG.1/38/8, para. 92).
11. Compliance and data reporting issues: presentation on and consideration of the work and recommended decisions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol.
12. Membership of the Technology and Economic Assessment Panel.
13. Issues related to the phase-out of hydrochlorofluorocarbons (decision XXVII/5).
14. Availability of recovered, recycled or reclaimed halons (decision XXVI/7).
15. Other matters.

#### **D. Organization of work**

18. The parties agreed to follow their customary procedure and establish contact groups as necessary, endeavouring to limit the number of groups operating simultaneously to ensure the effective participation of small delegations with the exception of the budget committee, which would convene as necessary.

### **III. Administrative matters**

#### **A. Consideration of membership of Montreal Protocol bodies for 2017**

19. The Co-Chair requested regional groups to submit nominations to the Secretariat for positions in various bodies under the Montreal Protocol, including the officers of the Twenty-Eighth Meeting of the Parties, the co-chairs of the Open-ended Working Group and the members of the Executive Committee of the Multilateral Fund and the Implementation Committee under the Non-Compliance Procedure of the Montreal Protocol for 2017.

20. Subsequently, the Secretariat reported that it had received the names of the nominees for the 2017 membership of the Implementation Committee and the Executive Committee, as well as for the 2017 co-chairs of the Open-ended Working Group, and that the relevant draft decisions were included in the compilation of decisions for the parties' consideration and adoption during the high-level segment.

## **B. Financial report of the trust fund and budgets for the Montreal Protocol**

21. Introducing the item, the Co-Chair drew attention to the note by the secretariat on the proposed revision to the approved budget for 2016 and proposed budgets for 2017 and 2018 for the Trust Fund of the Montreal Protocol (UNEP/OzL.Pro.28/4) and the corrigendum (UNEP/OzL.Pro.28/4/Corr.1) and addendum (UNEP/OzL.Pro.28/4/Add.1) thereto. He noted that it had been the practice of the parties at past meetings to establish a budget committee to review budget-related documents and prepare one or more draft decisions on budgetary matters. In accordance with that practice, the parties agreed to establish an open-ended budget committee, coordinated by Mr. Ives Enrique Gomez Salas (Mexico) and Ms. Jean Clarke (Ireland), to agree on budgets for the Montreal Protocol trust fund and to prepare draft decisions on financial matters for the Protocol.

22. Subsequently, the co-chairs of the budget committee presented a draft decision on the financial report and budget of the trust fund for the Montreal Protocol, which the parties approved for consideration and adoption during the high-level segment.

## **IV. Report by the Technology and Economic Assessment Panel on updated and new information on alternatives to ozone-depleting substances (decision XXVII/4)**

23. Introducing agenda item 4, the Co-Chair recalled that in decision XXVII/4 the Meeting of the Parties had requested the Technology and Economic Assessment Panel to prepare a report for consideration by the Open-ended Working Group and an updated version of that report for consideration by the Twenty-Eighth Meeting of the Parties. A task force established by the Panel had presented its initial report at the thirty-seventh meeting of the Open-ended Working Group, in April 2016, and a revised report at the Working Group's thirty-eighth meeting, in July. The task force had then prepared a further update of the report, taking into account comments received at and after those meetings, for consideration by the Twenty-Eighth Meeting of the Parties. The executive summary of the report was set out in an addendum to the note by the Secretariat on the matters for discussion at the current meeting (UNEP/OzL.Pro.28/2/Add.1).

24. Ms. Bella Maranion, on behalf of the decision XXVII/4 task force and the other task force co-chairs, Mr. Lambert Kuijpers and Mr. Roberto Peixoto, and members of the task force Mr. Fabio Polonara, Mr. Ashley Woodcock and Ms. Helen Tope, gave a presentation on the updated report, which they said responded to comments made at the thirty-eighth meeting of the Open-Ended Working Group on high-ambient-temperature criteria and the mitigation scenarios and provided further information related to total, new manufacturing, and servicing demand and the availability of alternatives for foam-blowing, metered-dose inhalers and aerosols. A summary of the presentation, prepared by the presenters, is set out in section A of annex II to the present report.

25. The presentation was followed by a question and answer period on matters highlighted during the presentation or discussed in the report.

26. A number of representatives expressed a desire to see information on volumes of HFC consumption and production in countries, in addition to the aggregated data for Article 5 and non-Article 5 parties already provided by the report, particularly given that a very small number of countries were responsible for a high proportion of HFC production and consumption. Responding on behalf of the task force, Mr. Lambert Kuijpers, co-chair of the task force, explained that such information was not available and that even the aggregated data for Article 5 and non-Article 5 parties were subject to a degree of uncertainty. He also confirmed that the task force, in projecting future demand, had taken into account regulations in force in the United States and the European Union but had not considered regulations in any other country.

27. Responding to several questions about the cost and availability of alternatives, he explained that because so many of the alternatives to high-GWP HFCs had been developed only recently, and since many were still being further developed, their prices had not yet settled in the market. Some production capacity for some alternatives had been constructed, but it was still expanding and was also dependent on the rate of adoption of such alternatives. The situation was changing very rapidly, and although the range of prices for some alternatives was narrowing, prices were still not stable and it was very difficult to predict future developments with any degree of precision. He also confirmed that the costs of intellectual property rights had not been taken into account in the report; as with other issues, it was impossible to obtain accurate data on such costs. Similarly, the report did not provide details on the availability of alternatives in various regions; that information was in general not available, although he was aware that HFC surveys had been undertaken and that others were under way in a

number of developing countries. The report of the task force used the assumption that alternatives would be equally available in all countries, although the situation would be different in reality.

28. Mr. Woodcock added, in response to a question about the availability of alternatives for foams, that it was difficult to predict future developments. HFOs were currently more expensive than either HFCs or HCFCs, but it was quite likely that new blends would be developed that would offer improved performance at lower prices.

29. A number of representatives observed that while large companies were already adopting alternatives such as cyclopentane for foam-blowing, that option was not suitable for small and medium-sized enterprises, which were the bulk of companies in developing countries; that, they said, was a matter of considerable concern for the companies' economic viability. Mr. Kuijpers, expressing agreement and noting that flammability was also a concern for small and medium-sized enterprises, said in response that while HFOs were not yet affordable it was very likely that prices would fall in the future. In response to another question he said that it should be possible for technicians from different sectors, such as refrigeration and air-conditioning and foams, to be trained together in the application of alternatives.

30. Responding to a question about the availability of HFC-32, he confirmed that the substance was commercially available and was being widely considered and applied as an alternative to high-GWP HFCs. It was impossible, however, for the task force to comment on the availability of the substance and equipment that could use it in specific countries or regions because that depended on too many factors on which the task force had no information.

31. In response to a question about impediments to the adoption of alternatives to HFC-using metered-dose inhalers in developing countries, as mentioned in the report, Ms. Tope clarified that multi-dose dry-powder inhalers were more expensive than HFC-using metered-dose inhalers. Single-dose dry-powder inhalers, however, were cheaper and could be affordable even for low-income patients.

32. In response to a question about the feasibility of mitigation scenario 3 in the report, Mr. Kuijpers explained that the scenario had set 2020 as the date at which manufacturing of HFCs would begin to be converted; it was not a date for total phase-out of HFCs. It, like other scenarios, was designed to illustrate the impact of setting 2020 as the start of the conversion process, plus various timescales for completing the process. With regard to some requested clarifications related to the business-as-usual and other scenarios in the report, he suggested that bilateral discussion with the commenting party might be helpful.

33. Responding to a question about whether the report took account of HFC leakage rates, he explained that the figures had been calculated on the assumption that all HFCs produced would eventually be released into the atmosphere. He agreed, however, that the reduction of leakage through a variety of measures was important and should be looked at further.

34. Responding to a question about the publication of new standards by international organizations, he confirmed that the process was a time-consuming one. Three years should be regarded as the absolute minimum time required, but the process could take up to five years. In response to another question, he said that the Panel could not comment meaningfully on the sale in countries of air-conditioners that did not meet international standards; enforcing such standards was a matter for the importing and exporting countries.

35. In response to a question about the extent of the redesign needed to adapt equipment for use in high-ambient-temperature settings, he explained that it would involve some re-engineering and the use of some new or modified components; it was difficult to generalize, however, as the necessary redesign would vary from product to product. It was also difficult to estimate the impact of redesign on prices because it would vary by product and sub-sector and market volume; producing estimates would have required more time than had been available to the task force.

36. Ms. Maranion observed in conclusion that, while she understood parties' desire for comprehensive information before they made decisions, the Meeting of the Parties had historically of necessity adopted decisions based on only partial information and then adjusted the course as more information became available. In the current case, she noted, the Technology and Economic Assessment Panel could continue to update its reports on alternatives and their cost and availability, and the amendment proposals included provisions for the regular review of developing technologies.

37. Following the question-and-answer period, one representative said that some alternatives to high-GWP HFCs did not function well in tropical conditions, and he expressed the hope that the Technology and Economic Assessment Panel would be able to help parties choose suitable

alternatives. Another representative said that, while the mitigation scenarios presented in the report were very helpful and gave parties a clear idea of the kind of actions that would need to be taken, the lack of information on the cost and availability of alternatives, particularly for specific sub-sectors and regions, was a concern.

38. Another representative welcomed the new information contained in the report, particularly on foams and aerosols. While the adoption of hydrocarbons as foam-blowing agents presented challenges, he said, they also served as a good example of the potential for leapfrogging from HCFCs to non-HFC alternatives without using HFCs in the interim. Similarly, not-in-kind and low-GWP alternatives to HFC-using metered-dose inhalers were available, although they too posed challenges in some circumstances. Welcoming the information in the report on international standards processes, he added that there was a clear need to update standards to ensure that climate-friendly and economically viable alternatives, including flammable refrigerants, could be adopted more widely in all sectors in both non-Article 5 and Article 5 parties.

39. Another representative expressed the hope that in its future work the Panel would undertake research on the leakage of HFCs during manufacturing and maintenance, saying that it represented an important source of emissions. He also said that the Panel should look more closely at situations in which HFOs were the most appropriate and environmentally friendly alternatives to high-GWP HFCs, including their economic impact, particularly in developing countries.

40. The parties took note of the information presented, and it was agreed that interested parties would consult informally on the matter during the current meeting.

## **V. Report by the Technology and Economic Assessment Panel on assessment of the climate benefits and the financial implications for the Multilateral Fund of the hydrofluorocarbon phase-down schedules in the amendment proposals (decision Ex.III/1)**

41. Introducing the item, the Co-Chair recalled that in decision Ex.III/1 the Third Extraordinary Meeting of the Parties had requested the Technology and Economic Assessment Panel to prepare a report, for consideration by the Twenty-Eighth Meeting of the Parties, assessing the climate benefits and financial implications for the Multilateral Fund of the schedules for phasing down the use of HFCs included in the proposals to amend the Protocol in respect of HFCs. The Panel had established a working group on the issue, which had produced the report, the executive summary of which was reproduced in the addendum to the note by the Secretariat on the matters for discussion at the current meeting (UNEP/OzL.Pro.28/2/Add.1).

42. Ms. Bella Maranion and Mr. Lambert Kuijpers, co-chairs of the working group, then gave a presentation on the report, saying that it aimed to provide a clear definition of terms, to build on the accepted methodology used by the Panel in previous assessments for the business-as-usual and mitigation scenarios across various use sectors, and to provide an initial assessment of the potential benefits and costs of the amendment proposals. A summary of the presentation, prepared by the presenters, is set out in section B of annex II to the present report.

43. The presentation was followed by a question-and-answer period on matters highlighted during the presentation or discussed in the report.

44. Responding to a question, Mr. Kuijpers confirmed that the scenarios in the report assumed that all HFCs produced would eventually be emitted to the atmosphere. While it would be beneficial to develop various scenarios incorporating assumptions about rates of recovery and reuse, it would be complicated, requiring information about the capacity of individual parties to recover used HFCs.

45. In response to a question about the difference between “demand” and “consumption” in the report, he said that the Panel had used a bottom-up definition of demand, calculating the volume of HFCs likely to be needed to supply the volume of equipment projected to be in operation in each sector, which in turn would be influenced by estimates of growth in GDP and population. Consumption, as defined in the Montreal Protocol, would be greater because it would include among other things produced, used and stockpiled HFCs and any HFCs that leaked between production and use, but it was impossible for the Panel to estimate figures that included such factors. In general, the Panel had used the assumptions set out in its earlier reports on HFCs. Responding to a further question, he said that he thought the report's estimate of 2014 demand was accurate but that the Panel could look into it further.

46. Ms. Maranion confirmed, in response to questions, that the Panel had not taken into account the climate benefits of addressing the inadvertent production of HFC-23, acknowledging that several reports suggested that they might be significant. The Panel had also not included any estimates of the impact of an exemption for high-ambient-temperature countries, given that the details of any such exemption were still being discussed by parties. She also said, as suggested by one representative, that early action on the part of non-Article 5 parties would be helpful in promoting the development and uptake of climate-friendly alternatives to high-GWP HFCs. She also noted that the Panel had not considered the potential impact of countries increasing their production of HFCs in order to raise their baselines; as Mr. Kuijpers had explained, the Panel's calculations were based only on bottom-up estimates of demand.

47. In response to a question about the relatively small differences between the climate benefits of the non-Article 5 party phase-down schedules in the amendment proposals, Mr. Kuijpers said that it was a result of the scenarios running to 2050, well beyond the final phase-down date in all of the proposed amendments. The differences would be greater if a shorter time horizon were chosen.

48. Responding to a question about a recent report from the International Institute for Applied Systems Analysis (IIASA), he said that the Panel was aware of the report, and its much higher estimate of costs, but could not comment on it as it had been produced only very recently; the Panel would, however, study and consider its conclusions. He confirmed that the Panel's estimates of the costs to the Multilateral Fund included three elements: the cost of the conversion of equipment manufacturing, the cost of compensation for the closure of facilities and the cost of the servicing operation for HFC-using equipment. They did not, however, include the cost of disposing of old equipment, as such costs had not previously been financed by the Fund.

49. In response to another question Mr. Kuijpers said that, while it would be helpful to calculate the climate benefits of actions taken in particular regions, it would be an enormous task, requiring detailed information on each country. Ms. Maranion confirmed that in calculating climate benefits the Panel had adopted a relatively narrow definition that took into account only the reduction in demand for HFCs following from each of the amendment proposals, comparing it to a business-as-usual scenario.

50. Following the question-and-answer period several representatives said that while the report was valuable, the parties should be cautious in considering its projections of future demand, given the uncertainties over future developments.

51. One representative said that there was a major difference in the cumulative climate benefits of the four amendment proposals, amounting to more than 50 gigatonnes of carbon dioxide equivalent, and that the difference depended primarily on when the proposed phase-downs were to begin. In addition, he said, the report's treatment of the Indian proposal, which assumed that no interim phase-down steps for Article 5 parties would be agreed on before 2050, was perhaps unrealistic because the intention was to agree to interim reduction steps; had such steps been taken into account, the projected climate benefits flowing from the proposal would have been higher. He also said that, while the estimates of costs to the Multilateral Fund were very helpful, other cost categories such as capacity-building, institutional strengthening and project preparation also needed to be taken into account. In addition, he said, any projection spanning 30 or 40 years was uncertain, but once an amendment had been adopted, costs would be re-evaluated every three years in the context of the replenishment of the Fund. Suggestions, in the recent IIASA report, that cumulative costs were higher than the Panel had estimated were not necessarily correct; although the environmental benefits clearly were cumulative, much of the costs would be in the form of one-off capital costs of conversion. He looked forward, he said, to discussing the issue further.

52. The representative of the European Union said that the Panel's report underestimated the climate benefits of his party's proposed amendment, and overestimated the costs, by assuming that no interim phase-down steps for Article 5 parties would be agreed and that all of the phase-down would be accomplished in the last year, before 2050. The proposal was clear that interim steps would be agreed no later than 2020. In addition, the basket approach of the proposed amendment would encourage leapfrogging of technologies. More broadly, he said, a long conversion period would result in higher demand for HFCs and a long servicing tail. A delay of five years in starting the phase-down, according to the Panel, would double the climate impact by 2030. Had these matters been taken into account in the report, it would have predicted greater climate benefits and lower costs flowing from the amendment proposed by the European Union.

53. Several representatives, while thanking the Panel for its hard work, said that the report was not comprehensive enough to allow the Parties to reach firm decisions. By focusing only on the climate benefits and costs to the Multilateral Fund, it ignored elements such as the cost, effectiveness,

availability and safety of alternatives, which were crucial issues that had to be taken into account, particularly for developing countries with fragile economies.

54. One representative said that the cost-effectiveness figures used by the Panel, which were based on those adopted by the Executive Committee of the Multilateral Fund for the second stage of the HCFC phase-out, were not necessarily applicable to the first stage of HFC phase-down. Even the figures used for HCFC phase-out had been shown to underestimate the real costs faced by companies converting to alternatives. It was essential to have detailed information on the costs of the alternatives to high-GWP HFCs, on a regional basis, before parties could understand the impacts of the amendment proposals on their own economies and on the Fund.

55. Other representatives drew attention to the importance of issues such as the costs of disposal of HFCs and of HFC-using equipment that would need to be replaced, the impact of HFC phase-down on small and medium-sized enterprises, energy efficiency, the costs faced by countries importing alternatives, and the needs and concerns of low-volume-consuming countries. The process of replacing high-GWP HFCs had to be sustainable for industry in developing countries as well as for the environment.

56. Other representatives, however, argued that the report provided sufficient information at the current stage to allow the amendment proposals to be discussed in full. Most significantly, the report made clear that an early freeze date with reasonable baselines would increase the climate benefits of an amendment while reducing its costs to the Multilateral Fund. The costs to the Fund of the amendment proposals differed by a factor of three, with the amendments with later phase-down start dates costing more. While full information on the costs of alternatives was of course important, the figures included in the report covered all the key sectors and provided enough detail for a broad understanding of the impacts and costs of each amendment proposal. Further information on the alternatives would emerge as non-Article 5 parties began to phase down high-GWP HFCs and as the Executive Committee started to prepare guidelines, but the report provided an adequate starting point.

57. The parties took note of the information presented.

## **VI. Dubai pathway on hydrofluorocarbons (decision XXVII/1)**

58. Introducing the item, the Co-Chair of the Open-Ended Working Group recalled that in accordance with paragraph 4 of decision XXVII/1, on the Dubai pathway, a series of Open-ended Working Group meetings and the Third Extraordinary Meeting of the Parties had been convened “to work ... to an HFC amendment in 2016 by first resolving challenges by generating solutions in the contact group on the feasibility and ways of managing HFCs”. The thirty-seventh, the resumed thirty-seventh and the thirty-eighth meetings of the Open-Ended Working Group had culminated in decisions by the Third Extraordinary Meeting of the Parties, in Vienna in July 2016, while the resumed thirty-eighth meeting of the Open-Ended Working Group had been held immediately prior to the current meeting.

59. At the suggestion of the Co-Chair, the Meeting of the Parties decided to reconvene the previously established contact group on the feasibility and ways of managing HFCs, which would continue to be co-chaired by Mr. Patrick McInerney (Australia) and Mr. Xia Yingxian (China). Subsequent discussions under this agenda item took place during the high-level segment (see paras 194–196).

## **VII. Issues related to exemptions under Articles 2A–2I of the Montreal Protocol**

### **A. Nominations for essential-use exemptions for 2017**

60. Introducing the sub-item, the Co-Chair recalled that in 2016 only one party, China, had submitted an essential-use exemption nomination for 2017, which related to the use of 65 tonnes of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water. The Open-ended Working Group at its thirty-eighth meeting had heard a presentation from the Technology and Economic Assessment Panel and its Medical and Chemical Technical Options Committee in which the Panel had recommended approval of China's nomination. At the same meeting, China had submitted a draft decision on the nomination, which it had subsequently revised taking into account plenary and informal discussions during the meeting of the Working Group. The revised draft decision (UNEP/OzL.Pro.28/3, sect. II, draft decision XXVIII/[A]) was before the Twenty-Eighth Meeting of the Parties for its consideration.

61. Following that introduction the parties approved the draft decision for consideration and adoption during the high-level segment.

## **B. Nominations for critical-use exemptions for 2017 and 2018**

62. Introducing the sub-item, the Co-Chair recalled that in 2016 five parties had submitted eight nominations for critical-use exemptions for methyl bromide for 2017 and 2018. He further recalled that the Open-ended Working Group, at its thirty-eighth meeting, had heard a presentation from the Technology and Economic Assessment Panel and its Methyl Bromide Technical Options Committee on their initial evaluation of, and interim recommendations regarding, the nominations. Since that time, the Committee had received additional information from, and held bilateral discussions with, some of the nominating parties, and had finalized its report and recommendations on the basis of those discussions and information.

63. Mr. Ian Porter, Mr. Mohammed Besri and Ms. Marta Pizano, co-chairs of the Methyl Bromide Technical Options Committee, gave a presentation on the Committee's final recommendations for critical-use nominations for methyl bromide, as well as two emergency-use nominations for the chemical submitted by Israel and Jamaica, respectively. A summary of the presentation prepared by the presenters is set out in section C of annex II to the present report.

64. Following the presentation, representatives requested clarification on certain issues and made statements in respect of the recommendations and the continued use of methyl bromide in accordance with critical-use exemptions. All who spoke expressed appreciation to the Methyl Bromide Technical Options Committee for the presentation and its evaluation of critical-use exemptions submitted in 2016 and in previous years.

65. Expressing concern that a number of parties, in particular those not operating under Article 5, continued to use methyl bromide for soil treatment and that emergency uses might be subject to abuse by parties, one representative queried whether the Committee had a sense of when parties would stop using methyl bromide and whether uses could be limited to quarantine and pre-shipment applications only.

66. Mr. Porter responded that while it was very hard for the Committee to make such a prediction, all the nominating parties had indicated their desire to phase out the use of methyl bromide, and it was the Committee's hope that that could be achieved within the following few years. Asked whether the Committee's evaluation was based solely on the availability of alternatives or had also taken into account the concerns of farmers, Mr. Porter said that the Committee had taken account of technical and socioeconomic issues, including the needs of farmers and relevant industries, that the nominating parties had referred to in their nominations.

67. One representative asked whether quarantine and pre-shipment uses of methyl bromide should not be eliminated, saying that it was his understanding that such applications could be classified as critical-use exemptions and thus created an opportunity for parties to increase their consumption of methyl bromide. Ms. Pizano said in response that the Committee had in past years reviewed alternatives to methyl bromide for quarantine and pre-shipment uses and had found that approximately 35 to 40 per cent of such uses could be replaced.

68. Two representatives commended those parties that had not submitted critical-use nominations or that had requested exemptions for reduced amounts of methyl bromide in 2016.

69. The representative of South Africa recalled that his country's nomination for a critical-use exemption for methyl bromide for structures and mills for 2017 was only its second and that, as had been the case in 2016, the Methyl Bromide Technical Options Committee had recommended that South Africa be granted exemptions for smaller amounts than it had sought. He expressed appreciation to the Committee, however, for revising upward the amounts recommended in its interim report in view of additional information submitted by South Africa after the thirty-eighth meeting of the Open-ended Working Group. While the situation had not changed since 2016, the Ministry of Agriculture was working with industry to expedite the registration of sulfur dioxide and other alternatives to methyl bromide despite continued challenges associated with obtaining all the information needed to complete such registrations. South Africa was also working to implement the Committee's recommendations regarding dosage and frequency of methyl bromide applications but faced a number of difficulties associated with its climatic and socioeconomic circumstances, including that most of its mills were very old and had wooden floors, which made them prone to pests. In summary, even though they might jeopardize its economy and food security, South Africa had accepted and would work to implement the Committee's recommendations but might need to submit critical-use nominations for structures and mills for 2018.

70. The representative of Canada said that during the thirty-eighth meeting of the Open-ended Working Group representatives of Canada had met with members of the Committee to clarify a number of issues regarding the country's research programme on alternatives to methyl bromide and, following the meeting, had also provided additional information to the Committee regarding its nomination. Canada would continue to provide information to the Committee on its research programme, which was moving forward, and would continue its efforts to eliminate critical uses of methyl bromide.

71. The representative of Australia expressed appreciation to the Committee for its final recommendation on Australia's nomination for 2018; Australia accepted the Committee's conclusion that alternatives to methyl bromide for the production of strawberry runner nucleus and foundation stocks were available and would implement them by 2018. He also said that Australia's research programme was comprehensive and was making good progress in finding alternatives with the aim of delivering healthy and disease-free strawberry runners; provided that the programme was successful, the country would phase out methyl bromide in its strawberry runner industry in 2019.

72. Two representatives, including one speaking on behalf of a group of parties, commended Australia for its commitment to phasing out methyl bromide for strawberry runners by 2019. Drawing attention to the report of the Committee and to statements by some of the nominating parties, the representative speaking on behalf of a group of parties said that those countries were pleased to learn that work would continue in Canada on the development of alternatives to methyl bromide, including through trials that, it was hoped, would eliminate the need for future critical-use exemptions, and that the country would share the results of that work with the Committee; that 2018 would be last year that China would submit a critical-use nomination for methyl bromide and that the country had submitted a national management plan to the Committee, which other Article 5 parties were invited to do as soon as possible; and that South Africa was working to fast-track the registration of alternatives to methyl bromide.

73. Another representative requested additional information on the need for South Africa's use of methyl bromide in structures and mills, saying that many alternatives were available for such applications.

74. Regarding quarantine and pre-shipment uses, one representative, speaking on behalf of a group of countries, expressed satisfaction that, as indicated in the note by the Secretariat on the matters for discussion at the current meeting (UNEP/OzL.Pro.28/2/Add.1), India planned to start reporting on its use of methyl bromide in quarantine and pre-shipment applications. The parties, he said, must further examine alternatives to methyl bromide for quarantine and pre-shipment applications if they were to get the substance fully under control under the Montreal Protocol.

75. Following the discussion, the Co-Chair suggested that the representative who had proposed that quarantine and pre-shipment uses of methyl bromide be eliminated might wish to consider presenting a proposal to that effect for consideration by the Meeting of the Parties at a future meeting.

76. The parties agreed to establish an informal group of interested parties to further discuss the critical-use nominations and the recommendations of the Methyl Bromide Technical Options Committee with a view to producing a draft decision on the nominations for consideration by the Meeting of the Parties. It was also understood that interested parties might consult informally regarding the nominations.

77. Subsequently the representative of Australia, speaking also on behalf of Argentina, Canada, China and South Africa, introduced a draft decision reflecting the outcome of the informal consultations.

78. After further consultations, the representative of Australia introduced a revised draft decision reflecting the outcome of those further consultations. The parties then approved the revised draft decision for consideration and adoption during the high-level segment.

## **VIII. Terms of reference for the study on the 2018–2020 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol**

79. Introducing the item, the Co-Chair said that in accordance with the three-year funding cycle of the Multilateral Fund the parties needed, during the current year, to develop and adopt terms of reference for a study designed to estimate the funds necessary to enable Article 5 parties to achieve compliance during the 2018–2020 replenishment period. He recalled that, at the thirty-eighth meeting of the Open-ended Working Group, a contact group, co-chaired by Mr. Philippe Chemouny (Canada)

and Mr. Obed Baloyi (South Africa), had been established to develop those terms of reference. The current text of the terms of reference was set out in the annex to document UNEP/OzL.Pro.28/2.

80. The parties decided that the contact group established at the thirty-eighth meeting of the Open-ended Working Group would reconvene to continue the discussion of the matter at the current meeting.

81. The co-chair of the contact group subsequently introduced a draft decision on the matter prepared by the contact group, which he orally revised to correct a typographical error. The Meeting of the Parties then approved the draft decision for consideration and adoption during the high-level segment.

## **IX. Report by the Technology and Economic Assessment Panel and the Scientific Assessment Panel on analysis of the discrepancies between observed atmospheric concentrations of and reported data on carbon tetrachloride (decision XXVII/7)**

82. Introducing the item, the Co-Chair recalled that by decision XXVII/7 the Parties had reiterated their concern about the observed discrepancies between atmospheric concentrations and reported data on carbon tetrachloride and had requested the Technology and Economic Assessment Panel and the Scientific Assessment Panel to continue their analysis of the matter and to present a report on their findings at the current meeting. As had been agreed at the thirty-eighth meeting of the Open-ended Working Group, that report would take into account a recent report by the World Climate Research Programme under its Stratosphere-Troposphere Processes and Their Role in Climate (SPARC) project, entitled "The mystery of carbon tetrachloride". The report of the assessment panels had been issued as volume 4 of the September 2016 report of the Technology and Economic Assessment Panel.

83. Mr. Paul A. Newman, co-chair of the Scientific Assessment Panel, and Ms. Helen Tope, co-chair of the Medical and Chemical Technical Options Committee, gave a presentation on the report. Mr. Newman said that the decline in carbon tetrachloride emissions resulting from control measures instituted following the ratification of the Montreal Protocol had been less than projected, leading to the conclusion that additional emissions had been occurring. The SPARC report had identified four main emission pathways: legacy emissions, for example from landfills containing discarded carbon tetrachloride; unreported inadvertent emissions from other sources; unreported non-feedstock emissions; and fugitive emissions from incineration, feedstock uses and process agent uses. The new emissions estimates for those pathways in the report had assisted in narrowing the discrepancy between bottom-up estimates and top-down emission calculations for carbon tetrachloride. Continuing the presentation, Ms. Tope said that further research was needed in order to tighten observation-derived top-down emissions estimates and that there was a need to develop improved methodologies for estimating bottom-up carbon tetrachloride emissions. In conclusion, she presented several recommendations, including the establishment of a working group or the holding of a workshop under the aegis of the assessment panels to further investigate the matter; and forwarding the "research direction suggestions" of the SPARC report to the Ozone Research Managers of the Vienna Convention for their consideration and evaluation.

84. In the ensuing discussion a number of representatives welcomed the report of the assessment panels. One representative, speaking on behalf of a group of parties, said that there were still gaps, for example with regard to leakage of carbon tetrachloride that might occur during transport and storage or as a consequence of the diversion of the chemical from feedstock, process agent or laboratory and analytical uses to other uses. Another representative expressed concern that carbon tetrachloride emissions remained a large contributor to the destruction of the ozone layer. Several representatives welcomed the suggestion that the Ozone Secretariat forward research suggestions from the SPARC report to the Ozone Research Managers, although one said that, given current budgetary limitations, additional activities should be undertaken only if they did not have significant budgetary implications.

85. Responding to the matters raised, Mr. Newman said that the estimates in the report did in fact take into account leakage from transport and storage, which had been estimated at 4 to 5 per cent of the estimated amount being transported. They did not, however, include the diversion of carbon tetrachloride from feedstock, process agent or laboratory and analytical uses to other uses, because there were no available data on that. Available data, from observations at disparate sites around the globe used to measure broad regional values, indicated that most emissions came from industrial regions rather than population centres, but it was not possible to identify specific emissions sources.

86. The parties took note of the information presented.

## **X. Proposal to establish an ad hoc standards coordination group (UNEP/OzL.Pro.WG.1/38/8, para. 92)**

87. Introducing the item, the Co-Chair recalled that at the thirty-eighth meeting of the Open-ended Working Group China had introduced a conference room paper containing a draft decision on the establishment of an ad hoc standards coordination group with the aim of improving coordination with relevant international and regional standards bodies on the revision and updating of international and regional safety standards relevant to the use of alternative substances. The Working Group had agreed to forward the revised draft decision for consideration by the Meeting of the Parties at the current meeting. The draft decision was set out in document UNEP/OzL.Pro.28/3, sect. II, (draft decision XXVIII/[B].)

88. The representative of China said that several parties had indicated they would discuss the matter with standards organizations in their own countries and provide feedback at the current meeting. Several representatives, including one speaking on behalf of a group of countries, said that the issue was an important one of relevance to the discussions on the proposed amendment to the Protocol and that they wished to discuss it further.

89. It was agreed that interested parties would meet to discuss the matter informally and report to the Meeting of the Parties on the outcome of their discussions.

90. Following informal consultations and discussions among interested parties, China subsequently introduced a modified version of the draft decision on the matter and the Meeting of the Parties approved the draft decision for consideration and adoption during the high-level segment.

## **XI. Compliance and data reporting issues: presentation on and consideration of the work and recommended decisions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol**

91. The President of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol, Mr. Iftikhar ul-Hassan Shah (Pakistan), presented a report on the outcomes of the fifty-sixth and fifty-seventh meetings of the Committee, providing an overview of the three draft decisions that the Committee had approved for consideration by the Twenty-Eighth Meeting of the Parties and summarizing the other issues that the committee had considered during the year. He observed that the work of the Committee at the two meetings had been lighter than in the recent past, which was attributable to the high level of compliance by parties with their obligations under the Montreal Protocol.

92. Turning to the draft decisions, he said that the first related to Israel's non-compliance with its data and information reporting obligations in respect of its use of ozone-depleting substances as process agents in 2014 and 2015, as required under paragraph 4 (a) of decision X/14, as updated by decision XXIII/7, and the measures it had in place to avoid the diversion to unauthorized uses of 17.3 ODP-tonnes of excess production of bromochloromethane stockpiled in 2014, as required by paragraph 3 of decision XXII/20. The party had not responded to the Committee's recommendations that it provide the outstanding information and was requested in the draft decision to do by 31 March 2017.

93. The second draft decision, on data and information provided by the parties in accordance with Article 7 of the Montreal Protocol, addressed the key obligation to report annual production and consumption data of ozone-depleting substances under article 7 of the Protocol. Of 197 parties, 8 had not reported such data for 2015 by the time the Committee had considered the issue at its fifty-seventh meeting. The Central African Republic, Hungary, Israel, Latvia, Romania and Uzbekistan, however, had subsequently submitted their data. Thus, 195 of 197 parties had by the time of the current meeting reported their production and consumption data for 2015, a figure comparable to the 193 parties that had reported their data for the previous year by the time of the Twenty-Seventh Meeting of the Parties. The draft decision urged the two parties that had not submitted their data – Iceland and Yemen – to report it and thereby return to compliance. He also reported that, in accordance with decision XV/15, 119 parties had reported their 2015 data by 30 June 2016, representing a significant improvement on the 84 that had done so by the same date for the previous year. The Committee had therefore been able to review the compliance status of those parties early, completing a significant portion of its work in the middle of the year at the fifty-sixth meeting. During the two meetings, the Committee had also reviewed the situation of non-compliance with data-reporting obligations by the Democratic Republic of the Congo, Dominica, Somalia and Yemen, which had not reported article 7 data for 2014 by the

time of the Twenty-Seventh Meeting of the Parties. In accordance with decision XXVII/9, those parties had since submitted their outstanding data, which confirmed that those Parties were in compliance with the control measures for 2014.

94. The third decision related to Guatemala's non-compliance with its commitment – in its plan of action in decision XXVI/16 – to reduce its consumption of HCFCs to no more than 4.35 ODP-tonnes in 2014; its 2014 consumption of 4.74 ODP-tonnes placed it in non-compliance, but the party had returned to compliance in 2015. The draft decision noted that fact with appreciation and urged the party to work with the relevant implementing agencies to implement the remainder of its plan of action in decision XXVI/16.

95. He also noted that the Committee had continued to closely monitor the return to compliance of parties previously found to be in non-compliance, and he reported that all save one had complied with their obligations for 2015. In response to decision XXIV/14, in which parties were requested to specify zero quantities in their Article 7 data reporting forms rather than leaving cells blank, all parties failing to do so for 2014 had responded to the secretariat's request for clarification on the matter, while for 2015 a small number of parties had yet to provide such clarification. The practice of leaving cells blank raised questions with regard to data, and the Committee therefore urged all parties to enter a number in each cell in data reporting forms rather than leaving them blank. The Committee would continue to keep the matter under review.

96. At its fifty-sixth meeting, he added, the Committee had also considered the establishment of a licensing system by South Sudan. The Committee had noted with appreciation the party's efforts to that end and congratulated it on the establishment and operation of such a system. Lastly, Fiji had recently submitted a request for a change in its baseline data for HCFC consumption. The Committee had noted with appreciation the participation by the representative of the party at its fifty-seventh meeting to provide information, but in view of the late submission of the request and the large volume of information to be considered, the Committee had agreed to defer consideration of the matter to its fifty-eighth meeting.

97. In closing, he reiterated the observations of many of his predecessors that the ozone community had built a compliance regime that was widely respected and regarded as a model to be emulated. While 2015 had been expected to be a challenging year – with a 10 per cent step-down target for Article 5 parties and a 90 per cent target for non-Article 5 parties – the small number of cases of non-compliance testified to the commitment of parties to meet their obligations under the Protocol. He expressed confidence that with the support of the parties the Committee would continue to provide the necessary support, noting that its work was greatly assisted by the participation of representatives of the Multilateral Fund and the implementing agencies, whose hard work with Article 5 parties to ensure that they remained compliant was deeply appreciated. He also expressed appreciation to the Ozone Secretariat and all his colleagues on the Committee.

98. The parties agreed to forward the draft decisions from the Implementation Committee for consideration and adoption during the high-level segment.

## **XII. Membership of the Technology and Economic Assessment Panel**

99. Introducing the item, the Co-Chair said that information on the membership of the Technology and Economic Assessment Panel and its technical options committees had been included in volume 1 of the Panel's June 2016 progress report. An updated table listing the co-chairs and members whose membership would expire in 2016 was set out in the addendum to the note by the secretariat on matters for discussion at the current meeting (UNEP/OzL.Pro.28/2/Add.1, annex III), and the parties needed to elect their successors taking into account the expertise required and the need for gender and geographical balance. Nominations had so far been received from two parties: Brazil had nominated Mr. Paulo Altoé, currently a member of the Flexible and Rigid Foams Technical Options Committee, to serve as the committee's co-chair and as a member of the Technology and Economic Assessment Panel, and India had nominated Mr. Rajendra Shende to serve as a senior expert member of the Panel. He requested interested parties, led by India and Brazil, to discuss the matter in the margins of the current meeting and to submit a draft decision for consideration and possible adoption by the Twenty-Eighth Meeting of the Parties.

100. Following the discussions among interested parties the Meeting of the Parties approved a draft decision containing two more names on the matter for consideration and adoption during the high-level segment. The fifth name was added to the draft decision during the adoption of the decision.

### **XIII. Issues related to the phase-out of hydrochlorofluorocarbons (decision XXVII/5)**

101. Introducing the item, the Co-Chair recalled that at the thirty-eighth meeting of the Open-ended Working Group the Technology and Economic Assessment Panel had presented a report that responded to decision XXVII/5, concluding that there was some uncertainty about the need for HCFCs for essential uses after 2020, for servicing existing refrigeration and air-conditioning equipment by non-Article 5 parties and for production to cover the basic domestic needs of Article 5 parties. The Working Group had requested the Panel to continue its work on the matter and had agreed that any interested parties that had developed relevant proposals could submit them for consideration at the current meeting.

102. In the ensuing discussion, one representative said that a small group of interested parties had discussed the matter informally at the thirty-eighth meeting of the Open-ended Working Group and intersessionally and intended to submit a conference room paper requesting the Panel to provide additional information to the parties on the need for HCFCs for the uses identified. Another representative said that discussions at the thirty-eighth meeting on the linkages between the HCFC phase-out and the HFC phase-down had resulted in an agreed text of relevance to the calculation of future HCFC needs, and that the agreed text should be reflected in any future report on the matter.

103. Subsequently, the representative of Canada presented a draft decision submitted by Australia, Canada, Japan and the United States of America. She recalled that by paragraphs 12–14 of decision XIX/6 the Meeting of the Parties had agreed to continue consideration of whether there was a continuing need for HCFCs for essential uses after 2020, for servicing existing refrigeration and air-conditioning equipment by non-Article 5 parties and for production to cover the basic domestic needs of Article 5 parties and that by decision XXVII/5 it had requested the Technology and Economic Assessment Panel to provide information to the parties on those issues. The draft decision requested the Panel to continue to consider those issues and to report on the matter to the Open-ended Working Group in 2017.

104. In the ensuing discussion, a number of parties asked for clarification on certain aspects of the proposed draft decision. One representative, supported by others, asked whether non-Article 5 parties would need to continue production of HCFCs after 2020 or whether basic domestic needs could be met by HCFCs produced in Article 5 parties. Several representatives said that greater clarity was needed in the terminology used in the draft decision, for example with regard to the monitoring of HCFC production by the Panel. One representative said that it was important to take the necessary regulatory measures to ensure a continued supply of ozone-depleting substances for laboratory and analytical uses.

105. Responding to the issues raised, the representative of Australia said that the draft decision merely continued the activities called for in decision XXVII/5, in which the Meeting of the Parties had requested the Panel to undertake the work outlined in the draft decision. The draft decision simply aimed to provide for the gathering of information to guide the parties in their further decision-making about the continued need for HCFCs for essential uses for non-Article 5 parties, as well as servicing requirements other than in the air-conditioning and refrigeration sectors for non-Article 5 parties and to meet the basic domestic needs of Article 5 parties after 2020.

106. The parties agreed that interested parties would discuss the matter informally and report to the Meeting of the Parties on the outcome of those discussions.

107. Following the discussions among interested parties the Meeting of the Parties approved a draft decision on the matter for consideration and adoption during the high-level segment.

### **XIV. Availability of recovered, recycled or reclaimed halons (decision XXVI/7)**

108. Introducing the item, the Co-Chair recalled that the availability of recovered, recycled or reclaimed halons had been discussed at the thirty-eighth meeting of the Open-ended Working Group, as summarized in document UNEP/OzL.Pro.28/2. No specific proposals on the matter, however, had been submitted by parties.

109. In the absence of any proposals at the current meeting, the item was not considered further.

## **XV. Other matters**

### **Financial and technical assistance under the Multilateral Fund**

110. The representative of the United Arab Emirates reported that his country would introduce a draft decision for discussion at Montreal Protocol meetings in 2017. His country, he said, had been among the first to ratify the Vienna Convention and Montreal Protocol, had been active in timely phasing out of ozone-depleting substances and had ratified all the amendments to the Protocol. It had achieved all that without receiving financial or technical assistance from the Multilateral Fund, despite being eligible for such assistance under Articles 5 and 10 of the Protocol. The party was proud to have hosted the Twenty-Seventh Meeting of the Parties, at which the Dubai pathway had been adopted. It fully supported the phase-down of HFCs but feared that such a phase-down would pose additional challenges beyond the original scope of the Montreal Protocol and that it, as a high-ambient-temperature country, would be particularly affected. His country would be unable to meet those challenges by itself, and he therefore wished to discuss its eligibility for technical and financial assistance during the meetings in 2017.

111. A number of other representatives said that the issue was an important one affecting the United Arab Emirates.

112. It was agreed that the statement of the representative of the United Arab Emirates would be reflected in the present report and that the matter would be included on the agenda for the next meeting of the Open-Ended Working Group.

## **Part two: High-level segment (13 and 14 October 2016)**

### **I. Opening of the high-level segment**

113. The high-level segment of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol was opened at 10.05 a.m. on Thursday, 13 October 2016, by Ms. Lucie Desforges (Canada), President of the Bureau of the Twenty-Seventh Meeting of the Parties.

114. Opening statements were delivered by Mr. Paul Kagame, President of Rwanda; Mr. Erik Solheim, Executive Director of the United Nations Environment Programme (UNEP); and Ms. Desforges.

#### **A. Statements by representative(s) of the Government of Rwanda**

115. In his address, Mr. Kagame said that the parties to the Montreal Protocol were on the cusp of momentous progress and had an opportunity to take a major step forward in addressing climate change by taking meaningful action on hydrofluorocarbons (HFCs). He urged the parties to be ambitious: recalling that in the space of a single generation the Montreal Protocol had helped to reverse the damage to the ozone layer caused by human activity while economic prosperity and well-being had expanded worldwide, he said that the faster HFCs were phased down the safer and more prosperous the world would be; an ambitious HFC amendment would not compromise social and economic progress, and indeed would promote it. Conversely, the longer action was delayed, the greater the cost and the impact on the environment and on future generations would be.

116. While the responsibility to phase down HFCs lay not just with Governments but also with scientists and the private sector, it was up to Governments to provide incentives and support action by the latter, including by sending clear signals that change was imminent and thereby prompting innovation and the development of new products that would enable an increasingly rapid and cost-effective phase-down. In addition, it was important that adequate funding be available to drive the energy efficiency agenda forward, as enormous gains could also be made by improving the energy efficiency of appliances. In closing, he invited the parties to work together in a spirit of cooperation and mutual respect to find solutions to all outstanding issues and to make history in Kigali by adopting an agreement that would inject new energy into the Paris Agreement and increase people's confidence in the ability of the international community to address climate change and other urgent matters effectively.

#### **B. Statement(s) by representative(s) of the United Nations Environment Programme**

117. In his opening remarks, the Executive Director commended the President of Rwanda for the transformation of Kigali over the previous two decades into one of the cleanest, most effective cities in Africa at a time when millions of Rwandans had been lifted out of poverty. Noting that he had

travelled to India the previous week to celebrate the announcement by the Prime Minister of India that that country would ratify the Paris Agreement on climate change on the birthday of Mahatma Gandhi, which together with similar announcements by other world leaders suggested that the Paris Agreement would enter into force in 2016, he invited the parties to the Montreal Protocol to follow Gandhi's non-violent but firm approach to tackle the challenges that they faced and to "be the change" that they wished to effect. The Montreal Protocol demonstrated that Governments could be courageous and take the actions that were necessary to deal with major environmental, developmental and other challenges. Recalling the history of the Protocol, dating to the discovery of the threat to the ozone layer by scientists Mario Molina and Sherwood Rowland and, after initial scepticism by the larger scientific community and the chemical industry, action by world leaders to adopt the most successful multilateral agreement in history, he urged the parties to build on the success of the Protocol and to follow the "spirit of Montreal" that had enabled its adoption in 1987.

118. That spirit, he said, encompassed an understanding by all parties that only together could they find solutions to the pressing environmental, developmental and other challenges that they faced; that economies and technologies could be rapidly transformed and make climate change an opportunity for sustainable development; that each party must be flexible and examine its own position to explore how it could move closer to the positions of others and make the compromises necessary for bold action; and that their actions had an impact on people and therefore must be ambitious. In closing, he expressed the hope that the parties would follow the spirit of Montreal and reach an agreement on HFCs at the current meeting; as HFCs were one of the "lowest-hanging fruits" of climate action, it would be unforgivable for them not to pick them in Kigali.

### **C. Statement by the President of the Twenty-Seventh Meeting of the Parties to the Montreal Protocol**

119. In her opening remarks, Ms. Desforges expressed appreciation to all those who had actively participated in the various Montreal Protocol meetings that had taken place during the course of 2016 to address the key issue on the agenda for the current meeting, the Dubai pathway on hydrofluorocarbons, under which the parties were required to work towards an amendment to the Montreal Protocol in 2016 to phase down the production and consumption of HFCs. The issue of HFCs had been on the agenda of the Montreal Protocol for seven years, and the parties had devoted a great deal of time and resources to it with the aim of protecting the global climate and ozone layer through an agreement that worked for all parties. Stressing that the world was looking for them to reach an agreement on HFCs at the current meeting, she said that the time had come for the parties to deliver on what they had agreed to in Dubai and to phase down HFCs under the Montreal Protocol.

## **II. Organizational matters**

### **A. Election of officers of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol**

120. 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 Twenty-Eighth Meeting of the Parties to the Montreal Protocol:

President:	Mr. Vincent Biruta (Rwanda) (African States)
Vice-Presidents:	Mr. Andrei Pilipchuk (Belarus) (Eastern European States)
	Mr. Elías Gómez Mesa (Dominican Republic) (Latin American and Caribbean States)
	Mr. Abdulbasit S. Sairati (Saudi Arabia) (Asian-Pacific States)
Rapporteur:	Mr. Mikkel Sorensen (Denmark) (Western European and other States)

### **B. Adoption of the agenda of the high-level segment of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol**

121. The following agenda for the high-level segment was adopted on the basis of the provisional agenda contained in document UNEP/OzL.Pro.28/1:

1. Opening of the high-level segment:
  - Statements by representative(s) of the Government of Rwanda;

Statements by representative(s) of the United Nations Environment Programme;

Statement by the President of the Twenty-Seventh Meeting of the Parties to the Montreal Protocol.

2. Organizational matters:
  - (a) Election of officers for the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;
  - (b) Adoption of the agenda of the high-level segment of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;
  - (c) Organization of work;
  - (d) Credentials of representatives.
3. Presentations by the assessment panels on progress in their work and any emerging issues.
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 Twenty-Eighth Meeting of the Parties.
7. Dates and venue for the Twenty-Ninth Meeting of the Parties to the Montreal Protocol.
8. Other matters.
9. Adoption of decisions by the Twenty-Eighth Meeting of the Parties to the Montreal Protocol.
10. Adoption of the report.
11. Closure of the meeting.

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

122. The parties agreed to follow their customary procedures. In addition, they agreed to convene ministerial round-table discussions on addressing the remaining negotiation issues and ensuring benefits for all in connection with an HFC amendment to the Montreal Protocol.

### **D. Credentials of representatives**

123. The Bureau of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol approved the credentials of the representatives of 98 of the 146 parties represented at the meeting. The Bureau provisionally approved the participation of 48 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 full participation in the meetings of the parties, including with regard to the right to vote.

## **III. Presentations by the assessment panels on progress in their work and any emerging issues**

124. Mr. David Fahey, Mr. Bonfils Safari and Mr. Paul A. Newman, three of the four co-chairs of the Scientific Assessment Panel, gave a presentation on the Panel's plans for the 2018 scientific assessment of ozone depletion and summaries of the current science and emerging science issues. A summary of the presentation, prepared by the presenters, is set out in section E. 1. of annex II to the present report.

125. Ms. Janet Bornman and Mr. Nigel Paul, two of the three co-chairs of the Environmental Effects Assessment Panel, gave a presentation on the potential areas of focus of the 2018 assessment of the environmental effects of ozone depletion and its interaction with climate change, including effects on human health and related economic impacts, aquatic ecosystems, terrestrial ecosystems, ground-level ozone and materials. A summary of the presentation, prepared by the presenters, is set out in section E. 2. of annex II to the present report.

126. Mr. Ashley Woodcock, one of the three co-chairs of the Technology and Economic Assessment Panel, gave a presentation on the progress of the Panel's work and emerging issues, including progress in the phase-out of ozone-depleting substances in each sector and plans for the Panel's 2018 assessment report. He also paid tribute to Mr. David Catchpole, who was stepping down from the Panel and its Halons Technical Options Committee after 26 years of dedicated service to the Montreal Protocol. A summary of the presentation, prepared by the presenters, is set out in section E. 3. of annex II to the present report.

127. The Meeting of 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**

128. Mr. Agustin Sanchez (Mexico), in his capacity as Chair of the Executive Committee of the Multilateral Fund, reported on progress in the implementation of the Committee's decisions since the Twenty-Seventh Meeting of the Parties, summarizing the information provided in document UNEP/OzL.Pro.28/10.

129. He reported that the Executive Committee had focused on monitoring the implementation of HCFC phase-out management plans and HCFC production phase-out management plans in the context of the next target for HCFCs, a 35 per cent reduction by 1 January 2020. Following the approval of stage I HCFC phase-out management plans for Botswana and Libya, 142 countries currently had approved plans, and one of the three remaining countries without a plan had submitted it for consideration at the next meeting of the Executive Committee. Fourteen countries currently had approved stage II HCFC phase-out management plans and eight countries were submitting stage II plans for consideration at the next meeting of the Executive Committee.

130. The full implementation of the HCFC phase-out management plans approved to date would address almost 30 per cent of the total baseline HCFC consumption and 88 per cent of the baseline HCFC production of Article 5 parties. In approving HCFC phase-out management plans, the Committee had continued to give priority to the introduction of low-GWP technologies where possible and had also provided funding for a number of feasibility studies and demonstration projects for such technologies in the foam and refrigeration sectors.

131. Funding had also been provided for further national surveys of alternatives to ozone-depleting substances, bringing the total number of countries conducting such surveys to 127. The analysis of the national surveys would be considered at the first Executive Committee meeting in 2017 and was expected to provide information on the consumption trends for low-GWP, medium-GWP and high-GWP alternatives currently in use in different sectors and sub-sectors. Based on the outcome of those surveys and the discussions on the HFC amendment, the Executive Committee would consider revising the format for the collection of country programme data at a future meeting. The Committee would also consider the frequency of its meetings in the light of the discussions prior to and at the Twenty-Eighth Meeting of the Parties.

132. He then reported on behalf of the Multilateral Fund's four implementing agencies: the United Nations Development Programme (UNDP); UNEP; the United Nations Industrial Development Organization (UNIDO) and the World Bank.

133. During 2016, UNDP had continued to assist 47 parties with the implementation of HCFC phase-out management plans and had assisted 15 parties in preparing their stage II plans. It had begun to implement stage II plans in five parties and had submitted requests for stage II plans for 12 parties for consideration at the next meeting of the Executive Committee. UNDP had also been at the forefront of technical assessments and demonstration projects for cost-effective alternatives to HCFCs that minimized environmental impacts and promoted low-carbon development, and it was also conducting surveys of alternatives to ozone-depleting substances in 12 countries.

134. UNEP acted as the lead implementing agency or a cooperating agency for HCFC phase-out management plans in 102 parties and was implementing institutional strengthening projects in 104 parties. Through its OzonAction Compliance Assistance Programme, UNEP also assisted all 147 Article 5 parties to comply with their commitments under the Montreal Protocol. That was facilitated by the unique system of regional networks of national ozone officers; UNEP had organized eight network meetings and 11 regional thematic workshops as well as South-South cooperation, capacity-building activities and global information clearing-house services.

135. UNIDO was implementing HCFC phase-out management plans in 74 parties, including stage II plans for Brazil, Chile, Oman, Pakistan, Sudan and the Bolivarian Republic of Venezuela, which had been recently approved. It was also implementing seven demonstration projects on low-GWP alternatives to HCFCs, two feasibility studies on district cooling, surveys on ozone-depleting substance alternatives for 31 parties and seven demonstration projects on the destruction of ozone-depleting substances. Among the projects being implemented was a demonstration project on performance testing of low-GWP alternatives for air-conditioners in high-ambient-temperature countries.

136. Reported consumption and production data for 2015 indicated that countries implementing HCFC phase-out projects with the World Bank had successfully achieved the required reductions from baseline levels, and several had already prepared stage II HCFC phase-out management plans. The World Bank was also embarking on two projects to demonstrate climate-friendly and commercially viable alternatives, one of which focused on the needs of small and medium-sized enterprises. It had worked closely with parties to carry out surveys of alternatives to ozone-depleting substances, which were scheduled for review in 2017.

137. In conclusion, he thanked the members of the Executive Committee, the Multilateral Fund Secretariat and the bilateral and implementing agencies for their devotion, work and commitment. The Multilateral Fund had created real change that would enable future generations to reap ozone and climate benefits that would protect human health and the environment.

138. The parties took note of the information presented.

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

139. Under item 5 of the agenda for the high-level segment, the parties engaged in two 90-minute round table discussions moderated by Mr. John Barkat, United Nations Assistant Secretary-General and Ombudsman, and heard statements from ministers and other heads of delegation as well as remarks by Mr. John Kerry, Secretary of State of the United States of America.

140. On the morning of Friday, 14 October, the meeting participants observed a moment of silence in memory of the King of Thailand, His Majesty Bhumibol Adulyadej, who had passed away the previous day.

### **A. First round-table discussion**

141. The first round-table discussion, on the theme “Towards an agreement on a hydrofluorocarbon (HFC) amendment under the Montreal Protocol: addressing remaining negotiation issues”, took place on the morning of 13 October 2016. Mr. Barkat, as moderator, posed questions to seven discussants and then took questions for the discussants from the floor. The discussants, listed in the order in which they spoke, were Mr. Alberto Pedro D’Alotto, Argentina; Ms. Irene Canas Diaz, Costa Rica; Mr. Miguel Arias Cañete, European Union; Mr. Anil Madhav Dave, India; Mr. Ibrahim Usman Jibril, Nigeria; Ms. Gina McCarthy, Administrator, Environmental Protection Agency, United States of America; and Mr. Erik Solheim, Executive Director of UNEP.

142. Before the discussion, participants viewed a short film on the Montreal Protocol, narrated by Mr. David Attenborough, which had been produced in celebration of three decades of work under the Protocol with the aim of inspiring future efforts to protect the environment.

143. In opening remarks, Mr. Barkat cautioned against short-sightedness, highlighting the importance of bridging the gap between present and future needs and stressing the need for compromise. He then posed the first question for the discussants, asking them to identify the remaining issues that needed to be resolved to ensure the adoption of an HFC amendment at the current meeting, as well as means of bridging the gaps between the parties.

144. Responding to the questions, Mr. D’Alotto said all the parties, whether Article 5 or non-Article 5, had clearly made great efforts to understand one another’s positions and to reach a compromise that was mutually beneficial. He said that within the framework of common but differentiated

responsibilities an HFC amendment that was agreeable to all the parties was attainable at the current meeting. The level of ambition of an HFC phase-down would, however, be determined by the availability of mature technologies and suitable alternatives at a reasonable cost. In that regard, he emphasized the importance of allowing sufficient time to enable industry to make the transition away from HFCs, saying that developing countries in particular needed to protect their industries. An agreement on an HFC amendment that did not threaten the economic growth of any party, he said, would constitute an extremely successful outcome of the current meeting.

145. Ms. Diaz drew attention to the linkages between Sustainable Development Goals 12 (Ensure sustainable consumption and production patterns) and 13 (Take urgent action to combat climate change and its impacts), suggesting that bad consumption habits were largely responsible for the deteriorating climate. Consumers were nonetheless increasingly aware of environmental and climate-related issues, and they had the power to bring about change among producers. Providing examples of action in her region, she said that manufacturers had proven that they were prepared to conform with regulatory requirements with the aim of protecting the environment; producers and consumers needed to work together to achieve their joint objectives. In closing, she said that the myriad environmental agreements that existed all applied to a single planet and therefore required synergistic implementation and the integration of efforts to achieve the common goal of protecting the interests of future generations. In that regard, the Montreal Protocol provided a suitable framework for an ambitious and optimistic HFC amendment with significant climate benefits.

146. Mr. Arias Cañete said that the reason for adopting an HFC amendment to the Protocol was clear: phasing down HFCs currently represented the most cost-efficient and affordable way to reap enormous climate gains. There was a need to design and adopt a creative and flexible agreement that took into account the differences in parties' situations and capabilities, determining appropriate baselines and reasonable freeze dates. International negotiations sometimes foundered in details, he said, and he therefore urged the parties to focus on the big picture. The member States of the European Union were committed to providing additional technical and financial support to the Multilateral Fund to help developing countries in implementing the HFC phase-down, and an HFC amendment would certainly benefit from adequate financial support; he called for the intelligent use of that support with the aim of emulating the previous successes under the Protocol. The European Union had called on parties to strive for the highest level of ambition; it was time, he said, to act responsibly, in solidarity, and to eschew egotistical motives.

147. Mr. Dave spoke of the need for unity among the parties in the "global family". If any member of the family suffered, he said, the rest of the family would too. The target of an HFC amendment was within reach but the needs of all parties must be taken into account. India, like many other developing countries, was responsible for only a small share – some 2 per cent – of global emissions of HFCs. Nevertheless, it was willing and eager to play its part in taking responsibility for the future of the global family. Although the need to act with a sense of urgency was clear, he emphasized the need for unity and a balanced approach that would leave no one behind; in that regard, he noted the importance of financial and technical assistance to developing countries. In discussing how to achieve their goals at the current meeting, the parties should visualize a future that would be favourable for all parties.

148. Mr. Jibril expressed satisfaction at the good intentions of participants at the current meeting to move the process of adoption of an HFC amendment forward in the context of the highly successful Montreal Protocol. Although details including freeze dates, baseline years and financial and technical support had yet to be determined, the parties had clearly reached the appropriate time for the adoption of a historic agreement on HFCs. The adoption of the Paris Agreement on climate change had been made possible by the flexibility of the world's leaders, who had striven to ensure that the needs of all the parties were accommodated. He urged parties to work together in a spirit of give and take to achieve their common goal.

149. Ms. McCarthy, expressing gratitude to the Government of Rwanda for hosting the meeting and to the Ozone Secretariat and UNEP for their tremendous efforts to facilitate the work of the Twenty-Eighth Meeting of the Parties, highlighted the remarkable progress that had been made since the Twenty-Seventh Meeting of the Parties in November 2015. All parties understood the seriousness of the situation with regard to HFCs and the opportunity that the Protocol provided for addressing it, and she urged participants to take advantage of the momentum and the spirit of sincerity, productive discussions, respect and mutual support at the current meeting to finalize the details of an HFC amendment in a timely manner. An HFC phase-down represented a huge down payment on parties' obligations under the Paris Agreement, with the potential to avoid 0.5°C of global warming by the end of the century. Hitherto, negotiations under the Montreal Protocol had been successful because the parties had listened to one another and worked together to find mutually beneficial solutions to their problems with the support of a tried and trusted financial mechanism. She said that an HFC

phase-down would undoubtedly benefit from ample financial support to those parties that needed it, noting that in the margins of the seventy-first session of the General Assembly, in September 2016, philanthropic organizations and other donors had pledged \$80 million to help countries in need of assistance to implement an ambitious HFC amendment and improve energy efficiency. She emphasized the importance of an early freeze date and continuing to base practical and responsible commitments on the best available science. The adoption of an HFC amendment, she said, would represent a success for each of the parties and a collective leap forward for humankind.

150. Mr. Solheim spoke of the importance of viewing the adoption of an HFC amendment as a business opportunity rather than a cost to be borne. Strong public opinion, he said, had the power to bring about real change for the benefit of present and future generations; when the people asked their politicians to act, policies were implemented and markets were regulated, thereby affording significant business opportunities. The countries and industries that seized the opportunities afforded by such situations invariably derived the most benefit, while industries that resisted or did not anticipate change fell by the wayside. The success of the twenty-first session of the United Nations Framework Convention on Climate Change rested on strong leadership – by France, the United States and China, among others - and a completely new business perspective. Businesses had taken the view that the agreement would provide an opportunity for larger profits, new jobs and greater employee satisfaction. The adoption of an African instrument – a Kigali protocol on an HFC amendment – would not only be a historic event for the continent but, he predicted, would bring about change at a much faster rate than expected, affording opportunities for new chemicals to be phased in at reasonable cost through mass production by industries and for both industry and the world at large to reap the benefits.

151. Following the above statements Mr. Barkat invited questions and comments from the floor.

152. Responding to a comment by a representative that countries needed to preserve their economic growth and that energy efficiency should not be used as a negotiating tool, Ms. Diaz said that the cost of a transition away from HFCs would increase the longer that transition was delayed and that increased energy efficiency would generate savings that could be invested elsewhere. Being ambitious and tackling the transition without delay, she said, would ultimately create opportunities.

153. Addressing the question of the remaining issues to be resolved in the amendment negotiation process, Mr. Dave named seven: common but differentiated responsibilities; flexibility; economic growth; the availability of non-HFC technologies in various sectors; intellectual property rights issues; cost-effectiveness, safety and penetration of non-HFC alternative technologies; and the cost to the economy. Ms. McCarthy said that while those key issues had to be borne in mind, parties should ask themselves in each case whether they were better off with an HFC amendment or without one. How parties would pay for their commitments to address climate change was a key consideration in the negotiation process, and an HFC amendment would lead to some of the most inexpensive reductions towards achieving the shared goals of the Paris Agreement. The individual elements of the amendment agreement would work as a package, she said, and flexibility could be provided to enable parties to meet the challenges that they faced. Mr. Arias Cañete echoed her comments, adding that it was better for countries not to become locked into HFC technology when the rest of the world was making progress. The biggest developments in renewable energies were occurring in countries that were brave enough to move ahead, he said, giving Costa Rica and Morocco as examples. The important thing was to take the first step.

154. Also addressing the topic of issues still to be resolved, one representative said that the technical viability and commercial availability of alternatives to HFCs was a concern in addressing key remaining issues and proposed that the amendment provide for a review of alternative technologies and equipment. Such a review should be done prior to a freeze, she said, and should take into consideration national circumstances and constraints such as the high ambient temperatures and high urban densities common to many cities in the tropics. Mr. Arias Cañete responded that although the parties were looking at existing technologies when negotiating the amendment, the proposed schedules extended to 2045 or 2047; technologies would therefore change during the phase-down. Mr. Solheim expressed agreement, adding that technological change could occur very fast and that the private sector would find solutions as long as politicians provided appropriate guidance to the markets. Ms. McCarthy suggested that there was a wealth of technical information on available chemicals and technologies and how they could be combined to produce better products for consumers; in addition, research could be focused to address identified questions, and technical reviews and assessments were regularly done under the Montreal Protocol to address just such issues. Finally, she said, the high-ambient-temperature exemption was precisely the kind of tool used under the Montreal Protocol to respond to challenges posed by the availability and viability of alternatives. There were many ways, she concluded, that the issue could be addressed to enable parties to understand the consequences for their individual countries and potential business opportunities.

155. Several panellists addressed a request for more information on the opportunities that an ambitious amendment could generate for Article 5 parties, and for Africa in particular. Mr. Arias Cañete in response said that an ambitious amendment would help to fight global warming and benefit the entire world, particularly Africa, which would see a higher impact from global warming than more temperate areas. Some parties, he said, should support developing countries and some should force technological developments, but all had to have ambitious targets. Concurring that avoiding climate change was an important benefit, Mr. Solheim said that an amendment would also offer important business opportunities for Article 5 parties, drawing attention to the world's biggest solar plant, in Morocco, and new green infrastructure in Ethiopia as examples of green development in Africa that illustrated the development benefits of pursuing environmental protection. China similarly had achieved remarkable economic development since the signature of the Montreal Protocol by seizing on green business opportunities, including the development of green technologies like high-speed rail and solar and wind energy. Finally, he recalled that Sustainable Development Goal 1 (end poverty in all its forms everywhere) meant bringing everyone into the global middle class, which would in turn create consumer demand that would be met by those countries at the forefront of change who saw it for the business opportunity that it was. Many of those countries would come to Africa, with assistance from the rest of the world, to scale up manufacturing capabilities.

156. Ms. McCarthy added that many of the highly effective innovations in the refrigeration and air-conditioning sector required alternatives to HFCs to be fully energy efficient. An HFC amendment would help to ensure that those alternatives were available and would send strong market signals that would give rise to innovation and investment, energy efficient technologies and the broad availability of the needed chemicals.

157. Calling for early access to financial assistance for technology transition, Ms. Diaz drew attention to Costa Rica's experience with renewable energy as an example of how ambition could create opportunity. The country had been ambitious in developing its renewable energies, with the result that it now generated 99 per cent of its electricity through renewables. That had created unforeseen opportunities, attracting companies seeking clean energy supply and bringing jobs and regional development.

158. One representative, referring to Mr. Arias Cañete's comments on focusing on the big picture, asked whether the "wall behind the picture" of the amendment was solid and sustainable. Mr. Arias Cañete responded that he preferred to view the amendment in terms of a thermometer. The Paris Agreement had shown that parties were convinced of the need to fight global warming and, if that was the case, that they had to act in every area, particularly with regard to HFCs with high global warming potential. The European Union had already enacted a freeze in 2015 and started reductions in 2016, sending a signal to markets that they should develop alternative technologies. Those technologies would be available to others at the time of the baseline and freeze dates. He likened the situation to that of renewable energies, which had been developed at an initially high cost that had since fallen by 80 per cent: an ambitious amendment would send the market and industry a signal to invest in technologies that were environmentally friendly and more affordable, and in time such technologies would spread and their cost would fall. At the same time, he said, the European Union was the largest provider of climate finance for developing countries, because solidarity was needed among parties and developed countries had to help developing countries.

159. Ms. McCarthy added that to predict the future one needed to look at history. The Montreal Protocol had been constructed in a way that had sent clear, defined market signals over the long term, which had led to investment in new chemicals and new technologies that had benefitted everyone. It also included processes and procedures that allowed an amendment to be revisited over time to ensure that the expected outcome had been achieved and to adjust as necessary.

## **B. Second round-table discussion**

160. The second round-table discussion, on the theme, "Towards an HFC amendment under the Montreal Protocol: ensuring benefits for all", took place on the morning of 14 October 2016. The format was the same as that of the first round-table discussion, with Mr. Barkat posing questions to seven discussants and then taking questions for them from the floor. The seven discussants, listed in the order in which they spoke, were Mr. Batio Bassiere, Minister of Environment, Burkina Faso; Mr. Andrew Yatiman, Director, Office of Environment and Emergency Management, Federated States of Micronesia; Ms. Martha Garciarivas, Undersecretary for Environmental Protection, Mexico; Ms. Hakima El Haite, Minister of the Environment, Morocco; Mr. Jay Dev Joshi, Minister of Population and Environment, Nepal; Mr. Vidar Helgesen, Minister of Climate and Environment, Norway; and Mr. Norbert Kurilla, State Secretary, Slovakia.

161. Starting things off, Mr. Barkat said that while change could be elusive and traditional approaches unhelpful, all parties had made sustained and serious efforts to achieve an HFC amendment, which boded well for the adoption of such an amendment at the current meeting. He urged representatives in the final hours of the meeting to listen to one another and to view the issues in a holistic manner against the backdrop of the global reality. He then asked each of the discussants to explain why an HFC amendment was important and how it could benefit all.

162. In his response Mr. Bassiere said that the presence of so many parties at the current meeting highlighted the importance of an HFC amendment. The parties had gathered to negotiate an amendment because they were a family and, while there were differences as in any family, the common good should prevail. When dealing with questions of the environment, in particular, parties should ask themselves what the world, future generations and vulnerable peoples would gain, not what they themselves would gain, because the environment knew no boundaries. The amendment, he added, was a logical next step to the Paris Agreement, which was expected to enter into force in the coming weeks. All parties must play their roles, cease to be spectators and help to bring about an amendment that could be adopted at the current meeting.

163. Mr. Yatilman listed what he said were the three main advantages of an HFC amendment under the Montreal Protocol: first, significant climate gains that would benefit all of humankind; second, the possibility of complementary measures, notably enhanced energy efficiency that would considerably increase the climate gains of an HFC phase-down and reduce reliance on fossil fuels; third, the contribution of an HFC amendment to the achievement of the Sustainable Development Goals and the global development agenda.

164. Ms. Garciarivas said that an amendment would be important because it would have an impact on the life of every human being. The amendment process was historic, she said, with 197 parties aiming for the same goal. Like the Montreal Protocol itself, which remained an example for the entire planet, and the Paris Agreement, which represented major progress, the amendment would have both environmental and economic benefits. Nevertheless, a balance was required between the two, and the negotiation process was key to achieving the right outcome. It was essential that industry in developing countries had incentives to transform their production lines while remaining profitable. In that regard she underscored the importance of the Multilateral Fund for Mexico and for developing countries in general, as it allowed assistance to be channelled where it was truly needed to enable the implementation of the provisions of the Montreal Protocol, and she expressed the hope that an HFC amendment would be adopted in Kigali.

165. Ms. El Haite also characterized the possible adoption of an HFC amendment as historic. With the adoption of the Paris Agreement, she said, the world's leaders had committed to change, and the parties were currently negotiating the first post-Paris agreement, which would send a strong political signal that they were convinced of the need for change. The 0.5°C temperature increase that could be avoided by an HFC amendment would yield benefits such as avoiding a rise in sea level, reducing the northward migration of peoples and ensuring food security for millions. She invited all the parties to attend the twenty-second session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Marrakech, Morocco, where the focus would be on the most vulnerable peoples, adding that it would be unimaginable to arrive in Marrakech without an appropriate response – an HFC amendment – for the people awaiting change. She urged the parties to leave the current meeting with a common position that sent a strong political signal to the world by adopting an ambitious amendment that met all the promises of Paris and the expectations of those suffering from climate change.

166. In his remarks, Mr. Joshi noted that developing countries were strongly affected by climate change even though they produced very small quantities of greenhouse gases. For developing countries to make the transition from HFCs to low-GWP gases, they would have to make policy, legislative and technological changes, for which financial and technical assistance would be required from the Multilateral Fund and international organizations. In addition, it would be important to ensure that new technologies were energy efficient, readily available, commercially viable and environmentally friendly in order to obviate the need for any further amendments.

167. Mr. Helgesen said that he was a child of the Arctic, a region of the world that was warming at a rate almost twice the global average. Drawing attention to various climate change effects in the region, including rising temperatures, melting glaciers and sea-level rise with significant and often unknown effects on ecosystems, the fishing industry and exports, he said that an HFC amendment would provide an opportunity to rapidly achieve concrete results in combating climate change by means of an early and fast phase-down. In addition, by putting more energy-efficient solutions in place, the parties could limit expected temperature increases by 1°C rather than 0.5°C. The parties

needed to work together to overcome the particular challenges of an HFC phase-down for certain countries, providing early funding and ensuring that such countries were sufficiently well equipped to honour their commitments under an HFC amendment. He echoed the words of previous speakers, saying that many environmental problems could be solved much more quickly than originally thought and that the Montreal Protocol had triggered innovation that had brought about much faster progress than had been imagined at the time of its adoption. Such success could be repeated if leaders adopted decisions that sent clear signals to markets, investors, businesses and technological innovators. Currently all 197 parties to the Protocol were in compliance with their Protocol obligations, which bore testimony to the instrument's eminence among the multilateral environmental agreements. A failure to adopt an HFC amendment at the current meeting could cause confusion and sow doubt in the markets by damaging the credibility of the Paris Agreement.

168. Mr. Kurilla said that it was necessary to build on past achievements, working closely and collectively to close the deal on an ambitious HFC amendment at the current meeting. He said that early action was essential to enhancing cost effectiveness and he emphasized the complexity of the interlinkages between the effects of climate change such as food insecurity and migration. Inclusiveness and ownership would be important features of an HFC amendment, and flexibility was paramount; the parties needed to recognize and address the differing situations of countries in order to deliver results. The ability to compromise was also fundamental; although it might appear difficult to strike a deal from a national perspective, from a global viewpoint all parties would be winners if an HFC amendment were adopted. Speaking on behalf of the European Union, he said that it stood ready to provide financial and technical assistance to developing countries and the most vulnerable populations. He called on the parties to seize the opportunity to adopt an amendment in Kigali, saying that failure to do so was unthinkable.

169. Mr. Barkat then asked the discussants to clarify the implications of not taking action on an HFC amendment.

170. Mr. Yatilman said in response that his country had been the first to propose an HFC amendment to the Montreal Protocol. Not reaching agreement at the current meeting would be tantamount to parties declaring that they did not care about the world. The road to the twenty-first session of the Conference of the Parties to the Framework Convention on Climate Change had been a long one, with consensus sometimes seeming unattainable, but after considerable effort the Paris Agreement had been adopted, sending an important signal to the world that leaders were committed to addressing global challenges. In closing, he said that the global warming avoided by means of an HFC amendment would constitute a massive leap towards the achievement of the objectives of the Paris Agreement.

171. Mr. Helgesen drew attention to a report by the Global Commission on the Economy and Climate entitled *The Sustainable Infrastructure Imperative: Financing for Better Growth and Development*, which highlighted the need for \$90 billion of investment in sustainable infrastructure in the coming years and the consequent importance of sending consistent signals, both at the national and global levels, to markets and investors, among others. Governments alone could not hope to raise the kind of investment required to combat climate change and achieve sustainable development; they needed private investors who, in turn, needed clear signals regarding the way forward. A failure to reach agreement in Kigali, so soon after the adoption of the Paris Agreement and in the lead-up to the climate talks in Marrakech, would send the wrong signal.

172. Ms. Garciarivas said that she firmly expected agreement to be reached on an HFC amendment at the current meeting after so many years of work by all the parties. Citing recent extreme weather events caused by climate change with devastating effect in countries like Mexico and Haiti, she said that all countries were vulnerable to the impact of climate change and would benefit from an HFC amendment. Saying that Mexico's president was firmly convinced of the need for action on the basis of the Paris Agreement, she highlighted a number of initiatives being undertaken by Mexico in areas such as technology conversion, renewable energy and structural reform.

173. Ms. El Haite said that through commitment at a high political level, 2015 had seen the adoption of the Sustainable Development Goals, followed by the Sendai Framework for Disaster Risk Reduction 2015–2030, the Addis Ababa Action Agenda and, finally, the Paris Agreement. In Paris the parties had understood that failure to reach agreement would call the achievement of the Sustainable Development Goals into question. Consequently, for the first time in the history of climate negotiations, the discussions in Paris had involved not only the climate and environment agendas but all human agendas, including development and respect for human rights such as the right to health and the right to decent housing. Having for years negotiated in isolated spheres within the United Nations system, in Paris the parties had understood that they must instead break down barriers and build

bridges. They had taken on a commitment to change production and development models and construct a civilization in which all gases that increased global temperatures would be eliminated. Failure to agree on an HFC amendment would damage the credibility of the Paris Agreement, which depended on action and implementation. In closing, she urged the parties not to waste the opportunity to celebrate an HFC amendment to the Montreal Protocol at the forthcoming climate change meetings in Marrakech.

174. Mr. Kurilla echoed the comments of previous speakers, saying that a failure by parties to adopt an HFC amendment in Kigali would send a confusing signal to investors. Mobilizing the magnitude of public and private funding required to address the environmental problems facing the international community was an enormous challenge. The HFC phase-down, he said, represented a relatively small effort in exchange for a drastic reduction in greenhouse gas emissions, and parties would find it impossible to explain to their citizens a failure to seize the opportunity presented in Kigali. The adoption of the Paris Agreement had been a landmark event, but the real work was only starting, and it was critical that parties moved forward together, spurred on by the momentum built in recent months, to ever greater achievements.

### C. Statements by ministers and other heads of delegation

175. During the high-level segment, statements were made by the heads of delegation of the following parties, listed in the order in which they spoke: South Africa, China, India, European Union, Slovakia (Presidency of the European Union), Nigeria, Myanmar, Kenya, Bangladesh, Norway, Zimbabwe, Djibouti, Venezuela (Bolivarian Republic of), Lao People's Democratic Republic, Cameroon, Singapore, Uganda, Madagascar, Nepal, Brazil, Holy See, Costa Rica, Ethiopia, Indonesia, Samoa, Micronesia (Federated States of), Italy, Mauritius, Sri Lanka, Canada, Japan, Afghanistan, Malaysia, Luxembourg, Maldives, United States of America, Marshall Islands and Thailand. A statement was also delivered by the representative of the International Institute of Refrigeration.

176. Representatives of many parties who spoke expressed thanks to the Government and people of Rwanda for their hospitality in hosting the current series of meetings. Many also thanked the Ozone Secretariat, the Multilateral Fund Secretariat, the United Nations Environment Programme, the implementing agencies, donor partners, the assessment panels, international organizations and other stakeholders for their roles in ensuring the success of the meeting in particular and of the Montreal Protocol in general.

177. 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, with several pointing to recent research demonstrating that the depletion of the ozone layer was indeed being reversed. One representative said that the Protocol had created a robust and transparent mechanism for providing technical and financial assistance to developing countries to meet their phase-out obligations for ozone-depleting substances and had fostered an outstanding degree of international cooperation. Another representative said that the Protocol had been an example of how concerted efforts and full commitment by the international community could effectively address global challenges. Several representatives expressed pride at their countries' ratification of the Protocol and its amendments and reiterated their commitment to the objectives of the instrument.

178. A number of representatives said that the historical success of the Montreal Protocol, and the tried and tested institutional frameworks for assisting parties in putting in place measures to reduce ozone-depleting substances, could now be applied to the new challenge of phasing down the consumption and production of HFCs. One representative said that the Montreal Protocol had the opportunity to make history again and to raise the bar among multilateral agreements. Another representative said that the Protocol's model of commitment, efficiency and accountability facilitated the adoption of new paradigms suited to future challenges.

179. Many representatives described the continued actions in their own countries to phase out ozone-depleting substances and to implement the Montreal Protocol, including through legislative, policy, institutional and programmatic measures. A wide range of activities were outlined, including the introduction of quota and licensing systems; import controls; training and capacity-building for customs officers and servicing technicians in the refrigeration and air-conditioning sectors; the strengthening of institutional capacity; the promotion of alternative substances and new technologies and industrial restructuring to accommodate those developments; public-private partnership ventures; and education and awareness-raising, including through international ozone days. One representative said that strong political commitment was the cornerstone of such achievements. Several representatives placed those measures in the context of their HCFC phase-out management plans and the introduction of non-ozone-depleting, low-global-warming-potential, energy-efficient alternatives, particularly in the refrigeration, air-conditioning and foam sectors. Some representatives described

their countries' achievements in phasing out ozone-depleting substances, including CFCs, halons, carbon tetrachloride and methyl bromide, ahead of schedule.

180. Several representatives, espousing the value of a holistic, interdisciplinary, multisectoral approach to the solution of complex global problems, said that their countries' efforts to control ozone-depleting substances under the Protocol were part of a wider commitment to sustainable development and the protection of the environment and human health. One representative encouraged the international community to promote cooperation between politics, science and the economy for the common good and for the protection and benefit of creation as a whole, saying that in that regard the Montreal Protocol should continue to inform, educate and encourage a sense of responsibility in the area of environmental protection. Another representative said that economic growth could not be sustained without a clean, safe environment and another that sustainable production and consumption should be components of a wider model based on a harmonious relationship between humanity and nature and the eradication of inequality, injustice and poverty.

181. Many representatives stressed the importance of reaching agreement on the amendment of the Montreal Protocol to include HFC controls, with significant climate benefits. Several representatives reflected on the broader context of the challenging and intense negotiations, including in the context of the Dubai pathway, which had brought the parties to the verge of agreement. One representative said that the protracted discussions had enabled parties to reach a better understanding of parties' differing positions and concerns. Another representative said that beyond all the scientific data, it was important to keep in mind that millions of human lives were at risk unless urgent action was taken to control greenhouse gases, including HFCs.

182. Several representatives called upon parties to strive for an ambitious amendment, with early freeze dates, that would send a clear signal to the international community that the parties to the Protocol were committed to a holistic development agenda that both protected the ozone layer and limited global warming. Such a demonstration of commitment was particularly important in the light of significant initiatives taking place elsewhere, including the forthcoming entry into force of the Paris Agreement on Climate Change, the recently adopted 2030 Agenda for Sustainable Development and the adoption by the International Civil Aviation Organization of a global market-based measure to help achieve carbon-neutral growth from 2020. Other notable initiatives alluded to by representatives included the High Ambition Coalition of the European Union and the New York Declaration of the Coalition to Secure an Ambitious HFC Amendment.

183. Several representatives urged the adoption of a realistic, flexible step-down approach to phase-down schedules for HFCs, taking account of individual country circumstances and capabilities. One representative said that it was important to bear in mind that some developing countries had special circumstances that might demand special solutions and that the successful institutions and methods of the Montreal Protocol for accommodating such particularities should be preserved; the final package on HFCs, she continued, would entail not only baselines and control measures, but also the continuation of financial support by the Multilateral Fund, as in the past. Another representative said that in order to achieve a successful phase-down of HFCs, augmentation of the Multilateral Fund should cover cost elements related to energy efficiency, enhanced support for the servicing sector, the cost of patents and royalties and support for research and development.

184. Many said that the development and availability of alternative substances was crucial to the process, and that developed countries had to take due responsibility for technology transfer, capacity-building activities, project financing and other forms of support for developing countries. One representative said that developed country parties should take the lead in putting in place an ambitious baseline and phase-down schedule, thus driving market change and the development of new alternatives to HFCs, while for developing countries any solution should maximize climate benefits while at the same time being implementable. Another representative said that it was important to balance ambition with practicality.

185. A number of representatives identified challenges that they said needed to be overcome in implementing an HFC amendment, including the identification of environmentally friendly, reliable, affordable and economically viable alternatives; safety issues, for example with regard to the flammability of alternatives; the energy efficiency of alternatives; the particular challenges faced by countries with high ambient temperatures and dense urban environments; the refinement of regulations and legislation in an environment of rapidly changing technology; and the issue of intellectual property rights and the patenting of non-HFC technologies and their cost implications. In addition, several representatives alluded to long-standing challenges that continued to present difficulties in complying with the provisions of the Montreal Protocol, including conflict, vulnerability to natural disasters, porous national borders, the management of banks of ozone-depleting substances, the

dumping of obsolete substances, the problems faced by small-island developing States (for example in the fisheries sector) and the climate change vulnerabilities of high mountain States.

186. Several representatives described activities and initiatives that were already being implemented in their countries to promote low-GWP alternatives to ozone-depleting substances. Examples included the launch of a collaborative research programme on low-GWP non-HFC alternatives involving ministries, research institutes, academia, industry and citizens' groups; conducting a feasibility study on a district cooling project for a capital city; instituting a green fund to support the development and demonstration of green economy alternatives; and establishing a high-level coordination committee on climate change and ozone protection. Several representatives said that conducting ozone-depleting substance alternative surveys and technology reviews at the national level would greatly assist in assessing the availability and promoting the adoption of alternatives and providing information on the scale and nature of the challenge.

187. The European Commissioner for Climate Action and Energy said that action on HFCs would be a fast and cost-effective way of achieving significant emissions reductions and would lead to considerable energy efficiency savings as a co-benefit, with most of the technologies needed already available at moderate cost. The European Union Member States, he said, were committed to providing financial and technical support through the Multilateral Fund for the Implementation of the Montreal Protocol to help developing countries comply with their HFC obligations, and he announced a pledge by the European Union of 3 million euros of additional funding to kick-start early action on replacing HFCs in the Latin American and Caribbean region, on top of the 8 million euros it was already spending on similar projects in Africa, South-East Asia and the Pacific.

188. The representative of Canada said that her country had been one of a group of donor countries and philanthropists that had announced, in September 2016 in New York, their intention to provide \$80 million to fund early action and energy-efficient alternatives if an ambitious amendment were adopted at the current meeting in Kigali. The representative of Luxembourg said that his country would make additional resources available to the Multilateral Fund to assist developing countries in the implementation of any agreement on HFCs reached at the current meeting. The representative of Norway indicated his country's intention to increase its support to the Multilateral Fund to provide fast-start support in 2017, provided that agreement was reached on an ambitious amendment with a sufficiently early freeze date for Article 5 parties.

189. On the way forward for the Montreal Protocol, a number of representatives highlighted the growing complexity and interrelationship of global challenges and the need for a synergistic, coordinated response involving cooperation between multilateral environmental agreements and other entities both within and outside the United Nations. One representative said that isolated instruments were no longer feasible in the current global and financial reality of growing competition for scarce resources; in such circumstances, the Montreal Protocol should recognize and encourage market mechanisms that added value to ecosystem services and encourage sustainable production practices. Another representative said that parties should continue to strive for balanced environmental, social and economic benefits. Another representative said that the positive trends and momentum generated thus far should be maintained to ensure continued, sustained efforts to protect the ozone layer and promote climate change mitigation efforts through the strengthening of existing structures and socioeconomic and legal frameworks. Finally, one representative said that the Montreal Protocol should continue to work with the same innovative and flexible approach that had made it one of the most successful and widely respected global environmental agreements.

190. In conclusion, the representative of Thailand thanked the parties for their sympathy and condolences on the recent death of His Majesty King Bhumibol Adulyadej.

#### **Remarks by Mr. John Kerry**

191. In his remarks Mr. Kerry recalled that almost thirty years before, agreement on the Montreal Protocol had fundamentally changed the path the planet was on. That achievement, and work carried out under the Protocol since, had demonstrated the value of international cooperation, diplomacy and patience. The hole in the ozone layer, which had been growing at alarming speed, was starting to close.

192. The scientific evidence behind the devastating impacts of climate of change was growing every year. An ambitious amendment to phase down HFCs was the single most effective immediate step that could be taken, preventing 0.5 degrees of global warming. HFC use currently produced 1 gigatonne of carbon dioxide equivalent emissions a year, equivalent to the emissions of 300 coal-fired power plants. While the phase-down of HFCs posed serious challenges to many Parties, he recalled that under the Montreal Protocol no country was expected to undertake action alone. An HFC

amendment would recognize the differences between the parties – through differentiated baselines and phase-down schedules – and provide financial support, just as the Protocol had always done. He also drew attention to the additional funding that had recently been pledged from Governments and foundations to support developing countries in implementing an ambitious HFC amendment and improving energy efficiency.

193. The important thing, he stressed, was to send a signal to industry that countries were serious about phasing down HFCs, just as the Paris Agreement had helped to stimulate record levels of investment in renewable energy. The pace of technological innovation was already very rapid and costs were falling all the time; the private sector was increasingly recognizing the opportunities offered by new markets for refrigeration and air-conditioning. He concluded by urging parties not to delay any longer but, as in Paris, to work together to overcome the obstacles and live up to the challenge of protecting the future of the planet.

## **VI. Report by the co-chairs of the preparatory segment and consideration of the decisions recommended for adoption by the Twenty-Eighth Meeting of the Parties**

194. The President of the Meeting of the Parties invited the co-chairs of the contact group on HFCs to report directly to the high-level segment on the outcome of the deliberations of the contact group. Subsequently, the co-chair of the contact group introduced a draft amendment to the Montreal Protocol in respect of the phase-down of HFCs, along with a related draft decision providing for the adoption of that amendment and another draft decision related to the amendment. The contact group, he said, had reached agreement on most matters but a number of issues remained to be discussed in plenary, and a number of provisions in the draft amendment and draft decision related to the amendment were accordingly enclosed in square brackets to indicate that they had not yet been agreed.

195. The President of the Meeting of the Parties requested the co-chairs of the contact group on HFCs to assist him in facilitating the discussion in the plenary on the remaining unresolved issues regarding the text of the amendment and the accompanying decision.

196. Following a reading through of the proposed amendment text, and a discussion of the outstanding issues, the Meeting of the Parties adopted the text of the amendment as decision XXVIII/1 and the accompanying decision as decision XXVIII/2, as orally amended during the discussions.

### **Comments made during the adoption of the amendment**

197. The co-chair of the contact group reported that during the group's discussions Switzerland and Norway had proposed the adoption of a decision on listing all potential new HFCs. The proponents had agreed to withdraw the proposed decision owing to a lack of time to address it at the current meeting but indicated that they would introduce it again at another meeting in 2017 and asked the Secretariat to include it in the agenda of the next meeting.

198. One representative proposed the addition of a preambular paragraph explaining that the adoption of the Kigali Amendment reflected the parties' desire to address the adverse climate effects of the transition from HCFCs to HFCs, which she said would explain the reason for action on HFCs under the Montreal Protocol. Citing the late hour and the fact that no such paragraph had been discussed in the contact group, another representative opposed the proposal. The parties agreed that no such paragraph would be included in the decision as adopted but agreed to reflect it in the present report.

199. The representative of the Russian Federation, speaking on behalf of his country and the representatives of Belarus, Kazakhstan, Tajikistan and Uzbekistan, said that not enough attention had been paid to the financial consequences of adopting an HFC amendment and that their countries were concerned that the amount required would be substantial. In addition, he said, HFCs were not ozone depleting substances and were therefore beyond the scope of the Montreal Protocol, while financing for the phase-down of HFCs was likewise beyond the remit of the Multilateral Fund, which had been established for the single purpose of financing the phase-out of ozone-depleting substances. As a result, he said, the replenishment of the Multilateral Fund for the purpose of financing HFC phase-down could be achieved only through voluntary contributions to the Fund. He proposed, therefore, that as part of the amendment on HFCs paragraph 1 of Article 10 of the Protocol be amended to provide that all funding for HFC phase-down activities to be provided by the Multilateral Fund come only from voluntary contributions to the Fund.

200. The representative of a non-Article 5 party, speaking on behalf of a group of parties, said in response that those parties could not accept such a proposal because it would undermine the

assurances that non-Article 5 parties had given regarding their willingness to provide sufficient additional financial resources to finance an HFC phase-down, which for many Article 5 parties was a condition of their willingness to agree to an HFC phase-down amendment. The proponents of the change to Article 10 agreed to withdraw their proposal but asked that the present report reflect their proposal, their stated reason for it and their position that in the implementation of an HFC phase-down amendment their countries would consider their own contributions to the Multilateral Fund for the financing of HFC phase-down to be voluntary. The statement delivered by the Russian Federation is set out in annex III to the present report.

201. The representative of Indonesia said that, while her country would not block consensus or the adoption of an amendment in respect of HFCs, national consultations would be necessary after the close of the current meeting to determine whether her country could accept the first freeze year for Article 5 parties of 2024. The co-chair of the contact group noted that the representatives of Cambodia and Thailand had made statements to the same effect with regard to their countries, saying that they should also be reflected in the present report.

202. One representative said that financial assistance for facilities in respect of the destruction of HFCs, including HFC-23, would be critical. In the absence of such assistance, she said, her country would be unable to comply with the destruction provisions of the amendment.

203. One representative said that during the negotiations on the Kigali Amendment many representatives had expressed the desire of their countries to take early and ambitious action to phase down HFCs under the Amendment, with some hoping to freeze consumption as early as 2021, but had noted that such early action would require correspondingly ambitious financial assistance from non-Article 5 parties. His country, he said, encouraged all parties to take such ambitious action to phase down HFCs early and encouraged non-Article 5 parties to explore ways to support that financially. His country, he went on, would prepare a declaration for signature over the next few months by parties that wished to take ambitious early action on HFC phase-down and parties that wished to provide financial support for such action. Many other representatives expressed support for the idea of early HFC phase-down matched by early financial support, with several stressing in particular the importance of the latter, and said that their countries would join other parties in signing the declaration.

204. Following adoption of the Amendment one representative, speaking on behalf of a group of parties, said that it had been agreed in the contact group that, in order to give effect to new subparagraph 9 (a) (ii) of Article 2 to the Protocol, the Scientific Assessment Panel would need to begin the work necessary to provide the Meeting of the Parties with the information it would require to adjust the global-warming potentials of the substances in Group I of Annex A, Annex C and Annex F in accordance with that subparagraph and that it should report on its progress in that regard to the Open-ended Working Group at its thirty-ninth meeting.

205. Following the adoption of decision XXVIII/1, on the further amendment of the Montreal Protocol, the parties agreed that the amendment adopted through that decision should be known as the “Kigali Amendment”.

206. Many representatives then took the floor to express satisfaction at the adoption of the Amendment, saying that it was a historic achievement that would make a major contribution to meeting the commitments under the Paris Agreement on Climate Change and that it demonstrated that the countries of the world could come together in a spirit of compromise and cooperation to effectively address the world’s pressing problems. Many representatives also expressed thanks and appreciation to the proponents of an HFC amendment to the Protocol for their efforts in bringing the issue before the parties and for what one termed their climate leadership. Many representatives also thanked the co-chairs of the contact group that led the negotiations, as well as the Executive Secretary and the Ozone Secretariat, for their tremendous hard work and their achievement in facilitating the negotiations leading to the adoption of the Amendment.

207. The President of the Meeting of the Parties requested the Co-Chairs of the preparatory segment to go through all remaining issues on the agenda. Subsequently, the Co-Chair of the preparatory segment reported that various draft decisions had been approved for consideration and adoption during the high-level segment.

## **VII. Dates and venue for the Twenty-Ninth Meeting of the Parties to the Montreal Protocol**

208. The representative of Canada conveyed an offer by her country to host the Twenty-Ninth Meeting of the Parties to the Montreal Protocol and the Eleventh meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer in Montreal in 2017, the

thirtieth anniversary year of the Montreal Protocol. The Meeting of the Parties accordingly decided that those meetings would take place in Montreal on dates to be announced following consultations between the host country and the Secretariat.

## VIII. Other matters

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

## IX. Adoption of decisions by the Twenty-Eighth Meeting of the Parties to the Montreal Protocol

210. Under the item the representative of Rwanda, speaking on behalf of her country and Morocco, introduced a draft decision on energy efficiency in the context of an HFC phase-down, by which the Meeting of the Parties would request the Technology and Economic Assessment Panel to review energy efficiency opportunities in the refrigeration and air-conditioning and heat-pump sectors, invite parties to provide the Panel with relevant information on a voluntary basis and request the Panel to assess any information provided and report on the outcome of its efforts to the Twenty-Ninth Meeting of the Parties. Following discussion, in which many stressed the importance of improving energy efficiency as a means of enhancing the climate benefits of an HFC phase-down, the Meeting of the Parties approved the draft decision for adoption. The Meeting of the Parties then adopted the decision, along with the decisions approved during the preparatory segment, as indicated in the following paragraph.

211. The Twenty-Eighth Meeting of the Parties decides:

### Decision XXVIII/1: Further Amendment of the Montreal Protocol

To adopt, in accordance with the procedure laid down in paragraph 4 of Article 9 of the Vienna Convention for the Protection of the Ozone Layer, the Amendment to the Montreal Protocol set out in annex I to the report of the Twenty-Eighth Meeting of the Parties;

### Decision XXVIII/2: Decision related to the amendment phasing down hydrofluorocarbons

*Recalling* decision XXVIII/1, by which the Meeting of the Parties adopted the amendment to the Montreal Protocol set out in annex I to the report of the Twenty-Eighth Meeting of the Parties (hereinafter referred to as the Amendment),

1. That paragraphs 2 and 4 of Article 2J in Article I of the Amendment are applicable to Belarus, Kazakhstan, the Russian Federation, Tajikistan and Uzbekistan;

2. That subparagraphs (b), (d) and (f) of paragraph 8 qua of Article 5 in Article I of the Amendment are applicable to Bahrain, India, the Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates (hereinafter referred to as Article 5, group 2, parties);

#### Elements in paragraph 1 (a) of decision XXVI/9, including intellectual property rights issues in considering the feasibility and ways of managing hydrofluorocarbons

3. To recognize the importance of timely updating international standards for flammable low-global-warming potential (GWP) refrigerants, including IEC60335-2-40, and to support promoting actions that allow safe market introduction, as well as manufacturing, operation, maintenance and handling, of zero-GWP or low-GWP refrigerant alternatives to hydrochlorofluorocarbons and hydrofluorocarbons;

4. To request the Technology and Economic Assessment Panel to conduct periodic reviews of alternatives, using the criteria set out in paragraph 1 (a) of decision XXVI/9, in 2022 and every five years thereafter, and to provide technological and economic assessments of the latest available and emerging alternatives to hydrofluorocarbons;

5. To request the Technology and Economic Assessment Panel to conduct a technology review four or five years before 2028 to consider a compliance deferral of two years from the freeze date of 2028 for Article 5, group 2, parties to address growth above a certain threshold in relevant sectors;

**Relationship with the HCFC phase-out**

6. To acknowledge the linkage between the hydrofluorocarbon and hydrochlorofluorocarbon reduction schedules relevant to sectors and the preference to avoid transitions from hydrochlorofluorocarbons to high-GWP hydrofluorocarbons and to provide flexibility if no other technically proven and economically viable alternatives are available;

7. To also acknowledge these linkages with respect to certain sectors, in particular industrial process refrigeration, and the preference to avoid transitions from hydrochlorofluorocarbons to high-GWP hydrofluorocarbons and to be willing to provide flexibility, if no other alternatives are available, in cases where:

(a) hydrochlorofluorocarbon supply may be unavailable from existing allowable consumption, stocks as well as recovered/recycled material, and

(b) it would allow for a direct transition at a later date from hydrochlorofluorocarbons to low-GWP or zero-GWP alternatives;

8. To provide, prior to the commencement of the Article 5 hydrofluorocarbon freeze and in the light of the acknowledgement in paragraph 7 above, flexibility measures in relation to the hydrochlorofluorocarbon phase-out relevant to certain sectors, in particular the industrial process refrigeration subsector, in order to avoid double conversions;

**Financial issues*****Overarching principles and timelines***

9. To recognize that the Amendment maintains the Multilateral Fund for the Implementation of the Montreal Protocol as the financial mechanism and that sufficient additional financial resources will be provided by parties not operating under paragraph 1 of Article 5 to offset costs arising out of hydrofluorocarbon obligations for parties operating under paragraph 1 of Article 5 under the Amendment;

10. To request the Executive Committee to develop, within two years of the adoption of the Amendment, guidelines for financing the phase-down of hydrofluorocarbon consumption and production, including cost-effectiveness thresholds, and to present those guidelines to the Meeting of the Parties for the parties' views and inputs before their finalization by the Executive Committee;

11. To request the Chair of the Executive Committee to report back to the Meeting of the Parties on the progress made in accordance with this decision, including on cases where Executive Committee deliberations have resulted in a change in a national strategy or a national technology choice submitted to the Executive Committee;

12. To request the Executive Committee to revise the rules of procedure of the Executive Committee with a view to building in more flexibility for parties operating under paragraph 1 of Article 5;

***Flexibility in implementation that enables parties to select their own strategies and priorities in sectors and technologies***

13. That parties operating under paragraph 1 of Article 5 will have flexibility to prioritize hydrofluorocarbons, define sectors, select technologies and alternatives and elaborate and implement their strategies to meet agreed hydrofluorocarbon obligations, based on their specific needs and national circumstances, following a country-driven approach;

14. To request the Executive Committee of the Multilateral Fund to incorporate the principle referred to in paragraph 13 above into relevant funding guidelines for the phase-down of hydrofluorocarbons and in its decision-making process;

***Guidance to the Executive Committee of the Multilateral Fund with respect to the consumption, production and servicing sectors***

15. To request the Executive Committee, in developing new guidelines on methodologies and cost calculations, to make the following categories of costs eligible and to include them in the cost calculation:

- (a) For the consumption manufacturing sector:
  - (i) Incremental capital costs;
  - (ii) Incremental operating costs for a duration to be determined by the Executive Committee;

- (iii) Technical assistance activities;
  - (iv) Research and development, when required to adapt and optimize low-GWP or zero-GWP alternatives to hydrofluorocarbons;
  - (v) Costs of patents and designs, and incremental costs of royalties, when necessary and cost-effective;
  - (vi) Costs of the safe introduction of flammable and toxic alternatives;
- (b) For the production sector:
- (i) Lost profit due to the shutdown/closure of production facilities as well as production reduction;
  - (ii) Compensation to displaced workers;
  - (iii) Dismantling of production facilities;
  - (iv) Technical assistance activities;
  - (v) Research and development related to the production of low-GWP or zero-GWP alternatives to hydrofluorocarbons with a view to lowering the costs of alternatives;
  - (vi) Costs of patents and designs or incremental costs of royalties;
  - (vii) Costs of converting facilities to produce low-GWP or zero-GWP alternatives to hydrofluorocarbons when technically feasible and cost-effective;
  - (viii) Costs of reducing emissions of HFC-23, a by-product from the production process of HCFC-22, by reducing its emission rate in the process, destroying it from the off-gas, or by collecting and converting it to other environmentally safe chemicals. Such costs should be funded by the Multilateral Fund to meet the obligations of Parties operating under paragraph 1 of Article 5 specified under the Amendment;
- (c) For the servicing sector:
- (i) Public-awareness activities;
  - (ii) Policy development and implementation;
  - (iii) Certification programmes and training of technicians on safe handling, good practice and safety in respect of alternatives, including training equipment;
  - (iv) Training of customs officers;
  - (v) Prevention of illegal trade of hydrofluorocarbons;
  - (vi) Servicing tools;
  - (vii) Refrigerant testing equipment for the refrigeration and air-conditioning sector;
  - (viii) Recycling and recovery of hydrofluorocarbons;

16. To request the Executive Committee to increase in relation to the servicing sector the funding available under Executive Committee Decision 74/50 above the amounts listed in that decision for parties with total hydrochlorofluorocarbon baseline consumption up to 360 metric tonnes when needed for the introduction of alternatives to hydrochlorofluorocarbons with low-GWP and zero-GWP alternatives to hydrofluorocarbons and maintaining energy efficiency also in the servicing/end-user sector;

***Cut-off date for eligible capacity***

17. That the cut-off date for eligible capacity is 1 January 2020 for those parties with baseline years from 2020 to 2022 and 1 January 2024 for those parties with baseline years from 2024 to 2026;

***Second and third conversions***

18. To request the Executive Committee to incorporate the following principles relating to second and third conversions into funding guidelines:

(a) First conversions, in the context of a phase-down of hydrofluorocarbons, are defined as conversions to low-GWP or zero-GWP alternatives of enterprises that have never received any direct

or indirect support, in part or in full, from the Multilateral Fund, including enterprises that converted to hydrofluorocarbons with their own resources;

(b) Enterprises that have already converted to hydrofluorocarbons in phasing out chlorofluorocarbons and/or hydrochlorofluorocarbons will be eligible to receive funding from the Multilateral Fund to meet agreed incremental costs in the same manner as enterprises eligible for first conversions;

(c) Enterprises that convert from hydrochlorofluorocarbons to high-GWP hydrofluorocarbons, after the date of adoption of the Amendment, under hydrochlorofluorocarbon phase-out management plans already approved by the Executive Committee will be eligible to receive funding from the Multilateral Fund for a subsequent conversion to low-GWP or zero-GWP alternatives to meet agreed incremental costs in the same manner as enterprises eligible for first conversions;

(d) Enterprises that convert from hydrochlorofluorocarbons to high-GWP hydrofluorocarbons with their own resources before 2025 under the Amendment will be eligible to receive funding from the Multilateral Fund to meet agreed incremental costs in the same manner as enterprises eligible for first conversions;

(e) Enterprises that convert from hydrofluorocarbons to lower-GWP hydrofluorocarbons with Multilateral Fund support when no other alternatives are available will be eligible to receive funding from the Multilateral Fund for a subsequent conversion to low-GWP or zero-GWP alternatives if necessary to meet the final hydrofluorocarbon phase-down step;

#### ***Sustained aggregate reductions***

19. To request the Executive Committee to incorporate the following principle related to sustained aggregate reductions into Multilateral Fund policies: remaining eligible consumption for funding in tonnage will be determined on the basis of the starting point of national aggregate consumption less the amount funded by previously approved projects in future multi-year agreement templates for hydrofluorocarbon phase-down plans, consistent with Executive Committee decision 35/57;

#### ***Enabling activities***

20. To request the Executive Committee to include the following enabling activities to be funded in relation to the hydrofluorocarbon phase-down under the Amendment:

- (a) Capacity-building and training for the handling of hydrofluorocarbon alternatives in the servicing, manufacturing and production sectors;
- (b) Institutional strengthening;
- (c) Article 4B licensing;
- (d) Reporting;
- (e) Demonstration projects; and
- (f) Development of national strategies;

#### ***Institutional strengthening***

21. To direct the Executive Committee to increase institutional strengthening support in light of the new commitments related to hydrofluorocarbons under the Amendment;

#### ***Energy efficiency***

22. To request the Executive Committee to develop cost guidance associated with maintaining and/or enhancing the energy efficiency of low-GWP or zero-GWP replacement technologies and equipment, when phasing down hydrofluorocarbons, while taking note of the role of other institutions addressing energy efficiency, when appropriate;

#### ***Capacity-building to address safety***

23. To request the Executive Committee to prioritize technical assistance and capacity-building to address safety issues associated with low-GWP or zero-GWP alternatives;

#### ***Disposal***

24. To request the Executive Committee to consider funding the cost-effective management of stockpiles of used or unwanted controlled substances, including destruction;

**Other costs**

25. That the parties may identify other cost items to be added to the indicative list of incremental costs emanating as a result of the conversion to low-GWP alternatives;

**Exemption for high-ambient-temperature parties**

26. To make available an exemption for parties with high ambient temperature conditions where suitable alternatives do not exist for the specific sub-sector of use, as described below;

27. To distinguish and separate this exemption from the essential-use and critical-use exemptions under the Montreal Protocol;

28. To make this exemption effective and available as of the hydrofluorocarbon freeze date, with an initial duration of four years;

29. To apply this exemption for sub-sectors, contained in Appendix I of this decision, in parties with an average of at least two months per year over ten consecutive years with a peak monthly average temperature above 35 degrees Celsius, where the party listed in Appendix II has formally notified the Secretariat of its intent to use this exemption no later than one year before the hydrofluorocarbon freeze date, and every four years thereafter should it wish to extend the exemption;<sup>1,2</sup>

30. That any party operating under this high-ambient-temperature exemption will report separately its production and consumption data for the sub-sectors to which the exemption applies;

31. That any transfer of production and consumption allowances for this high-ambient-temperature exemption will be reported to the Secretariat under Article 7 of the Protocol by each of the parties concerned;

32. That the Technology and Economic Assessment Panel and a subsidiary body of the Panel that includes outside experts on high ambient temperatures will assess the suitability of hydrofluorocarbon alternatives for use where suitable alternatives do not exist based on criteria agreed by the parties that will include, but not be limited to, the criteria listed in paragraph 1 (a) of decision XXVI/9, and recommend sub-sectors to be added to or removed from appendix I to the present decision and report this information to the Meeting of the Parties;

33. That the assessment referred to in paragraph 32 above will take place periodically starting four years from the hydrofluorocarbon freeze date and every four years thereafter;

34. To review, no later than the year following receipt of the first report of the Technology and Economic Assessment Panel on the suitability of alternatives, the need for an extension of the high-ambient-temperature exemption for a further period of up to four years, and periodically thereafter, for specific sub-sectors in parties that meet the criteria set out in paragraph 29 above, and that parties will develop an expedited process for ensuring the renewal of the exemption in a timely manner where there are no feasible alternatives, taking into account the recommendation of the Panel and its subsidiary body;

35. That amounts of Annex F substances that are subject to the high-ambient-temperature exemption are not eligible for funding under the Multilateral Fund while they are exempted for that party;

36. That the Implementation Committee under the Non-Compliance Procedure of the Montreal Protocol and the Meeting of the Parties should, for 2025 and 2026, defer consideration of the hydrochlorofluorocarbon compliance status of any party operating under a high-ambient-temperature exemption in cases where it has exceeded its allowable consumption or production levels due to its HCFC-22 consumption or production for the sub-sectors listed in appendix I to the present decision, on the condition that the party concerned is following the phase-out schedule for consumption and production of hydrochlorofluorocarbons for other sectors and has formally requested a deferral through the Secretariat;

37. To consider, no later than 2026, whether to extend the compliance deferral referred to in paragraph 36 for an additional period of two years and, if appropriate, to consider further deferrals thereafter, for parties operating under the high-ambient-temperature exemption;

<sup>1</sup> Spatially weighted average temperatures deriving the daily highest temperatures (using the Centre for Environmental Data Archival: [http://browse.ceda.ac.uk/browse/badc/cru/data/cru\\_cy/cru\\_cy\\_3.22/data/tmx](http://browse.ceda.ac.uk/browse/badc/cru/data/cru_cy/cru_cy_3.22/data/tmx)).

<sup>2</sup> As listed in Appendix II to the present decision.

**Other exemptions**

38. To allow for other exemptions, such as for essential uses and critical uses, for production or consumption that is necessary to satisfy uses agreed by the parties to be exempted uses;

39. To consider mechanisms for such exemptions in 2029, including multi-year exemption mechanisms;

40. To provide information and guidance to the Technology and Economic Assessment Panel for its periodic review of sectors where exemptions may be required;

**Appendix I: List of exempted equipment for high ambient temperatures**

- (a) Multi-split air conditioners (commercial and residential)
- (b) Split ducted air conditioners (commercial and residential)
- (c) Ducted commercial packaged (self-contained) air-conditioners

**Appendix II: List of countries operating under the high-ambient-temperature exemption**

Algeria, Bahrain, Benin, Burkina Faso, Central African Republic, Chad, Côte d'Ivoire, Djibouti, Egypt, Eritrea, Gambia, Ghana, Guinea, Guinea-Bissau, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Libya, Mali, Mauritania, Niger, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Sudan, Syrian Arab Republic, Togo, Tunisia, Turkmenistan, United Arab Emirates.

**Decision XXVIII/3: Energy efficiency**

*Recognizing* that a phase-down of hydrofluorocarbons under the Montreal Protocol would present additional opportunities to catalyse and secure improvements in the energy efficiency of appliances and equipment,

*Noting* that the air-conditioning and refrigeration sectors represent a substantial and increasing percentage of global electricity demand,

*Appreciating* the fact that improvements in energy efficiency could deliver a variety of co-benefits for sustainable development, including for energy security, public health and climate mitigation,

*Highlighting* the large returns on investment that have resulted from modest expenditures on energy efficiency, and the substantial savings available for both consumers and Governments,

1. To request the Technology and Economic Assessment Panel to review energy efficiency opportunities in the refrigeration and air-conditioning and heat-pump sectors related to a transition to climate-friendly alternatives, including not-in-kind options;
2. To invite parties to submit to the Ozone Secretariat by May 2017, on a voluntary basis, relevant information on energy efficiency innovations in the refrigeration, air-conditioning and heat-pump sectors;
3. To request the Technology and Economic Assessment Panel to assess the information submitted by parties on energy efficiency opportunities in the refrigeration and air-conditioning sectors during the transition to low-global-warming-potential and zero-global-warming-potential alternatives and to report thereon to the Twenty-Ninth Meeting of the Parties, in 2017;

**Decision XXVIII/4: Establishment of regular consultations on safety standards**

*Noting* that parties recognize the importance of the timely updating of international standards for flammable low-global-warming-potential (GWP) refrigerants, including International Standard IEC 60335-2-40 of the International Electrotechnical Commission (IEC), and support the promotion of actions that allow for the safe market introduction, manufacturing, operation, maintenance and handling of zero-GWP and low-GWP refrigerants that are alternatives to hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs),

*Aiming* to support the timely revision of relevant standards in a manner that is technology-neutral to enable the safe use and market penetration of low-GWP alternatives,

1. To request the Technology and Economic Assessment Panel to establish a task force that includes outside experts, as needed:

(a) To liaise and coordinate with standards organizations, including IEC, to support the timely revision of IEC standard 60335-2-40 and ensure that the requirements for the A2, A2L and A3 categories are revised synchronously using a fair, inclusive and scientifically sound approach;

(b) To submit to the Open-ended Working Group at its thirty-ninth meeting a report on safety standards relevant for low-GWP alternatives, including on the following:

- (i) Progress in the revision of international safety standards by the IEC, the International Organization for Standardization (ISO) and other international standards bodies;
- (ii) Information concerning tests and/or risk assessments and their results relevant to safety standards;
- (iii) Assessment of the implications of international standards for the implementation of the decisions of the Meeting of the Parties to the Montreal Protocol on the accelerated phase-out of HCFCs and HFC control measures, and recommendations to the parties;

(c) To provide relevant findings to the standards bodies;

2. To request the Ozone Secretariat to organize a workshop on safety standards relevant to the safe use of low-GWP alternatives back to back with the thirty-ninth meeting of the Open-ended Working Group, within existing resources;

3. To urge parties to consult and work with their industries and standards bodies to support the timely completion of the processes for developing new standards, harmonizing existing standards and revising current standards that would facilitate the adoption of additional environmentally friendly alternatives to HCFCs and HFCs and the broader deployment of existing such alternatives and allow for their use with a goal of completing such efforts by the end of 2018;

4. To invite parties to submit to the Ozone Secretariat by the end of 2016 information on their domestic safety standards relevant to the use of low-GWP flammable refrigerants;

5. To encourage parties to strengthen connections and cooperation between national and regional standards committees and national ozone units;

6. To request the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol to consider maintaining or, if required, increasing the Fund's technical and capacity-building assistance, in particular through the United Nations Environment Programme's Compliance Assistance Programme, with a view to improving cooperation between national authorities in charge of implementation of the Montreal Protocol and national and regional standards committees;

7. To consider holding regular consultations on international safety standards with the Ozone Secretariat and relevant international standards bodies, including IEC and ISO, and regional standards bodies, including the European Committee for Standardization, the European Committee for Electrotechnical Standardization, UL (formerly known as Underwriters Laboratories), the American National Standards Institute, the American Society of Heating, Refrigerating and Air-Conditioning Engineers and others, taking into account the outcomes of the processes mentioned in the present decision;

### **Decision XXVIII/5: Terms of reference for the study on the 2018–2020 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol**

*Recalling* the parties' decisions on previous terms of reference for studies on the replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol,

*Recalling also* the parties' decisions on previous replenishments of the Multilateral Fund,

1. To request the Technology and Economic Assessment Panel to prepare a report for submission to the Twenty-Ninth Meeting of the Parties, and to submit it through the Open-ended

Working Group at its thirty-ninth meeting, to enable the Twenty-Ninth Meeting of the Parties to adopt a decision on the appropriate level of the 2018–2020 replenishment of the Multilateral Fund;

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

(a) All control measures and relevant decisions agreed upon by the parties to the Montreal Protocol and the Executive Committee of the Multilateral Fund, in particular those pertaining to the special needs of low-volume- and very-low-volume-consuming countries, in addition to small and medium-sized enterprises, and the decisions of the Twenty-Eighth Meeting of the Parties and the Executive Committee at its meetings, up to and including its seventy-eighth meeting, insofar as those decisions will necessitate expenditure by the Multilateral Fund during the period 2018–2020;

(b) The need to allocate resources to enable all parties operating under paragraph 1 of Article 5 of the Montreal Protocol (Article 5 parties) to achieve and/or maintain compliance with Articles 2A–2E, 2G, 2H, 2I and 2J of the Protocol;

(c) The need to allocate resources to enable all Article 5 parties to meet compliance obligations relevant in the replenishment period 2018–2020 in respect of Article 2F of the Protocol, providing support for a transition to low-global-warming-potential (GWP) or zero-GWP alternatives in hydrochlorofluorocarbon (HCFC) phase-out, taking into account decision XIX/6 of the Meeting of the Parties and the extended commitments made by Article 5 parties under approved HCFC phase-out management plans;

(d) Rules and guidelines agreed upon by the Executive Committee at all its meetings, up to and including its seventy-eighth meeting, for determining eligibility for the funding of investment projects and non-investment projects, including, but not limited to, institutional strengthening;

3. That the Technology and Economic Assessment Panel should provide indicative figures of the resources within the estimated funding required for phasing out HCFCs that could be associated with enabling Article 5 parties to encourage the use of low-GWP or zero-GWP alternatives and indicative figures for any additional resources that would be needed to further encourage the use of low-GWP or zero-GWP alternatives;

4. The need for additional resources to enable Article 5 parties to carry out initial activities related to the phase-down of HFCs listed under Annex F and controlled under Article 2J;

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

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

7. That the Panel should provide indicative figures for the periods 2021–2023 and 2024–2026 to support a stable and sufficient level of funding, on the understanding that those figures will be updated in subsequent replenishment studies;

### **Decision XXVIII/6: Essential-use exemption for laboratory and analytical uses for 2017 in China**

*Noting with appreciation* the work done by the Technology and Economic Assessment Panel and its Medical and Chemicals Technical Options Committee,

*Recalling* decision XI/15, by which the parties, among other things, eliminated the use of ozone-depleting substances for the testing of oil, grease and total petroleum hydrocarbons in water from the global exemption for laboratory and analytical uses,

*Recalling also* decision XXIII/6, by which parties operating under paragraph 1 of Article 5 of the Montreal Protocol were allowed until 31 December 2014 to deviate from the existing ban on the use of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water in individual cases where such parties considered doing so to be justified, and in which it was clarified that any deviation beyond that should take place only in accordance with an essential-use exemption in respect of the use of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water beyond 2014,

*Noting* that China has reported difficulty in implementing existing alternatives to the use of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water and has indicated that it needs more time for the revision and promotion of national standards, and noting also

that the party is taking necessary measures to implement the alternatives and has expressed a willingness to continue doing so,

1. To encourage China, which has applied for an essential-use exemption for the use of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water, to complete the revision of its relevant national standard and to ensure that a revised national standard is brought into force as soon as possible with a view to ensuring a smooth transition to a method that does not use ozone-depleting substances;

2. To request that China, prior to submitting any further requests for essential-use exemptions for the use of ozone-depleting substances for the testing of oil, grease and total petroleum hydrocarbons in water, provide information on its evaluation of the use of other international analytical methods for such testing, on the national circumstances that make using them difficult and on progress in the development of its own method and in the revision of the relevant national standard, as well as a timeline for the phase-out of carbon tetrachloride for laboratory and analytical uses, indicating the anticipated steps and dates in that process;

3. To authorize the level of consumption for China for 2017 necessary to satisfy essential uses of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water, as specified in the annex to the present decision;

**Annex to decision XXVIII/6**

**Essential-use authorization for 2017 for carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water**

(Metric tonnes)

Party	2017
China	65

**Decision XXVIII/7: Critical-use exemptions for methyl bromide for 2017 and 2018**

*Noting with appreciation* the work of the Technology and Economic Assessment Panel and its Methyl Bromide Technical Options Committee,

*Recognizing* the significant reductions in critical-use nominations for methyl bromide by many parties,

*Recalling* paragraph 10 of decision XVII/9,

*Recalling also* that all parties that have nominated critical-use exemptions are to report data on stocks of methyl bromide using the accounting framework agreed to by the Sixteenth Meeting of the Parties,

*Noting with appreciation* that, in accordance with paragraph 1 of decision XXV/4, Australia submitted the available results of its research programme to the Technology and Economic Assessment Panel by the thirty-seventh meeting of the Open-Ended Working Group,

*Recognizing* that the production and consumption of methyl bromide for critical uses should be permitted only if methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide,

*Recognizing also* that parties operating under critical-use exemptions should take into account the extent to which methyl bromide is available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide in licensing, permitting or authorizing the production and consumption of methyl bromide for critical uses,

*Recalling* decision Ex.I/4, which requests parties with critical-use exemptions to submit annual accounting frameworks,

1. To permit, for the agreed critical-use categories for 2017 and 2018 set forth in table A of the annex to the present decision for each party, subject to the conditions set forth in the present decision and in decision Ex.I/4, to the extent that those conditions are applicable, the levels of production and consumption for 2017 and 2018 set forth in table B of the annex to the present decision, which are necessary to satisfy critical uses, with the understanding that additional production and consumption and categories of use may be approved by the Meeting of the Parties in accordance with decision IX/6;

2. That parties shall endeavour to license, permit, authorize or allocate quantities of methyl bromide for critical uses as listed in table A of the annex to the present decision;

3. That each party that has an agreed critical-use exemption shall renew its commitment to ensuring that the criteria in paragraph 1 of decision IX/6, in particular the criterion laid down in paragraph 1 (b) (ii) of decision IX/6, are applied in licensing, permitting or authorizing critical uses of methyl bromide, with each party requested to report on the implementation of the present provision to the Ozone Secretariat by 1 February for the years to which the present decision applies;

**Annex to decision XXVIII/7**

Table A

**Agreed critical-use categories**

(Metric tonnes)

2018	
Australia	Strawberry runners 29.730
2017	
Argentina	Strawberry fruit 38.84, tomato 64.10
Canada	Strawberry runners (Prince Edward Island) 5.261
China	Ginger, open field 74.617; ginger, protected 18.36
South Africa	Mills 4.1, structures 55.0

Table B

**Permitted levels of production and consumption<sup>a</sup>**

(Metric tonnes)

2018	
Australia	29.730
2017	
Argentina	102.94
Canada	5.261
China	92.977
South Africa	59.1

<sup>a</sup> Minus available stocks.

**Decision XXVIII/8: Phase-out of hydrochlorofluorocarbons**

*Aware* that parties not operating under paragraph 1 of Article 5 of the Montreal Protocol (non-Article 5 parties) are taking measures to reduce and eventually eliminate the production and consumption of the ozone-depleting substances listed in Annex C, group I (hydrochlorofluorocarbons),

*Recognizing* a need for continued consideration of issues related to hydrochlorofluorocarbons as indicated in paragraphs 12, 13, and 14 of decision XIX/6, and taking into account the report of the Technology and Economic Assessment Panel in response to decision XXVII/5,

*Noting* that Article 5 parties may require access to hydrochlorofluorocarbons produced by non-Article 5 parties to satisfy their basic domestic needs after 2020,

1. To request the Technology and Economic Assessment Panel, in relation to Annex C, group I, substances:

(a) To continue to assess sectors, including subsectors, if any, where essential uses for non-Article 5 parties may be needed after 1 January 2020, including estimates of the volumes of hydrochlorofluorocarbons that may be needed;

(b) To continue to assess the servicing requirements for refrigeration and air-conditioning equipment and any other possible needs in other sectors between 2020 and 2030 for non-Article 5 parties;

(c) To continue to review recent volumes of production of each of the hydrochlorofluorocarbons to satisfy basic domestic needs and to make projected estimates of such future production and estimated needs of Article 5 parties to satisfy basic domestic needs beyond 1 January 2020;

2. To invite parties to provide relevant information to the Ozone Secretariat by 15 March 2017 for inclusion in the Panel's assessment;

3. To request the Panel to report on the assessment referred to above to the Open-ended Working Group at its thirty-ninth meeting, in 2017;

### **Decision XXVIII/9: Data and information provided by the parties in accordance with Article 7 of the Montreal Protocol**

1. To note that 195 parties of the 197 that should have reported data for 2015 have done so and that 169 of those parties reported their data by 30 September 2016 as required under paragraph 3 of Article 7 of the Montreal Protocol;

2. To note with appreciation that 119 of those parties reported their data by 30 June 2016 in accordance with decision XV/15 and that reporting by 30 June each year greatly facilitates the work of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in assisting parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 parties) to comply with the Protocol's control measures;

3. To note further that a lack of timely data reporting by parties impedes the effective monitoring and assessment of parties' compliance with their obligations under the Montreal Protocol;

4. To note with concern that two parties, namely, Iceland and Yemen, have not reported their 2015 data as required under Article 7 of the Montreal Protocol and that this places them in non-compliance with their data reporting obligations under the Montreal Protocol until such time as the Secretariat receives their outstanding data;

5. To urge the parties listed in the preceding paragraph to report the required data to the Secretariat as quickly as possible and to urge the one Article 5 party, namely, Yemen, where appropriate, to work closely with the implementing agencies in reporting the required data;

6. To request the Implementation Committee to review the situation of the parties listed in the preceding paragraphs at its fifty-eighth meeting;

7. To encourage parties to continue to report consumption and production data as soon as figures are available, and preferably by 30 June each year, as agreed in decision XV/15;

### **Decision XXVIII/10: Non-compliance by Israel with its data and information reporting obligations**

*Noting* that Israel ratified the Montreal Protocol on Substances that Deplete the Ozone Layer and the London Amendment on 30 June 1992, the Copenhagen Amendment on 5 April 1995, the Montreal Amendment on 28 May 2003 and the Beijing Amendment on 15 April 2004 and is classified as a party not operating under paragraph 1 of Article 5 of the Protocol,

1. To note with concern that Israel has not reported on its use of controlled substances as process agents in 2014 and 2015, as required by paragraph 4 (a) of decision X/14, and to note that Israel's failure to report the required information placed the party in non-compliance with its reporting obligations under that decision;

2. Also to note with concern that Israel has not yet provided the information required under paragraph 3 of decision XXII/20 on the measures that it has in place to avoid the diversion to unauthorized uses of 17.3 ODP-tonnes of excess production of bromochloromethane stockpiled in 2014;

3. To express its concern at Israel's repeated failure to respond to the requests for information recorded in recommendations 55/4, 56/5 and 56/7 of the Implementation Committee;

4. To request Israel to submit to the Secretariat as soon as possible, and no later than 31 March 2017, the outstanding information on:

(a) Its use of controlled substances as process agents in 2014 and 2015, as required by paragraph 4 (a) of decision X/14;

(b) The measures it has put in place to avoid the diversion to unauthorized uses of the 17.3 ODP-tonnes of excess production of bromochloromethane stockpiled in 2014, in accordance with paragraph 3 of decision XXII/20;

5. To request the Implementation Committee to review the situation of Israel at its fifty-eighth meeting;

### **Decision XXVIII/11: Non-compliance in 2014 by Guatemala with the provisions of the Montreal Protocol governing consumption of the controlled substances in Annex C, group I (hydrochlorofluorocarbons)**

*Noting* that Guatemala ratified the Montreal Protocol on Substances that Deplete the Ozone Layer on 7 November 1989 and the London Amendment, the Copenhagen Amendment, the Montreal Amendment and the Beijing Amendment on 21 January 2002 and is classified as a party operating under paragraph 1 of Article 5 of the Protocol,

*Noting also* that the Executive Committee has approved \$9,772,935 from the Multilateral Fund for the Implementation of the Montreal Protocol in accordance with Article 10 of the Protocol to enable Guatemala to achieve compliance with the Protocol,

1. That the annual consumption reported by Guatemala for the controlled substances in Annex C, group I (hydrochlorofluorocarbons), of 4.74 ODP-tonnes in 2014 was inconsistent with its commitment set out in decision XXVI/16 to reduce consumption of hydrochlorofluorocarbons to no greater than 4.35 ODP-tonnes in that year and that the party was therefore in non-compliance with the consumption control measures for that substance under the Protocol for that year;

2. To note with appreciation the submission by Guatemala of an explanation for its compliance situation and its correction of its hydrochlorofluorocarbon consumption to 9.84 ODP-tonnes in 2013 and 4.74 ODP-tonnes in 2014, attributing the previous incorrect data to a technical error in computing the consumption of that substance in the country for those two years;

3. To note also that despite the revision of its 2013 data the party remained in non-compliance with its hydrochlorofluorocarbon consumption obligations under the Protocol for 2013;

4. To agree that the data corrections for 2013 and 2014 will not vary any of the benchmarks already recorded and agreed in decision XXVI/16;

5. To note that Guatemala has reported data for 2015 that indicate that it has already returned to compliance with the Protocol's hydrochlorofluorocarbon control measures and to congratulate Guatemala on that progress;

6. To urge Guatemala to work with the relevant implementing agencies to implement the remainder of the plan of action in decision XXVI/16;

7. To continue to monitor closely the progress of Guatemala with regard to the implementation of its plan of action and the phase-out of hydrochlorofluorocarbons. To the degree that the party is working towards and meeting the specific Protocol control measures, it should continue to be treated in the same manner as a party in good standing. In that regard, Guatemala should continue to receive international assistance to enable it to meet those commitments in accordance with item A of the indicative list of measures that may be taken by the Meeting of the Parties in respect of non-compliance;

### **Decision XXVIII/12: Membership of the Technology and Economic Assessment Panel**

1. To thank the Technology and Economic Assessment Panel for its outstanding reports and to thank the individual members of the Panel for their outstanding service and dedication;

2. To endorse the appointment of Mr. Rajendra Shende (India) as Senior Expert of the Technology and Economic Assessment Panel for a term of four years;

3. To endorse the appointment of Ms. Bella Maranion (United States of America) as Co-Chair of the Technology and Economic Assessment Panel for an additional four-year term;

4. To endorse the appointment of Mr. Paulo Altoé (Brazil) as Co-Chair of the Flexible and Rigid Foams Technical Options Committee for a term of four years;

5. To endorse the appointment of Mr. Daniel P. Verdonik (United States) as Co-Chair of the Halons Technical Options Committee for a term of four years;

6. To endorse the appointment of Mr. Adam Chattaway (United Kingdom of Great Britain and Northern Ireland) as Co-Chair of the Halons Technical Options Committee for a term of four years;

### **Decision XXVIII/13: Membership of the Implementation Committee**

1. To note with appreciation the work carried out by the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol in 2016;
2. To confirm the positions of Bangladesh, Canada, Haiti, Kenya and Romania as members of the Committee for one further year and to select the Congo, Georgia, Jordan, Paraguay and the United Kingdom of Great Britain and Northern Ireland as members of the Committee for a two-year period beginning on 1 January 2017;
3. To note the selection of Mr. Brian Ruddle (United Kingdom of Great Britain and Northern Ireland) to serve as President and of Mr. Leonard Marindany Kirui (Kenya) to serve as Vice-President and Rapporteur of the Committee for one year beginning on 1 January 2017;

### **Decision XXVIII/14: Membership of the Executive Committee of the Multilateral Fund**

1. To note with appreciation the work carried out by the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol with the assistance of the Fund secretariat in 2016;
2. To endorse the selection of Australia, Austria, Belgium, Germany, Japan, Slovakia and the United States of America as members of the Executive Committee representing parties not operating under paragraph 1 of Article 5 of the Protocol and the selection of Argentina, Bosnia and Herzegovina, Cameroon, China, Lebanon, Mexico and Nigeria as members representing parties operating under that paragraph, for one year beginning 1 January 2017;
3. To note the selection of Mr. Paul Krajnik (Austria) to serve as Chair and Mr. Mazen Hussein (Lebanon) to serve as Vice-Chair of the Executive Committee for one year beginning 1 January 2017;

### **Decision XXVIII/15: Co-Chairs of the Open-ended Working Group of the Parties to the Montreal Protocol**

To endorse the selection of Mr. Cheikh Ndiaye Sylla (Senegal) and Ms. Cynthia Newberg (United States of America) as co-chairs of the Open-ended Working Group of the Parties to the Montreal Protocol in 2017;

### **Decision XXVIII/16: Financial reports and budgets for the Montreal Protocol**

*Recalling* decision XXVII/18 on the financial report and budget of the trust fund for the Montreal Protocol,

*Taking note* of the financial report on the Trust Fund for the Montreal Protocol on Substances that Deplete the Ozone Layer for the year ended 31 December 2015,<sup>3</sup>

*Recognizing* that voluntary contributions are an essential complement for the effective implementation of the Montreal Protocol,

*Welcoming* the continued efficient management by the Secretariat of the finances of the Trust Fund for the Montreal Protocol,

*Noting* the depletion of the funding balance in 2016,

1. To approve the revised 2016 budget in the amount of \$6,772,162 and the 2017 budget of \$5,355,004, as set out in annex IV to the report of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;<sup>4</sup>
2. To reaffirm that a working capital reserve shall be maintained at a level of 15 per cent of the annual budget to meet the final expenditures under the Trust Fund, to note that such reserve shall be in the amount of \$803,251 for 2017 and to take note of the proposed reserve for 2018 in the amount of \$824,779;

<sup>3</sup> UNEP/OzL.Pro.28/4/Add.1.

<sup>4</sup> UNEP/OzL.Pro.28/12.

3. To approve, as a consequence of funding the working capital reserve referred to in paragraph 2 of the present decision, total contributions to be paid by the parties of \$4,276,933 for 2016 and \$5,756,630 for 2017 and to take note of the contributions of \$5,910,915 for 2018 as set out in annex V to the report of the Twenty-Eighth Meeting of the Parties and in the summary table immediately below;

<b>Summary of contributions</b>		
<i>Year</i>	<i>2017</i>	<i>2018</i>
Approved/proposed budget	5 355 004	5 498 526
7.5% of budget to replenish cash reserve	401 625	412 389
<b>Total contributions</b>	<b>5 756 630</b>	<b>5 910 915</b>

4. That the contributions of individual parties for 2017 and indicative contributions for 2018 shall be as listed in annex V to the report of the Twenty-Eighth Meeting of the Parties;

5. To note with concern that a number of parties have not paid their contributions for 2016 and prior years and to urge those parties to pay both their outstanding contributions and their future contributions promptly and in full, particularly given that the fund balance has been significantly depleted;

6. To request the Executive Secretary and to invite the President of the Meeting of the Parties to enter into discussions with any party whose contributions are outstanding for two or more years with a view to finding a way forward, and to request that the Executive Secretary report to the Twenty-Ninth Meeting of the Parties on the outcome of those discussions;

7. To decide to further consider, at its next meeting, how to address outstanding contributions to the trust fund and to request the Executive Secretary to continue to publish and regularly update information on the status of contributions to the Protocol's trust funds;

8. To request the Secretariat to ensure the full utilization of programme support costs available to it in 2017 and later years and where possible to offset those costs against the administrative components of the approved budget;

9. To invite parties to provide additional voluntary contributions to the trust fund entitled "Support of the Activities of the Ozone Secretariat" for any unbudgeted meetings;

10. In addition to the funds allocated from the core budget to cover the travel costs of representatives from parties operating under paragraph 1 of Article 5, to encourage parties to contribute to the trust fund entitled "Support of the Activities of the Ozone Secretariat" with a view to ensuring the full and effective participation of parties operating under paragraph 1 of Article 5 in the meetings of the Meeting of the Parties and the Open-ended Working Group;

11. To encourage parties and other stakeholders to contribute financially and by other means to assist the members of the assessment panels and their subsidiary bodies with a view to ensuring their continued participation in the assessment activities under the Protocol;

12. To request the Secretariat to indicate in future financial reports of the trust fund for the Montreal Protocol the amounts of cash on hand in the section entitled "Total reserves and fund balances" in addition to contributions that have not yet been received;

### **Decision XXVIII/17: Dates and venue of the Twenty-Ninth Meeting of the Parties to the Montreal Protocol**

To convene the Twenty-Ninth Meeting of the Parties to the Montreal Protocol in Montreal, Canada, and to announce a firm date for the meeting as soon as possible.

## **X. Adoption of the report**

212. The parties adopted the present report on Saturday, 15 October 2016, on the basis of the draft report set out in documents UNEP/OzL.Pro.28/L.1 and Add.1.

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## **XI. Closure of the meeting**

213. Under the item one representative, speaking on behalf of a group of parties, expressed thanks to Mr. Kuijpers for his long years of service as member and co-chair of the Technology and Economic Assessment Panel and its Refrigeration, Air-Conditioning and Heat Pumps Technical Options Committee.

214. The Twenty-Eighth Meeting of the Parties to the Montreal Protocol was then declared closed at 8.05 am on Saturday, 15 October 2016.

## Annex I

### Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer

#### Article I: Amendment

##### *Article 1, paragraph 4*

In paragraph 4 of Article 1 of the Protocol, for the words:

“Annex C or Annex E”

there shall be substituted:

“Annex C, Annex E or Annex F”

##### *Article 2, paragraph 5*

In paragraph 5 of Article 2 of the Protocol, for the words:

“and Article 2H”

there shall be substituted:

“Articles 2H and 2J”

##### *Article 2, paragraphs 8 (a), 9(a) and 11*

In paragraphs 8 (a) and 11 of Article 2 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

The following words shall be added at the end of subparagraph (a) of paragraph 8 of Article 2 of the Protocol:

“Any such agreement may be extended to include obligations respecting consumption or production under Article 2J provided that the total combined calculated level of consumption or production of the Parties concerned does not exceed the levels required by Article 2J.”

In subparagraph (a) (i) of paragraph 9 of Article 2 of the Protocol, after the second use of the words:

“should be;”

there shall be deleted:

“and”

Subparagraph (a) (ii) of paragraph 9 of Article 2 of the Protocol shall be renumbered as subparagraph (a) (iii).

The following shall be added as subparagraph (a) (ii) after subparagraph (a) (i) of paragraph 9 of Article 2 of the Protocol:

“Adjustments to the global warming potentials specified in Group I of Annex A, Annex C and Annex F should be made and, if so, what the adjustments should be; and”

##### *Article 2J*

The following Article shall be inserted after Article 2I of the Protocol:

“Article 2J: Hydrofluorocarbons

1. Each Party shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of

consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO<sub>2</sub> equivalents:

- (a) 2019 to 2023: 90 per cent
  - (b) 2024 to 2028: 60 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
2. Notwithstanding paragraph 1 of this Article, the Parties may decide that a Party shall ensure that, for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its calculated level of consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2020 to 2024: 95 per cent
  - (b) 2025 to 2028: 65 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
3. Each Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2019 to 2023: 90 per cent
  - (b) 2024 to 2028: 60 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
4. Notwithstanding paragraph 3 of this Article, the Parties may decide that a Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2020 to 2024: 95 per cent
  - (b) 2025 to 2028: 65 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent

5. Paragraphs 1 to 4 of this Article will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by the Parties to be exempted uses.
6. Each Party manufacturing Annex C, Group I, or Annex F substances shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its emissions of Annex F, Group II, substances generated in each production facility that manufactures Annex C, Group I, or Annex F substances are destroyed to the extent practicable using technology approved by the Parties in the same twelve-month period.
7. Each Party shall ensure that any destruction of Annex F, Group II, substances generated by facilities that produce Annex C, Group I, or Annex F substances shall occur only by technologies approved by the Parties.

### *Article 3*

The preamble to Article 3 of the Protocol should be replaced with the following:

“1. For the purposes of Articles 2, 2A to 2J and 5, each Party shall, for each group of substances in Annex A, Annex B, Annex C, Annex E or Annex F, determine its calculated levels of:”

For the final semi-colon of subparagraph (a) (i) of Article 3 of the Protocol there shall be substituted:

“, except as otherwise specified in paragraph 2;”

The following text shall be added to the end of Article 3 of the Protocol:

“; and

(d) Emissions of Annex F, Group II, substances generated in each facility that generates Annex C, Group I, or Annex F substances by including, among other things, amounts emitted from equipment leaks, process vents and destruction devices, but excluding amounts captured for use, destruction or storage.

2. When calculating levels, expressed in CO<sub>2</sub> equivalents, of production, consumption, imports, exports and emissions of Annex F and Annex C, Group I, substances for the purposes of Article 2J, paragraph 5 *bis* of Article 2 and paragraph 1 (d) of Article 3, each Party shall use the global warming potentials of those substances specified in Group I of Annex A, Annex C and Annex F.”

### *Article 4, paragraph 1 sept*

The following paragraph shall be inserted after paragraph 1 *sex* of Article 4 of the Protocol:

“1 *sept*. Upon entry into force of this paragraph, each Party shall ban the import of the controlled substances in Annex F from any State not Party to this Protocol.”

### *Article 4, paragraph 2 sept*

The following paragraph shall be inserted after paragraph 2 *sex* of Article 4 of the Protocol:

“2 *sept*. Upon entry into force of this paragraph, each Party shall ban the export of the controlled substances in Annex F to any State not Party to this Protocol.”

### *Article 4, paragraphs 5, 6 and 7*

In paragraphs 5, 6 and 7 of Article 4 of the Protocol, for the words:

“Annexes A, B, C and E”

there shall be substituted:

“Annexes A, B, C, E and F”

### *Article 4, paragraphs 8*

In paragraph 8 of Article 4 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

*Article 4B*

The following paragraph shall be inserted after paragraph 2 of Article 4B of the Protocol:

“2 *bis*. Each Party shall, by 1 January 2019 or within three months of the date of entry into force of this paragraph for it, whichever is later, establish and implement a system for licensing the import and export of new, used, recycled and reclaimed controlled substances in Annex F. Any Party operating under paragraph 1 of Article 5 that decides it is not in a position to establish and implement such a system by 1 January 2019 may delay taking those actions until 1 January 2021.”

*Article 5*

In paragraph 4 of Article 5 of the Protocol, for the word:

“2I”

there shall be substituted:

“2J”

In paragraphs 5 and 6 of Article 5 of the Protocol, for the words:

“Article 2I”

there shall be substituted:

“Articles 2I and 2J”

In paragraph 5 of Article 5 of the Protocol, before the words:

“any control measures”

there shall be inserted:

“with”

The following paragraph shall be inserted after paragraph 8 *ter* of Article 5 of the Protocol:

“8 *qua*

(a) Each Party operating under paragraph 1 of this Article, subject to any adjustments made to the control measures in Article 2J in accordance with paragraph 9 of Article 2, shall be entitled to delay its compliance with the control measures set out in subparagraphs (a) to (e) of paragraph 1 of Article 2J and subparagraphs (a) to (e) of paragraph 3 of Article 2J and modify those measures as follows:

- (i) 2024 to 2028: 100 per cent
- (ii) 2029 to 2034: 90 per cent
- (iii) 2035 to 2039: 70 per cent
- (iv) 2040 to 2044: 50 per cent
- (v) 2045 and thereafter: 20 per cent

(b) Notwithstanding subparagraph (a) above, the Parties may decide that a Party operating under paragraph 1 of this Article, subject to any adjustments made to the control measures in Article 2J in accordance with paragraph 9 of Article 2, shall be entitled to delay its compliance with the control measures set out in subparagraphs (a) to (e) of paragraph 1 of Article 2J and subparagraphs (a) to (e) of paragraph 3 of Article 2J and modify those measures as follows:

- (i) 2028 to 2031: 100 per cent
- (ii) 2032 to 2036: 90 per cent
- (iii) 2037 to 2041: 80 per cent
- (iv) 2042 to 2046: 70 per cent
- (v) 2047 and thereafter: 15 per cent

(c) Each Party operating under paragraph 1 of this Article, for the purposes of calculating its consumption baseline under Article 2J, shall be entitled to use the average of its calculated levels of consumption of Annex F controlled substances for the years 2020, 2021 and 2022,

plus sixty-five per cent of its baseline consumption of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(d) Notwithstanding subparagraph (c) above, the Parties may decide that a Party operating under paragraph 1 of this Article, for the purposes of calculating its consumption baseline under Article 2J, shall be entitled to use the average of its calculated levels of consumption of Annex F controlled substances for the years 2024, 2025 and 2026, plus sixty-five per cent of its baseline consumption of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(e) Each Party operating under paragraph 1 of this Article and producing the controlled substances in Annex F, for the purposes of calculating its production baseline under Article 2J, shall be entitled to use the average of its calculated levels of production of Annex F controlled substances for the years 2020, 2021 and 2022, plus sixty-five per cent of its baseline production of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(f) Notwithstanding subparagraph (e) above, the Parties may decide that a Party operating under paragraph 1 of this Article and producing the controlled substances in Annex F, for the purposes of calculating its production baseline under Article 2J, shall be entitled to use the average of its calculated levels of production of Annex F controlled substances for the years 2024, 2025 and 2026, plus sixty-five per cent of its baseline production of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(g) Subparagraphs (a) to (f) of this paragraph will apply to calculated levels of production and consumption save to the extent that a high-ambient-temperature exemption applies based on criteria decided by the Parties.”

#### *Article 6*

In Article 6 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

#### *Article 7, paragraphs 2, 3 and 3 ter*

The following line shall be inserted after the line that reads “– in Annex E, for the year 1991,” in paragraph 2 of Article 7 of the Protocol:

“– in Annex F, for the years 2011 to 2013, except that Parties operating under paragraph 1 of Article 5 shall provide such data for the years 2020 to 2022, but those Parties operating under paragraph 1 of Article 5 to which subparagraphs (d) and (f) of paragraph 8 *qua* of Article 5 applies shall provide such data for the years 2024 to 2026;”

In paragraphs 2 and 3 of Article 7 of the Protocol, for the words:

“C and E”

there shall be substituted:

“C, E and F”

The following paragraph shall be added to Article 7 of the Protocol after paragraph 3 *bis*:

“3 *ter*. Each Party shall provide to the Secretariat statistical data on its annual emissions of Annex F, Group II, controlled substances per facility in accordance with paragraph 1 (d) of Article 3 of the Protocol.”

#### *Article 7, paragraph 4*

In paragraph 4 of Article 7, after the words:

“statistical data on” and “provides data on”

there shall be added:

“production,”

*Article 10, paragraph 1*

In paragraph 1 of Article 10 of the Protocol, for the words:

“and Article 2I”

There shall be substituted:

“, Article 2I and Article 2J”

The following shall be inserted at the end of paragraph 1 of Article 10 of the Protocol:

“Where a Party operating under paragraph 1 of Article 5 chooses to avail itself of funding from any other financial mechanism that could result in meeting any part of its agreed incremental costs, that part shall not be met by the financial mechanism under Article 10 of this Protocol.”

*Article 17*

In Article 17 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

*Annex A*

The following table shall replace the table for Group I in Annex A to the Protocol:

Group	Substance	Ozone-Depleting Potential*	100-Year Global Warming Potential
<i>Group I</i>			
	CFCl <sub>3</sub> (CFC-11)	1.0	4 750
	CF <sub>2</sub> Cl <sub>2</sub> (CFC-12)	1.0	10 900
	C <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub> (CFC-113)	0.8	6 130
	C <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub> (CFC-114)	1.0	10 000
	C <sub>2</sub> F <sub>5</sub> Cl (CFC-115)	0.6	7 370

*Annex C and Annex F*

The following table shall replace the table for Group I in Annex C to the Protocol:

Group	Substance	Number of isomers	Ozone-Depleting Potential*	100-Year Global Warming Potential***
<i>Group I</i>				
	CHFC <sub>2</sub> (HCFC-21)**	1	0.04	151
	CHF <sub>2</sub> Cl (HCFC-22)**	1	0.055	1810
	CH <sub>2</sub> FCl (HCFC-31)	1	0.02	
	C <sub>2</sub> HFCl <sub>4</sub> (HCFC-121)	2	0.01–0.04	
	C <sub>2</sub> HF <sub>2</sub> Cl <sub>3</sub> (HCFC-122)	3	0.02–0.08	
	C <sub>2</sub> HF <sub>3</sub> Cl <sub>2</sub> (HCFC-123)	3	0.02–0.06	77
	CHCl <sub>2</sub> CF <sub>3</sub> (HCFC-123)**	–	0.02	
	C <sub>2</sub> HF <sub>4</sub> Cl (HCFC-124)	2	0.02–0.04	609
	CHFClCF <sub>3</sub> (HCFC-124)**	–	0.022	
	C <sub>2</sub> H <sub>2</sub> FCl <sub>3</sub> (HCFC-131)	3	0.007–0.05	
	C <sub>2</sub> H <sub>2</sub> F <sub>2</sub> Cl <sub>2</sub> (HCFC-132)	4	0.008–0.05	
	C <sub>2</sub> H <sub>2</sub> F <sub>3</sub> Cl (HCFC-133)	3	0.02–0.06	
	C <sub>2</sub> H <sub>3</sub> FCl <sub>2</sub> (HCFC-141)	3	0.005–0.07	
	CH <sub>3</sub> CFCl <sub>2</sub> (HCFC-141b)**	–	0.11	725
	C <sub>2</sub> H <sub>3</sub> F <sub>2</sub> Cl (HCFC-142)	3	0.008–0.07	
	CH <sub>3</sub> CF <sub>2</sub> Cl (HCFC-142b)**	–	0.065	2310

C <sub>2</sub> H <sub>4</sub> FCI	(HCFC-151)	2	0.003–0.005	
C <sub>3</sub> HFCl <sub>6</sub>	(HCFC-221)	5	0.015–0.07	
C <sub>3</sub> HF <sub>2</sub> Cl <sub>5</sub>	(HCFC-222)	9	0.01–0.09	
C <sub>3</sub> HF <sub>3</sub> Cl <sub>4</sub>	(HCFC-223)	12	0.01–0.08	
C <sub>3</sub> HF <sub>4</sub> Cl <sub>3</sub>	(HCFC-224)	12	0.01–0.09	
C <sub>3</sub> HF <sub>5</sub> Cl <sub>2</sub>	(HCFC-225)	9	0.02–0.07	
CF <sub>3</sub> CF <sub>2</sub> CHCl <sub>2</sub>	(HCFC-225ca)**	–	0.025	122
CF <sub>2</sub> ClCF <sub>2</sub> CHClF	(HCFC-225cb)**	–	0.033	595
C <sub>3</sub> HF <sub>6</sub> Cl	(HCFC-226)	5	0.02–0.10	
C <sub>3</sub> H <sub>2</sub> FCl <sub>5</sub>	(HCFC-231)	9	0.05–0.09	
C <sub>3</sub> H <sub>2</sub> F <sub>2</sub> Cl <sub>4</sub>	(HCFC-232)	16	0.008–0.10	
C <sub>3</sub> H <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub>	(HCFC-233)	18	0.007–0.23	
C <sub>3</sub> H <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub>	(HCFC-234)	16	0.01–0.28	
C <sub>3</sub> H <sub>2</sub> F <sub>5</sub> Cl	(HCFC-235)	9	0.03–0.52	
C <sub>3</sub> H <sub>3</sub> FCl <sub>4</sub>	(HCFC-241)	12	0.004–0.09	
C <sub>3</sub> H <sub>3</sub> F <sub>2</sub> Cl <sub>3</sub>	(HCFC-242)	18	0.005–0.13	
C <sub>3</sub> H <sub>3</sub> F <sub>3</sub> Cl <sub>2</sub>	(HCFC-243)	18	0.007–0.12	
C <sub>3</sub> H <sub>3</sub> F <sub>4</sub> Cl	(HCFC-244)	12	0.009–0.14	
C <sub>3</sub> H <sub>4</sub> FCl <sub>3</sub>	(HCFC-251)	12	0.001–0.01	
C <sub>3</sub> H <sub>4</sub> F <sub>2</sub> Cl <sub>2</sub>	(HCFC-252)	16	0.005–0.04	
C <sub>3</sub> H <sub>4</sub> F <sub>3</sub> Cl	(HCFC-253)	12	0.003–0.03	
C <sub>3</sub> H <sub>5</sub> FCl <sub>2</sub>	(HCFC-261)	9	0.002–0.02	
C <sub>3</sub> H <sub>5</sub> F <sub>2</sub> Cl	(HCFC-262)	9	0.002–0.02	
C <sub>3</sub> H <sub>6</sub> FCl	(HCFC-271)	5	0.001–0.03	

\* Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

\*\* Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.

\*\*\* For substances for which no GWP is indicated, the default value 0 applies until a GWP value is included by means of the procedure foreseen in paragraph 9 (a) (ii) of Article 2.

The following annex shall be added to the Protocol after Annex E:

*“Annex F: Controlled substances*

Group	Substance	100-Year Global Warming Potential	
<b>Group I</b>			
	CHF <sub>2</sub> CHF <sub>2</sub>	HFC-134	1 100
	CH <sub>2</sub> FCF <sub>3</sub>	HFC-134a	1 430
	CH <sub>2</sub> FCHF <sub>2</sub>	HFC-143	353
	CHF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	HFC-245fa	1 030
	CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> CH <sub>3</sub>	HFC-365mfc	794
	CF <sub>3</sub> CHF <sub>2</sub> CF <sub>3</sub>	HFC-227ea	3 220
	CH <sub>2</sub> FCF <sub>2</sub> CF <sub>3</sub>	HFC-236cb	1 340
	CHF <sub>2</sub> CHF <sub>2</sub> CF <sub>3</sub>	HFC-236ea	1 370
	CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	HFC-236fa	9 810
	CH <sub>2</sub> FCF <sub>2</sub> CHF <sub>2</sub>	HFC-245ca	693
	CF <sub>3</sub> CHFCH <sub>2</sub> CF <sub>2</sub> CF <sub>3</sub>	HFC-43-10mee	1 640
	CH <sub>2</sub> F <sub>2</sub>	HFC-32	675
	CHF <sub>2</sub> CF <sub>3</sub>	HFC-125	3 500
	CH <sub>3</sub> CF <sub>3</sub>	HFC-143a	4 470
	CH <sub>3</sub> F	HFC-41	92
	CH <sub>2</sub> FCH <sub>2</sub> F	HFC-152	53
	CH <sub>3</sub> CHF <sub>2</sub>	HFC-152a	124
<b>Group II</b>			
	CHF <sub>3</sub>	HFC-23	14 800

**Article II: Relationship to the 1999 Amendment**

No State or regional economic integration organization may deposit an instrument of ratification, acceptance or approval of or accession to this Amendment unless it has previously, or simultaneously, deposited such an instrument to the Amendment adopted at the Eleventh Meeting of the Parties in Beijing, 3 December 1999.

**Article III: Relationship to the United Nations Framework Convention on Climate Change and its Kyoto Protocol**

This Amendment is not intended to have the effect of excepting hydrofluorocarbons from the scope of the commitments contained in Articles 4 and 12 of the United Nations Framework Convention on Climate Change or in Articles 2, 5, 7 and 10 of its Kyoto Protocol.

**Article IV: Entry into force**

1. Except as noted in paragraph 2, below, this Amendment shall enter into force on 1 January 2019, provided that at least twenty instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.
2. The changes to Article 4 of the Protocol, Control of trade with non-Parties, set out in Article I of this Amendment shall enter into force on 1 January 2033, provided that at least seventy instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.
3. For purposes of paragraphs 1 and 2, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.
4. After the entry into force of this Amendment, as provided under paragraphs 1 and 2, it shall enter into force for any other Party to the Protocol on the ninetieth day following the date of deposit of its instrument of ratification, acceptance or approval.

**Article V: Provisional application**

Any Party may, at any time before this Amendment enters into force for it, declare that it will apply provisionally any of the control measures set out in Article 2J, and the corresponding reporting obligations in Article 7, pending such entry into force.

## Annex II

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

#### A. Presentation by members of the Technology and Economic Assessment Panel on updated and new information on alternatives to ozone-depleting substances (decision XXVII/4)

Ms. Bella Maranion, on behalf of the task force established by the Technology and Economic Assessment Panel in response to decision XXVII/4 and the task force co-chairs Mr. Lambert Kuijpers and Mr. Roberto Peixoto, along with and Mr. Fabio Polonara, Mr. Ashley Woodcock and Ms. Helen Tope, members of the task force, gave a presentation on the updated report on alternatives to ozone-depleting substances called for in paragraph 1 of decision XXVII/4. Ms. Maranion started the presentation by briefly reviewing the decision, which requested the Panel to prepare a report that would update and provide new information on alternatives to ozone-depleting substance based on guidance and criteria set out in decision XXVI/9. She said that the members of the task force were the same as those that had prepared the report for the Open-ended Working Group at its thirty-eighth meeting as called for by decision XXVII/4. She expressed appreciation for the efforts of the task force members in the preparation of the update report and discussed the three reports prepared by the task force in response to the decision. The first report, submitted to the Open-ended Working Group at its thirty-seventh meeting, had focused on the refrigeration and air-conditioning (R/AC) sector, including updates on alternatives in that sector based on those listed in the Panel's September 2015 decision XXVI/9 task force report. It had also provided information on programmes for testing alternative refrigerants under high ambient temperature (HAT) conditions and extended the mitigation scenarios to 2050. The second task force report had provided further updates to the R/AC sector information based on informal discussions held at the thirty-seventh meeting of the Open-ended Working Group. It also responded to other parts of decision XXVII/4, including by providing information on alternatives for refrigeration systems in fishing vessels and updating the information on HAT refrigerant testing programmes and the scenarios assumptions. For the Twenty-Eighth Meeting of the Parties, the task force prepared the updated report taking into account the discussions during the thirty-eighth meeting of the Open-ended Working Group. Based on those discussions, she outlined the specific topics that were addressed in the current report, which included responding to comments on the HAT exemption methodology; responding to comments on scenarios by providing further information related to HFC production; providing updated tables for total new manufacturing and servicing demand; and providing new and updated information on the availability of alternatives for foam blowing, metered-dose inhalers and aerosols.

Mr. Polonara then presented updates for the R/AC sector. He noted that the information on the refrigerants and blends in the updated report remained the same as in the report for the thirty-eighth meeting of the Open-ended Working Group. The updated report also included additional information about two organizations important to international refrigeration standards: the International Electro-technical Commission (IEC) and the International Organization for Standardization (ISO). He explained that both organizations developed standards that included requirements for refrigerant safety (definitions and charge limits) and maintenance procedures (safe practices, avoiding leaks of refrigerants). Working groups, subcommittees of the technical committee of IEC and ISO, drafted the text of standards related to refrigeration systems safety. In the case of widely-recognized national standards (e.g., ASHRAE, UL and SAE from the United States), there were efforts to harmonize them with international standards as appropriate. There was a strong focus on enabling climate-friendly refrigerants in both international standards processes. ISO/TC86/SC1 was re-evaluating the charge limits for flammable refrigerants. The focus to date had been on the A2L safety class (e.g., lower flammability refrigerants) but there was an increasing focus on the A2 and A3 safety classes (e.g., HFC-152a, hydrocarbons). IEC/TC61 was considering display cabinets to allow for larger charges of flammable refrigerants; for A2L and A3 refrigerants, that evaluation had started in 2015 with the aim of producing a new standard by 2018. It also considered domestic and commercial air-conditioning and heat pumps to allow for larger charges of flammable refrigerants; for A2L refrigerants, the evaluation had started in 2011 and a new standard was projected to be available by 2018 or 2019; for A3 refrigerants, the evaluation had started in 2015 and a new standard was expected to be ready by 2021.

Mr. Polonara then discussed the limited review of the preliminary proposal to define HAT countries that had been discussed by parties at the thirty-seventh meeting of the Open-ended Working Group.

The task force had reviewed information provided on that proposal, using a database providing temperature measurements in many countries (i.e., weather stations) in the world. The HAT criterion was an average of at least two months per year (over 10 consecutive years) of a peak monthly average temperature above 35°C. He noted that in this possible approach, varying parameters might result in certain changes; the task force had made no further technical assessment, however, as the issue was still being discussed by the parties. Mr. Polonara then noted that the scenarios of the updated report remained the same as in the report for the thirty-seventh meeting of the Open-ended Working Group. The updated report, however, also provided additional information on the production of various HFCs, a comparison of estimated production with the global calculated demand and updated annex tables for total new manufacturing and servicing demand.

Mr. Ashley Woodcock presented information on a new chapter in the updated report on foams. He noted that the information on new blowing agents remained the same as in the 2014 report prepared by the Panel task force in response to decision XXV/5. Hydrocarbons remained the major alternative for many foam sectors in large or medium-sized enterprises where local regulations permitted their use. Oxygenated hydrocarbons such as methyl formate and methylal were generally seen as less flammable than hydrocarbons and were used as alternatives to hydrocarbons, depending on local codes. Hydrofluoroolefins and Hydrochlorofluoroolefins might be used in blends to balance cost and performance (although developments were still ongoing) and were becoming increasingly available commercially, with additional production capacity under construction. For the foams business-as-usual (BAU) and mitigation scenarios, he noted that the calculation of the BAU with regulations scenario assumed entry into force of two final regulations: the European Union's fluorinated gas regulation and the United States Environmental Protection Agency's Significant New Alternatives Policy (2015). He explained a figure showing decreasing BAU HFC demand for foam blowing agents in non-Article 5 parties and increasing demand in Article 5 parties over the period 2006-2050.

Ms. Helen Tope presented information on a new chapter in the updated report on metered-dose inhalers and aerosols, which included non-metered-dose-inhaler medical, consumer and technical aerosols. Metered-dose inhalers for asthma and chronic obstructive pulmonary disease used approximately 10,000 tonnes per year of HFC-134a and HFC-227ea. A BAU scenario estimated total cumulative HFC demand of 990 Mt CO<sub>2</sub>-eq (~30 Mt CO<sub>2</sub>-eq./year). She noted that both HFC metered-dose inhaler and dry powder metered-dose inhaler and dry-powder inhaler alternatives were available for all key classes of drugs used in the treatment of asthma and chronic obstructive pulmonary disease. Completely avoiding HFC metered-dose inhalers was not yet feasible, however, because there were economic impediments to switching to multi-dose dry-powder inhalers for salbutamol and because a minority of patients could not use available alternatives. Regarding aerosols, she estimated global HFC demand for aerosols at 44 kilotonnes in 2015, with about 15 kilotonnes of HFC-134a and 29 kilotonnes of HFC-152a. A BAU scenario for global HFC demand (HFC-134a and HFC-152a) for aerosols for the period 2015-2050 estimated total cumulative HFC demand at 740 Mt CO<sub>2</sub>-eq. (~20 Mt CO<sub>2</sub>-eq./year). She said that relatively low-GWP options and not-in-kind alternatives, where suited for the purpose, were available for HFC propellants and solvents, although their adoption might not always be feasible in some markets or for some products.

**B. Presentation by members of the Technology and Economic Assessment Panel on an assessment of the climate benefits and financial implications for the Multilateral Fund of the HFC phase-down schedules in the amendment proposals (decision EX.III/1)**

Ms. Bella Maranion and Mr. Lambert Kuijpers, co-chairs of the working group established by the Technology and Economic Assessment Panel in response to decision Ex.III/1, presented information on the report prepared by the working group.

Mr. Kuijpers started the presentation with a review of decision Ex.III/1 decision, by which the Meeting of the Parties had requested the Panel to "prepare a report for consideration by the twenty-eighth Meeting of the Parties containing an assessment of the climate benefits, and the financial implications for the Multilateral Fund, of the schedules for phasing down the use of hydrofluorocarbons (HFCs) contained in the amendment proposals as discussed by the Parties at the thirty-eighth meeting of the Open-ended Working Group and the Third Extraordinary Meeting of the Parties." To respond to the decision, the Panel formed a working group of eight panel members. The Panel's response to the decision was carefully considered, taking into account the need to define key terms, the challenge of understanding the context of the decision given that many of the sessions at which parties had discussed the proposed HFC amendments had been closed informal discussions and that the Panel had had only six weeks to complete its analysis and deliver a final report to facilitate

discussions at the Twenty-Eighth Meeting of the Parties. The objectives of the report were to provide a clear definition of terms, to build on the accepted methodology used by the Panel for the business-as-usual (BAU) and mitigation scenarios and to provide an initial assessment of the potential benefits and costs of the amendment proposals.

Mr. Kuijpers then described the key terms in decision Ex.III/1. “Climate benefit” was understood as a reduction in HFC consumption below that of a BAU scenario integrated over a specified period, which was a direct, simplified climate impact metrics method based on HFC consumption reductions. That was consistent with the Panel’s approach to mitigation scenarios in previous reports. He mentioned that achieved reductions were from HFC BAU consumption as a result of future implementation of mitigation measures, i.e., following the schedules contained in the HFC amendment proposals. The reductions were calculated from the years the controls started up to the year 2050. He noted that in the report “consumption” was used interchangeably with “demand” rather than as the term was defined under the Montreal Protocol. He said that “financial implications for the Multilateral Fund” meant costs to the Multilateral Fund for Article 5 party implementation of control schedules following the schedules for HFC phase-down in the amendment proposals. Those costs were calculated based on the current Multilateral Fund guidelines for costs, including stage II of the HCFC phase-out management plans (HPMPs). The “amendment proposals as discussed by parties” were the amendment proposal by Canada, Mexico and the United States of America (with additional text submitted in 2016) (referred to as “North America”); the amendment proposal by India; the amendment proposal by the European Union and its member States (referred to as “EU”); and the amendment proposal by Kiribati, the Marshall Islands, Mauritius, the Federated States of Micronesia, Palau, the Philippines, Samoa and Solomon Islands (referred to as “Island states”). For the additional proposals (providing only baseline and freeze dates) that resulted from the HFC contact group discussions at the thirty-eighth meeting of the Open-ended Working Group, the Panel had provided a limited analysis of potential climate benefits.

Switching to the starting point for the study, Mr. Kuijpers said that the report updated estimates for global HFC production and consumption in 2015 to establish whether there was good agreement and a sound basis for further analysis. The sources for global production information were public data, presentations and confidential information. Consumption data reported by some parties (i.e., the United States and the European Union) had been extrapolated to produce global estimates (2010–2014); furthermore, bottom-up estimates of demand by sector and subsector as the Panel had made in previous reports were used for the period after 2015. The 2015 estimates for HFC global production and consumption showed good agreement. The HFC BAU scenarios in the Ex.III/1 report included the R/AC, foams, metered-dose inhaler and aerosols and fire protection sectors. The HFCs considered in the report were HFC-32, HFC-125, HFC-134a, HFC-143a, HFC-152a, HFC-227ea, HFC-245fa and HFC-365mfc. The non-Article 5 party HFC BAU scenario took into account the final Fluorinated-gas regulation in the European Union, the July 2015 Significant New Alternatives Policy in the United States and certain reported HFC consumption by non-Article 5 parties up to 2014. The Article party 5 HFC BAU did not consider any HFC regulations. The HFC BAU for R/AC included manufacturing and servicing components. An important issue was that total HFC manufacturing demand was determined by the amount of equipment that was manufactured in the conversion from HCFCs, which was only applied to Article 5 parties, plus the continuing growth of new HFC equipment. For R/AC, the HFCs considered were HFC-32, HFC-125, HFC-134a and HFC-143a. It was necessary to take into account that, with 12–20 year R/AC equipment lifetimes, R/AC servicing amounts would be the same or larger than the amounts needed for manufacturing. He presented a figure showing the large percentage share of the R/AC sector in both the non-Article 5 party and Article 5 party total demand.

On climate benefits, Mr. Kuijpers said that the Panel had considered “climate benefit” to be a reduction in HFC consumption below that of a BAU scenario over the period from the control start year until 2050, which was consistent with the Panel’s approach in previous reports. The year 2050 had been chosen because it was consistent with the end-year requested by the parties for the scenarios in the Panel’s decision XXVII/4 task force report. A choice of different end years would lead to different climate benefits. He said that there were other methods of calculating “climate benefits” on the basis of estimated emissions, supported by atmospheric measurements (Velders, 2015), leading to direct global temperature impact via the radiative forcing in a given year. He showed an illustrative figure of how climate benefits for demand had been calculated.

Ms. Marañon continued the presentation with a description of how the Panel had calculated climate benefits. She listed a number of issues that had been taken into account, including historic HCFC consumption values and best estimates for the trend in future demand. HFC consumption to 2014 had been determined on the basis of available data, and consumption for 2015 had been checked against the best estimate of HFC 2015 production in order to ascertain the 2015 starting point for future BAU

demand calculations. She then showed a figure which gave the BAU scenario with and without with regulations for non-Article 5 parties, together with the four control schedules for non-Article 5 parties set out in the four amendment proposals.

She noted again that the control schedules, based on certain baselines and subsequent reductions, had been compared against the BAU scenario with regulations to identify the climate benefit, i.e., the difference in demand between the two, expressed in CO<sub>2</sub>-equivalent. Where it concerned the proposals for non-Article 5 parties, the North American proposal yielded a climate benefit of 10,690 Mt CO<sub>2</sub>-eq., the European Union proposal a benefit of 11,500 Mt CO<sub>2</sub>-eq., the Indian proposal a benefit of 10,000 Mt CO<sub>2</sub>-eq., and the Island States proposal a benefit of 12,470 Mt CO<sub>2</sub>-eq. She then showed a figure showing the BAU scenario for Article 5 parties, along with the control schedules as described in the amendment proposals. She noted that while the calculations for the European Union and Indian proposals had assumed that there would be no reduction steps after the freeze year until 2050, the proposals themselves indicated that possible reduction steps would be decided on in the future.

As to the cost calculations, she said that they encompassed manufacturing conversion costs (plus costs for production shutdown and servicing) and that costs for project preparation, institutional strengthening, capacity-building and other factors had not been included. Where available, the current Multilateral Fund cost guidelines for HCFC conversion had been used. She then showed a table with the cost effectiveness ranges for the various sectors subsectors, including for production shutdown and servicing, that had been used in the calculations. As to the Article 5 parties, she said that the North American proposal yielded a climate benefit of 75,850 Mt CO<sub>2</sub>-eq. and costs in the range of \$3,440–5,250 million and that the European Union proposal yielded a climate benefit of 53,260 Mt CO<sub>2</sub>-eq. and costs in the range of \$5,580–8,540 million. She noted that the European Union proposal had a freeze in 2019 at the average HCFC-HFC consumption for 2015–2016 and no reduction steps, which would have to be negotiated; not taking any reductions into account until 2050 was the reason that the climate benefit was relatively low and the costs high for the European Union proposal. She said that the Indian proposal yielded a climate benefit of 26,130 Mt CO<sub>2</sub>-eq. and costs in the range of \$9,300–14,220 million. Also, because no reduction steps were assumed after the freeze in 2031 until a final 85 per cent reduction in 2050, the climate benefit was relatively low and the costs high. The Island States proposal yielded a climate benefit of 74,890 Mt CO<sub>2</sub>-eq. and costs in the range of \$4,550–6,950 million. In closing she showed a slide with the cost ranges for the four amendment proposals for Article 5 parties and restated some key points about the report including that it provided an assessment of the potential climate benefits and costs of the four amendment proposals for the consideration of the parties and that it built on the accepted methodology used by the Panel for BAU and mitigation scenarios across the various sectors of use. She emphasized again that the cost calculations in the report consisted of manufacturing conversion costs plus the cost of production shutdown and servicing. Costs for project preparation, institutional strengthening, capacity-building and other factors had not been included and where available, current Multilateral Fund cost guidelines for HCFC conversion had been used.

### **C. Presentation by members of the Methyl Bromide Technical Options Committee on final recommendations for 2017 and 2018 critical-use exemptions and emergency uses**

Mr. Ian Porter, co-chair of the Methyl Bromide Technical Options Committee, on behalf of the Technology and Economic Assessment Panel and the Methyl Bromide Technical Options Committee, presented an overview of the trends and outcomes for the critical-use nominations submitted in 2016 for 2017 and 2018.

In introducing the presentation, he reported that critical-use requests for methyl bromide from non-Article 5 parties had fallen from 146 nominations for 18,700 t in 2005 to two nominations for 34 t in 2018. He then showed the trends in Article 5 parties since 2015, saying that the total nominated amounts had fallen from 530 t (eight nominations) to 337 tonnes (six nominations).

Total reported stocks from all parties submitting nominations in 2016 were noted at 41.8 tonnes. That was the first round in which Article 5 parties had reported stocks and one Article 5 party had not reported. He added that interpretation of the decisions complicated the reporting of stocks.

He then provided an overview of the trends in the nomination requests for critical-use exemptions, showing that the amounts of methyl bromide sought for two non-Article 5 party nominations (Canada and Australia) had been relatively constant for many years. For the Article 5 party nominations, two parties (Argentina and China) had shown a downward trend in nominations, Mexico had not sought a nomination in the current round and the nomination of South Africa was similar to its nomination for the previous year.

Co-chair Mohammed Besri then provided an overview of the final recommendations for critical-use nominations for soil fumigation submitted in 2016 for 2017/2018 use and the changes made in recommendations since the interim recommendations reported at the thirty-eighth meeting of the Open-ended Working Group.

For Australian strawberry runners in 2018, the final recommendation was reduced to 29.73 t for the uptake of a small amount (0.03t) for the treatment of substrates. After the meeting of the Open-ended Working Group, the Party had explained that although research with alternatives was yielding positive results, alternatives were not yet available for the rest of the production system.

For Canadian strawberry runners in 2017, the “unable to assess” recommendation proposed at the Open-ended Working Group meeting had changed to a full recommendation of the nominated amount of 5.261 t. The party had clarified that no chemical alternatives could be used on Prince Edward Island due to potential groundwater contamination and that substrates were uneconomical for the final stages of runner production. A new research programme had commenced, which included consideration of alternative substrate systems.

For the Argentina strawberry fruit and tomato nominations a reduction was recommended based on a lower methyl bromide dosage rate (26 to 15 g/m<sup>2</sup>) for the uptake of barrier films and a change in adoption from two years to three years. After the Open-ended Working Group meeting the party had explained that more time was needed to adopt barrier films.

For the two nominations submitted by China for open field and protected ginger, the recommendations of 74.617 t and 18.36 t proposed at the Open-ended Working Group meeting had not changed. Those nominations had been reduced (13%) for uptake of barrier films with MB over a two year period.

Ms. Pizano then presented the final recommendations for methyl bromide use in commodities and structures. For South Africa, the Committee recommended a reduced amount for the two key sectors of the nomination but accepted that the Party needed more time for uptake of the recommendations put forward to the Open-ended Working Group. For the mill nomination of 13 t, the final recommendation of 4.1 t was reduced based on a dosage rate of 20 g/m<sup>3</sup> and a maximum of one fumigation per year. Additional time was allowed for the adoption and optimization of alternatives as a transitional measure. The final recommendation of 55.0 t for dwellings was based on a rate adjustment to conform to the Committee’s standard presumptions and included additional time for the adoption of alternatives.

The co-chairs then pointed out some highlights, including China’s indicated intent to seek no more methyl bromide critical-use exemptions after 2018; one party failing to provide an accounting framework as requested in paragraph 9 (f) of decision Ex.1/4; and only one Article 5 party providing a national management strategy as requested in paragraph 3 of decision Ex.1/4. She also stressed that there were concerns over the reporting of stocks.

In finalizing the presentation, Ms. Pizano presented an overview of two emergency use requests. Israel had informed the Ozone Secretariat in December 2015 of an emergency use of 0.5 tonnes of methyl bromide for museum artifacts. The Committee acknowledged the importance of the historic artifacts and that Israel was unable to use potential alternatives such as phosphine or sulfuryl fluoride, but nevertheless noted that modified atmospheres or humidified heated air were successfully used for controlling pests for museum artifacts and that wooden floors, ceilings and furniture could be treated with inert gases.

Jamaica informed the Secretariat in July 2016 of an emergency use of 1.5 tonnes of methyl bromide for use by a flourmill for the fumigation of stored commodities and warehouses. The Committee noted that alternatives were available for flourmills and had fully replaced methyl bromide in many countries. They included heat, phosphine, sulfuryl fluoride and others, within an integrated pest management approach.

Ms. Pizano finalized the presentation by stressing the importance of parties submitting critical-use nominations in 2017 fully observing the timelines specified in the workplan included in the final report.

**D. Presentation by members of the Scientific Assessment Panel and the Technology and Economic Assessment Panel’s Medical and Chemicals Technical Options Committee on analysis of the discrepancies between observed atmospheric concentrations of and reported data on carbon tetrachloride (decision XXVII/7)**

Mr. Paul A. Newman, co-chair of the Scientific Assessment Panel, and Ms. Helen Tope co-chair of the Medical-Chemicals Technical Options Committee on behalf of the co-chairs of the Scientific Assessment Panel and the Technology and Economic Assessment Panel, gave a presentation on the report on carbon tetrachloride budget discrepancies prepared in response to decision XXVII/7. By that decision Twenty-Seventh Meeting of the Parties had requested the Technology and Economic Assessment Panel and the Scientific Assessment Panel “to continue their analysis of the discrepancies between observed atmospheric concentrations and reported data on carbon tetrachloride and to report and provide an update on their findings to the Twenty-Eighth Meeting of the Parties.”

Mr. Newman initially described the key findings of the report entitled “Stratosphere-Troposphere Processes and their Role in Climate: Report on the Mystery of Carbon Tetrachloride.” (See: <http://www.sparc-climate.org/publications/sparc-reports/sparc-report-no7/> The Stratosphere-Troposphere Processes And their Role in Climate (SPARC) project.) Stratosphere-Troposphere Processes and their Role in Climate (SPARC) is a core project of the World Climate Research Programme. Under the auspices of SPARC, a workshop was held in Dübendorf, Switzerland, from 4 to 6 October 2015 to examine the carbon tetrachloride budget discrepancy that had been reported on in the Scientific Assessment Panel’s assessment reports, most recently in the “Scientific Assessment of Ozone Depletion: 2014”.

The key findings included new estimates of emissions of carbon tetrachloride. In particular, Mr. Newman highlighted four emission pathways for carbon tetrachloride:

- (a) Fugitive: 2 Gg yr<sup>-1</sup>, from UNEP Reports;
- (b) Unreported non-feedstock: 13 Gg yr<sup>-1</sup>
- (c) Unreported inadvertent emissions;
- (d) Legacy: combined C. & D. ~10 Gg yr<sup>-1</sup>

The four pathways had a total emissions of 20±5 Gg yr<sup>-1</sup>. Only pathway A could be estimated from Article 7 reports.

He also highlighted observations from the atmosphere, oceans and soils, along with modelling tools for estimating top-down emissions. A new SPARC (2016) 33-year total lifetime lowered the observations-based top-down emissions estimate to about 40 kt y<sup>-1</sup>. In addition, a second technique used the persistent carbon tetrachloride CTC difference between the northern and southern hemispheres to estimate an emissions of 30 kt y<sup>-1</sup>. The combination of the two observation-based estimates yielded a top-down emissions estimate of 35 kt yr<sup>-1</sup>.

He pointed out that the difference between the top-down estimate of 35±16 kt y<sup>-1</sup> and the industrial bottom-up emissions estimates of 20±5 kt y<sup>-1</sup> was about 15 kt y<sup>-1</sup>, which was greatly reduced from the 54 kt y<sup>-1</sup> discrepancy reported by the World Meteorological Organization in 2014. While the SPARC (2016) bottom-up value was still less than its top-down value, the SPARC estimates reconciled the carbon tetrachloride budget discrepancy when considered at the edges of their uncertainties.

Ms. Tope discussed the joint of the Scientific Assessment Panel and the Technology and Economic Assessment Panel regarding the carbon tetrachloride discrepancy. Previous assessments had omitted some emissions sources from bottom-up emissions estimates Article 7 data reports were therefore not adequate on their own for deriving bottom-up global carbon tetrachloride emissions estimates. Further scientific research was needed to tighten observations-derived top-down emissions estimates. Finally, there was a continuing need to develop improved methodologies for estimating bottom-up carbon tetrachlorideCl<sub>4</sub> emissions.

Ms. Tope concluded the presentation by presenting the recommendations of the Scientific Assessment Panel and the Technology and Economic Assessment Panel for consideration by the Parties. First, a joint working group of the two panels could be established for estimating emissions of carbon tetrachloride in support of their quadrennial assessments. Second, to address remaining questions, a joint workshop of the two panels could be held in coordination with the Ozone Secretariat in order to further evaluate the emissions pathways outlined in the SPARC report. The workshop could also be tasked with developing improved methodologies for estimating bottom-up carbon tetrachloride

emissions. Finally, the SPARC report included a “Research Direction Suggestions” section. Parties might wish to request the Ozone Secretariat to forward it to the Vienna Convention’s Ozone Research Managers for consideration and evaluation for their next report.

## **E. Presentations during the high-level segment by members of the assessment panels on progress in the panels’ work and emerging issues**

### **1. Scientific Assessment Panel**

The Co-Chairs of the Scientific Assessment Panel, Mr. Bonfils Safari, Mr. David W. Fahey, Mr. Paul A. Newman and Mr. John A. Pyle, presented the plan and schedule for the 2018 scientific assessment of ozone depletion and the current science and emerging science issues that would be addressed in the assessment.

The terms of reference for the assessment had been adopted by the Twenty-Seventh Meeting of the Parties in Dubai in November 2015 (decision XXVII/6, para. 7). The terms of reference noted the continued need for scientific knowledge of the state of the ozone layer and the depletion attributable to the remaining potential emissions of ozone-depleting substances. Assessment topics would include those addressed in previous assessments: the abundances of ozone-depleting substances and hydrofluorocarbons (HFCs), changes in global and polar ozone amounts, the relationship between climate change and stratospheric ozone and the policy implications of Montreal Protocol decisions. In addition, several important emerging scientific issues would be included as assessment topics:

- (a) New evidence for recovery of the global ozone layer: new published research that suggested that the Antarctic ozone hole was improving due to the reduction of ozone-depleting substances;
- (b) Global ozone projections in the twenty-first century: the evolution of global ozone in the second half of the century would depend largely on changes in the abundances of greenhouse gases. In some scenarios, atmospheric models showed that ozone would recover to 1980 levels by mid-century but might overshoot 1980 levels in later decades (i.e., super recovery) and reduce ultraviolet radiation exposure of humans and ecosystems. The Scientific Assessment Panel would work closely with the Environmental Effects Assessment Panel to evaluate the resulting effects, especially in the northern hemisphere;
- (c) An update of the carbon tetrachloride budget, of which the 2016 report of the Technology and Economic Assessment Panel and the Scientific Assessment Panel provided a new evaluation;
- (d) Evaluation of new atmospheric observations and their interpretation concerning principal ozone-depleting substance and hydrofluorocarbon (HFC) abundances and their budgets. Of special interest is a re-evaluation of the methyl bromide budget in cooperation with the Technology and Economic Assessment Panel;
- (e) New projections of HFC emissions and the climate implications of HFC phase-down proposals. HFC emissions are undergoing change due to national regulations and technical changes in HFC use sectors;
- (f) Changes in stratospheric circulation. Systematic changes in winds in the stratosphere have been observed that could influence ozone and other trace gas amounts in the stratosphere.

The assessment topics reflect the continued scientific vigilance of the Scientific Assessment Panel in respect of the many environmental and human factors that affect global ozone and the abundances of ozone-depleting substances and their substitutes.

Preparatory work had begun on planning for the 2018 assessment. In October 2016, the Scientific Assessment Panel would initiate communication with the Ozone Secretariat with details of the assessment plan and a request for nominations for authorship from the parties. Assessment chapter authors would be selected in early 2017 followed by chapter meetings. First chapter drafts would be available in the third quarter of 2017. Chapters would be finalized along with an executive summary document at a meeting in summer 2018. The executive summary would be released by September 2018 and the final report delivered to the Ozone Secretariat by the end of 2018.

### **2. Environmental Effects Assessment Panel**

The co-chairs of the Environmental Effects Assessment Panel, Ms. Janet Bornman and Mr. Nigel Paul, presented the annual update on the environmental effects of ozone depletion and ultraviolet (UV) radiation, stressing the importance of interactive effects of a range of co-occurring environmental conditions that modified responses.

Ms. Bornman noted that the different greenhouse gas emission scenarios projected different trends in UV radiation, which in turn would result in different effects on human health and natural and agricultural ecosystems. Exposure to UV radiation and increasing frequencies of, e.g., drought and temperature extremes could affect food security. That might be partially offset, however, by the selection of certain crop breeding lines to improve the UV tolerance of agricultural crops under changing conditions.

Other factors, such as changes in human behaviour associated with a warming climate, would further modify both the negative and positive effects of UV radiation. Consequently, it would become increasingly necessary to balance the risks and benefits of exposure to UV radiation so that adequate vitamin D production for human health was not compromised. Recent studies continued to show that skin cancer was increasing in most countries, although age-related behaviour and sun protection programmes modified the effects of UV radiation. In that regard, the important issue of the costs and benefits of investing in protection programmes to reduce the current economic burden of skin cancers was raised.

Co-chair Mr. Nigel Paul went on to further highlight and assess some of the new data on the modifying effects of UV exposure and climate variability on ecosystems, the troposphere and materials. UV exposure in aquatic ecosystems was strongly affected by extreme climate events such as droughts and floods. The changes in UV exposure could affect the productivity of fisheries, the degradation of contaminants and the natural solar disinfection of water-borne infections. Also, in aquatic ecosystems new models of oceanic productivity were powerful tools for quantifying the effects of future changes in stratospheric ozone on the oceans.

New understanding of how UV radiation controlled the release of carbon dioxide from dead organic matter would allow better assessment of how future changes in UV radiation would affect carbon storage by ecosystems. Ground level ozone pollution, which had adverse effects on human health and the environment, would be affected by changes in UV radiation but future trends remained difficult to quantify. UV radiation reduced the service life of materials but new technologies were being developed to counter those effects.

Trifluoroacetic acid (TFA) was a breakdown product of some hydrochlorofluorocarbons, hydrofluorocarbons and hydrofluoroolefins.

A newly published risk assessment reinforced the conclusion that while TFA was not currently a significant risk to humans and the environment the monitoring of TFA production should continue. The use of hydrocarbons such as propane and isobutane as refrigerants was not expected to have major, large-scale effects on air quality.

### **3. Technology and Economic Assessment Panel**

During the high-level segment of the Twenty-Eighth Meeting of the Parties, Mr. Ashley Woodcock made a presentation on behalf of the Technology and Economic Assessment Panel. He said that the Panel and its technical options committees brought together the experience and expertise of 139 experts from over 30 countries. He summarized the achievements in each sector and also looked ahead.

He said that global production of foams currently exceeded 25 million tonnes per year, all of which was CFC free, and was increasing by 3 per cent per year in Article 5 parties. In Article 5 parties, almost half of foam applications using HCFCs had converted, of which 80 per cent had converted directly to a range of low-GWP blowing agents. Foams in insulation were important to energy efficiency and therefore important in mitigating climate change.

He informed parties about the historic agreement reached that week at the International Civil Aviation Organization (ICAO) to control CO<sub>2</sub> emissions from international aviation. He noted that at the same meeting a tremendous breakthrough for the Montreal Protocol with regard to halons had also occurred. ICAO had approved a requirement to replace halons in cargo bays in all new aircraft designs by 2024; from 2024, therefore, there would no longer be a need to use halons in any new designs in any fire protection application. The milestone had been achieved through more than a decade of engagement between ICAO and Montreal Protocol bodies, including especially Halon Technical Options Committee (HTOC) Co-chairs Mr. Dan Verdonik and Mr. David Catchpole. He pointed out, however, that halons would be needed for existing equipment and current aviation designs for the foreseeable future (excluding those covered by European Union retrofit requirements), which would require careful management. Many new designs continued to require high GWP HFCs, although two new low-GWP agents had been introduced recently that might be suitable for some applications.

He recognized the successful phase-out of CFCs used in metered-dose inhalers, which would be achieved in 2016 year following 30 years of concerted global action. Affordable CFC-free inhalers had been developed over the preceding 20 years and were available worldwide. Patients now had access to a large range of inhaled treatments from improved inhalers and had benefited from the industry response to the need to phase out chlorofluorocarbon-based metered-dose inhalers.

He described more successes in the chemicals sector, including the Russian Federation's phase-out of chlorofluorocarbon solvents in aerospace applications and the decrease in ozone-depleting substance process agents. Global use of ozone-depleting substances for feedstock was still increasing, however, and laboratory and analytical uses of ozone-depleting substances continued. He pointed out the new international study providing insights on carbon tetrachloride emissions, and that further investigations are required to better understand the sources of emissions.

Almost all controlled uses of methyl bromide have been phased out and replaced successfully, and the critical-use process had evolved successfully from non-Article 5 parties to Article 5 parties. Mr. Woodcock indicated, however, that global atmospheric measurements showed that about 30,000 t of methyl bromide were still emitted annually. Of that amount, 11,000 t was for quarantine and pre-shipment uses, for up to 40 per cent of which there might be alternatives. Around half of current methyl bromide emissions (around 15,000 t) could be accounted for. Addressing those issues would have a positive impact on the ozone layer.

In refrigeration and air-conditioning (R/AC), Mr. Woodcock showed how refrigerants had evolved over the previous two centuries and that while volumes used had increased there had been a continuous improvement in energy efficiency and a reduction in total environmental impact per unit. CFCs had been completely phased out, and HCFC phase-out was almost complete in non-Article 5 parties and decreasing in Article 5 parties. Low-GWP solutions were available for many applications and alternatives were being tested under high-ambient-temperature conditions. He said that R/AC was a rapidly evolving technology environment, with industries actively looking for best solutions. A more comprehensive approach balancing energy efficiency, flammability and toxicity in choosing alternatives would be needed, however.

Mr. Woodcock introduced decision XXVII/6, by which the Meeting of the Parties mandated the panels to prepare the 2018 assessment reports.

The Technology and Economic Assessment Panel, he said, remained ready to respond to tasks, would continue to be aligned with the current and future needs of the parties and will continue to identify emerging issues for the parties. He explained, however, that the Panel continued to be challenged by a limited pool of qualified experts from both Article 5 parties and non-Article 5 parties. He explained that the Panel experts primarily needed to have technical expertise and experience, but also the capacity to take on the workload, the ability to write and communicate in a comprehensible way, and the necessary support to take on the workload or be in a position to volunteer their time.

Mr. Woodcock explained that the Panel had worked hard to meet tight timelines in 2016 and appreciated the positive comments from Parties on its outputs. He requested that parties continue to consider the overall workload and timelines when assigning tasks to the Panel.

Mr. Woodcock finished the presentation by acknowledging Mr. Catchpole, who was stepping down from the Panel and the Halons Technical Options Committee after 26 years of dedicated service to the Montreal Protocol. The ICAO decision on halons adopted that week was a great legacy of his efforts.

## Annex III

### Statement by the delegation of the Russian Federation

The delegation of the Russian Federation, speaking also on behalf of the delegations of Belarus, Kazakhstan, Tajikistan and Uzbekistan, would like to make a statement explaining its position before the commencement of the procedure for adopting the HFC amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer.

The Russian Federation considers the Montreal Protocol an effective and successful international agreement to address the global problem of preserving the Earth's ozone layer.

Today it has been decided to address, under this global agreement on the preservation of the Earth's ozone layer, issues relating to the stabilization of climate change on Earth. This is undoubtedly a worthy and urgent task designed to help solve a global problem.

Given the results of the negotiations on the amendment we are concerned that, in the debate on the main elements of possible regulation of hydrofluorocarbons (HFCs) under the Montreal Protocol, issues relating to the financial implications of the amendment were, unfortunately, not adequately explored on terms agreed on by all the Parties.

In this connection, the delegation of the Russian Federation considers it necessary to voice a dissenting opinion on financial matters relating to the activities of the Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer. The dissenting position of the Russian Federation is based on the following two considerations:

- HFCs do not have any destructive effects on the Earth's ozone layer and therefore do not fall within the mandate of the Montreal Protocol, and the discussion on the HFC amendment to the Montreal Protocol has been made possible on the basis of a compromise consensus of the Parties to the Montreal Protocol, which expressed a desire to contribute to solving the global problem of climate change using the mechanisms of the Montreal Protocol and the experience of cooperation within that framework. Thus, the regulation of HFCs by the Montreal Protocol will be based solely on voluntary commitments made by the Parties effectively outside the mandate of the Montreal Protocol.
- The part of the London Amendment of 1990 to the Montreal Protocol relating to the establishment of the Multilateral Fund was accepted and ratified by the Parties exclusively to assist Article 5 countries in implementing measures for preventing the destruction of the Earth's ozone layer.

Thus, the Russian Federation believes that the replenishment of the Multilateral Fund of the Montreal Protocol by countries with obligations under the London Amendment to the Montreal Protocol in order to implement measures aimed at the regulation of HFCs must be carried out on a voluntary basis. Therefore, the Russian Federation, Belarus, Kazakhstan, Tajikistan and Uzbekistan will consider such contributions to the Multilateral Fund as voluntary.

## Annex IV

## Trust fund for the Montreal Protocol on substances that deplete the Ozone Layer

Approved revised 2016, approved 2017 and proposed 2018 budgets (in United States dollars)

<i>Cost category</i>	<i>Revised 2016</i>	<i>2017</i>	<i>Proposed 2018</i>
1100 Professional and higher category	1 060 652	1 249 082	1 249 082
1300 Administrative support	232 542	233 990	241 000
<b>Component total: employee salaries, allowances and benefits</b>	<b>1 293 194</b>	<b>1 483 072</b>	<b>1 490 082</b>
Consultants			
1201 Assistance in data reporting, analysis and promotion of implementation of the Protocol	85 000	85 000	85 000
<b>Component total: non-employee compensation and allowances</b>	<b>85 000</b>	<b>85 000</b>	<b>85 000</b>
Expendable equipment			
4101 Miscellaneous expendables	18 000	18 000	18 000
<b>Subtotal</b>	<b>18 000</b>	<b>18 000</b>	<b>18 000</b>
Non-expendable equipment			
4201 Personal computers and accessories	5 000	5 000	5 000
4202 Portable computers	5 000	5 000	5 000
4203 Other office equipment (server, scanner, furniture, etc.,)	5 000	5 000	5 000
4204 Photocopiers	5 000	5 000	5 000
4205 Equipment and peripherals for paperless meetings	5 000	5 000	5 000
<b>Subtotal</b>	<b>25 000</b>	<b>25 000</b>	<b>25 000</b>
Rental of premises			
4301 Rental of office premises	41 870	41 870	41 870
<b>Subtotal</b>	<b>41 870</b>	<b>41 870</b>	<b>41 870</b>
Operation and maintenance of equipment			
5101 Maintenance of equipment and others	20 000	20 000	20 000
<b>Subtotal</b>	<b>20 000</b>	<b>20 000</b>	<b>20 000</b>
Reporting costs			
5201 Reporting	65 000	65 000	50 000
5202 Reporting (assessment panels)	5 000	5 000	5 000
5203 Reporting (Protocol awareness)	5 000	5 000	5 000
<b>Subtotal</b>	<b>75 000</b>	<b>75 000</b>	<b>60 000</b>
Sundry			
5301 Communications	10 000	10 000	10 000
5302 Freight charges	10 000	10 000	10 000
5303 Training	10 000	10 000	10 000
5304 Others (International Ozone Day)	10 000	90 000	15 000
<b>Subtotal</b>	<b>40 000</b>	<b>120 000</b>	<b>45 000</b>

<i>Cost category</i>	<i>Revised 2016</i>	<i>2017</i>	<i>Proposed 2018</i>
<b>Component total: supplies and consumables</b>	<b>219 870</b>	<b>299 870</b>	<b>209 870</b>
Travel on official business			
1601 Staff travel on official business	210 000	210 000	210 000
1602 Conference Services staff travel on official business	15 000	15 000	15 000
<b>Component total: travel on official business</b>	<b>225 000</b>	<b>225 000</b>	<b>225 000</b>
Meeting costs			
1321 Conference services costs: Open-ended Working Group meetings	600 000	676 000 <sup>1</sup>	631 000
1322 Conference services costs: preparatory meetings and meetings of the parties	625 000	460 000	645 000
1323 Communication costs of Article 5 party assessment panel members and organizational costs of meetings	70 000	70 000	90 000
1324 Conference services costs: Bureau meetings	25 000	25 000	25 000
1325 Conference services costs: Implementation Committee meetings	125 000	125 000	125 000
1326 Conference services costs: Montreal Protocol informal consultation meetings	10 000	10 000	10 000
1332 Conference services costs: resumed thirty-seventh meeting of the Open-ended Working Group	80 000	–	–
1333 Conference services costs: Additional five-day meeting of the Open-ended Working Group and two-day back-to-back extraordinary Meeting of the Parties	870 000	–	–
<b>Subtotal</b>	<b>2 405 000</b>	<b>1 366 000</b>	<b>1 526 000</b>
Travel of Article 5 parties			
3301 Travel of Article 5 parties: assessment panel meetings	450 000	400 000	450 000
3302 Travel of Article 5 parties: preparatory meetings and meetings of the parties	375 000	375 000	375 000
3303 Travel of Article 5 parties: Open-ended Working Group meetings	325 000	325 000	325 000
3304 Travel of Article 5 parties: Bureau meetings	20 000	20 000	20 000
3305 Travel of Article 5 parties: Implementation Committee meetings	125 000	125 000	125 000
3306 Travel of Article 5 parties: consultations in an informal meeting	10 000	10 000	10 000
3312 Travel of Article 5 parties: Additional five-day meeting of the Open-ended Working Group and	435 000	–	–

<sup>1</sup> To include a workshop on safety standards in accordance with decision XXVIII/4.

<i>Cost category</i>	<i>Revised 2016</i>	<i>2017</i>	<i>Proposed 2018</i>
two-day back-to-back extraordinary Meeting of the Parties			
<b>Subtotal</b>	<b>1 740 000</b>	<b>1 255 000</b>	<b>1 305 000</b>
Hospitality			
5401 Hospitality	25 000	25 000	25 000
<b>Subtotal</b>	<b>25 000</b>	<b>25 000</b>	<b>25 000</b>
Component total: operating expenses	<b>4 170 000</b>	<b>2 646 000</b>	<b>2 725 250</b>
<b>Total direct costs</b>	<b>5 993 064</b>	<b>4 738 942</b>	<b>4 865 952</b>
Programme support costs (13 per cent)	779 098	616 062	632 574
<b>Grand total</b>	<b>6 772 162</b>	<b>5 355 004</b>	<b>5 498 526</b>

**Explanatory notes for the approved revised budget for 2016, the approved budget for 2017 and the proposed budget for 2018 of the Trust Fund for the Montreal Protocol on Substances that Deplete the Ozone Layer**

<i>Budget line</i>	<i>Comment</i>
Professional and higher category 1100	<p>Indicative Professional-level salary costs applicable to the Nairobi duty station and trends in salary costs have been used for the budgets. Salary costs for staff at the Professional level consist of: (a) basic salaries; (b) post adjustment as determined and reviewed by the International Civil Service Commission of the United Nations throughout the year, based on the cost of living index of the Nairobi duty station; and (c) entitlements such as home leave travel, which is granted during alternate years, and education grant.</p> <p>The post of Senior Environmental Affairs Officer was filled internally effective January 2016. The approved and proposed budgets for 2017 and 2018, respectively, represent full years' salary and emoluments at the P-5 level.</p> <p>The post of the Programme Officer became vacant as of January 2016. Recruitment to fill the post is currently under way and the post is expected to be filled by the end of 2016.</p> <p>The post of Senior Administrative Officer at the P-5 level is funded by the programme support cost budget.</p> <p>The post of Communications and Information Officer at the P-3 level is funded fully from the Trust Fund for the Vienna Convention.</p>
Administrative support/personnel 1300	<p>Indicative General Service level salary costs applicable to the Nairobi duty station and trends in actual salary cost have been used for the budgets. The approved 2016 budget increased by 5 per cent compared with the 2015 budget to cater for normal step increments and inflation.</p> <p>The 2017 and 2018 budget proposals reflect trends in actual costs and a 3 per cent inflation rate taking into account annual salary step increments.</p> <p>Two posts at the G-6 level, Programme Assistant and Meeting Services Assistant, are funded by the Trust Fund for the Vienna Convention.</p> <p>The 2017 budget cuts the staffing levels for the Secretariat further with the proposal to abolish two posts (Research Assistant (G-6) and Team Assistant (G-4))</p>
Consultants 1201	<p>Consultants are used by the Secretariat for research on meetings and facilitation of the workshop on HFC management. The proposed budget for 2017 would not change from the approved amount of \$85,000 and would be maintained at that level in 2018.</p>
Supplies and consumables 4101, 4201–4205, 4301, 5101, 5201–5203, 5301-5304	<p>The section includes expendable equipment, non-expendable equipment and rental of office premises, reporting costs, communication, freight, training and the costs of Ozone Day celebrations. The Secretariat is planning to enhance the 2017 Ozone Day celebrations as 2017 marks the thirtieth anniversary of the Montreal Protocol. The Secretariat will embark on a multi-faceted campaign to raise awareness.</p>
Reporting 5201	<p>The amount budgeted for reporting will enable the Secretariat to cover standard reporting costs associated with operations and remains relatively constant for the three years.</p>
Travel on official business 1601–1602	<p>Travel on official business for 2017 and 2018 is maintained at the 2016 level.</p>

<i>Budget line</i>	<i>Comment</i>
Operating expenses	This section includes meetings costs, travel of Article 5 party meeting participants and hospitality.
1321–1333 and 5401	<b>Meeting costs (not including travel of Article 5 parties)</b> The 2016 meeting costs have been increased as follows:
1321, 1333	\$80,000 to cover the cost of the resumed thirty-seventh meeting of the Open-ended Working Group (15 and 16 July 2016), back to back with the thirty-eighth meeting of the Open-ended Working Group (18–21 July) and the Third Extraordinary Meeting of the Parties (22 and 23 July) in Vienna.
1321, 1333	\$70,000 to cover interpretation at three sessions daily for the meetings of the Open-ended Working Group and the Third Extraordinary Meeting in Vienna in July. The cost of the third daily session is substantially higher due to the summer holidays and the Department of Conference Services having to hire non-Vienna-based interpreters  For the 2017 approved budget:
1322	The 2017 budget represents a decrease of 20 per cent compared to the 2016 budget given that one less meeting is planned for 2017. In addition, in 2017 the cost of the meeting, which is currently budgeted at \$252,000, is shared with the Vienna Convention Trust Fund, hence the decrease in meeting costs to \$460,000. However, the proposed budget for 2018 for this line item will increase to \$645,000.
1324	One Bureau meeting is scheduled for each of the years 2017 and 2018, with provision for interpretation and document translation into the appropriate languages depending on the membership of the Bureau. The proposed costs have remained the same as for the 2016 budget.
1325	The approved and proposed budgets for Implementation Committee meetings in 2017 and 2018 have remained the same as the approved amount for 2016.
5401	Hospitality cost covers receptions at the meetings of the Open-ended Working Group and the Meeting of the Parties.  Necessary funds may be transferred from the conference servicing budget lines (1321–1326) should such services be required, either through individual consultancies or corporate contracts.
3301–3312	<b>Travel of Article 5 party meeting participants</b> For the 2017 approved budget:  The participation of representatives of parties operating under paragraph 1 of Article 5 in the various Montreal Protocol meetings is budgeted at \$5,000 per representative per meeting using the most appropriate and advantageous economy class fare and United Nations daily subsistence allowances.  All other costs remain the same. For 2017 and 2018, the cost of travel for Article 5 party meeting participants decreases given that no additional meetings are planned.  The Secretariat confirms that no funds from the budget lines in this section have been used to cover the cost of travel of representatives of non-Article 5 parties.

## Annex V

## Contributions by the parties

## Trust Fund for the Montreal Protocol on Substances that Deplete the Ozone Layer

General Assembly resolution 70/245 of 23 December 2015 with a maximum assessment rate of 22 per cent

<i>Party</i>	<i>Adjusted United Nations scale of assessments with 22% maximum assessment rate</i>	<i>2016 Contributions by parties Current level</i>	<i>2017 Contributions by parties</i>	<i>2018 Proposed Contributions by parties</i>
1	Afghanistan	0	0	0
2	Albania	0	0	0
3	Algeria	0.16	5 840	9 211
4	Andorra	0	0	0
5	Angola	0	0	0
6	Antigua and Barbuda	0	0	0
7	Argentina	0.888	18 416	51 119
8	Armenia	0	0	0
9	Australia	2.327	88 412	133 957
10	Austria	0.717	34 018	41 275
11	Azerbaijan	0	0	0
12	Bahamas	0	0	0
13	Bahrain	0	0	0
14	Bangladesh	0	0	0
15	Barbados	0	0	0
16	Belarus	0	0	0
17	Belgium	0.881	42 543	50 716
18	Belize	0	0	0
19	Benin	0	0	0
20	Bhutan	0	0	0
21	Bolivia (Plurinational State of)	0	0	0
22	Bosnia and Herzegovina	0	0	0
23	Botswana	0	0	0
24	Brazil	3.807	125 072	219 155
25	Brunei Darussalam	0	0	0
26	Bulgaria	0	0	0
27	Burkina Faso	0	0	0
28	Burundi	0	0	0
29	Cabo Verde	0	0	0
30	Cambodia	0	0	0
31	Cameroon	0	0	0
32	Canada	2.908	127 204	167 403
33	Central African Republic	0	0	0
34	Chad	0	0	0
35	Chile	0.397	14 238	22 854
36	China	7.887	219 452	454 025

<i>Party</i>	<i>Adjusted United Nations scale of assessments with 22% maximum assessment rate</i>	<i>2016 Contributions by parties Current level</i>	<i>2017 Contributions by parties</i>	<i>2018 Proposed Contributions by parties</i>	
37	Colombia	0.321	11 041	18 479	18 974
38	Comoros	0	0	0	0
39	Congo	0	0	0	0
40	Cook Islands	0	0	0	0
41	Costa Rica	0	0	0	0
42	Côte d'Ivoire	0	0	0	0
43	Croatia	0	5 371	0	0
44	Cuba	0	0	0	0
45	Cyprus	0	0	0	0
46	Czechia	0.343	16 455	19 745	20 274
47	Democratic People's Republic of Korea	0	0	0	0
48	Democratic Republic of the Congo	0	0	0	0
49	Denmark	0.581	28 774	33 446	34 342
50	Djibouti	0	0	0	0
51	Dominica	0	0	0	0
52	Dominican Republic	0	0	0	0
53	Ecuador	0	0	0	0
54	Egypt	0.151	5 712	8 693	8 925
55	El Salvador	0	0	0	0
56	Equatorial Guinea	0	0	0	0
57	Eritrea	0	0	0	0
58	Estonia	0	0	0	0
59	Ethiopia	0	0	0	0
60	European Union	2.489	106 572	143 283	147 123
61	Fiji	0	0	0	0
62	Finland	0.454	22 124	26 135	26 836
63	France	4.838	238 422	278 506	285 970
64	Gabon	0	0	0	0
65	Gambia	0	0	0	0
66	Georgia	0	0	0	0
67	Germany	6.362	304 411	366 237	376 052
68	Ghana	0	0	0	0
69	Greece	0.469	27 197	26 999	27 722
70	Grenada	0	0	0	0
71	Guatemala	0	0	0	0
72	Guinea	0	0	0	0
73	Guinea-Bissau	0	0	0	0
74	Guyana	0	0	0	0
75	Haiti	0	0	0	0
76	Holy See	0	0	0	0
77	Honduras	0	0	0	0
78	Hungary	0.16	11 339	9 211	9 457

<i>Party</i>	<i>Adjusted United Nations scale of assessments with 22% maximum assessment rate</i>	<i>2016 Contributions by parties Current level</i>	<i>2017 Contributions by parties</i>	<i>2018 Proposed Contributions by parties</i>
79	Iceland	0	0	0
80	India	0.734	28 391	42 254
81	Indonesia	0.502	14 750	28 898
82	Iran (Islamic Republic of)	0.469	15 176	26 999
83	Iraq	0.128	0	7 368
84	Ireland	0.334	17 819	19 227
85	Israel	0.428	16 881	24 638
86	Italy	3.732	189 612	214 837
87	Jamaica	0	0	0
88	Japan	9.639	461 796	554 882
89	Jordan	0	0	0
90	Kazakhstan	0.19	5 158	10 938
91	Kenya	0	0	0
92	Kiribati	0	0	0
93	Kuwait	0.284	11 638	16 349
94	Kyrgyzstan	0	0	0
95	Lao People's Democratic Republic	0	0	0
96	Latvia	0	0	0
97	Lebanon	0	0	0
98	Lesotho	0	0	0
99	Liberia	0	0	0
100	Libya	0.124	6 053	7 138
101	Liechtenstein	0	0	0
102	Lithuania	0	0	0
103	Luxembourg	0	0	0
104	Madagascar	0	0	0
105	Malawi	0	0	0
106	Malaysia	0.321	11 979	18 479
107	Maldives	0	0	0
108	Mali	0	0	0
109	Malta	0	0	0
110	Marshall Islands	0	0	0
111	Mauritania	0	0	0
112	Mauritius	0	0	0
113	Mexico	1.429	78 522	82 262
114	Micronesia (Federated States of)	0	0	0
115	Monaco	0	0	0
116	Mongolia	0	0	0
117	Montenegro	0	0	0
118	Morocco	0	0	0
119	Mozambique	0	0	0
120	Myanmar	0	0	0

<i>Party</i>	<i>Adjusted United Nations scale of assessments with 22% maximum assessment rate</i>	<i>2016 Contributions by parties Current level</i>	<i>2017 Contributions by parties</i>	<i>2018 Proposed Contributions by parties</i>
121	Namibia	0	0	0
122	Nauru	0	0	0
123	Nepal	0	0	0
124	Netherlands	1.476	70 508	84 968
125	New Zealand	0.267	10 785	15 370
126	Nicaragua	0	0	0
127	Niger	0	0	0
128	Nigeria	0.208	0	11 974
129	Niue	0	0	0
130	Norway	0.845	36 277	48 644
131	Oman	0.113	4 348	6 505
132	Pakistan	0	0	0
133	Palau	0	0	0
134	Panama	0	0	0
135	Papua New Guinea	0	0	0
136	Paraguay	0	0	0
137	Peru	0.135	4 988	7 771
138	Philippines	0.164	6 565	9 441
139	Poland	0.837	39 261	48 183
140	Portugal	0.39	20 206	22 451
141	Qatar	0.268	8 909	15 428
142	Republic of Korea	2.03	85 002	116 860
143	Republic of Moldova	0	0	0
144	Romania	0.183	9 634	10 535
145	Russian Federation	3.075	103 929	177 016
146	Rwanda	0	0	0
147	Saint Kitts and Nevis	0	0	0
148	Saint Lucia	0	0	0
149	Saint Vincent and the Grenadines	0	0	0
150	Samoa	0	0	0
151	San Marino	0	0	0
152	Sao Tome and Principe	0	0	0
153	Saudi Arabia	1.141	36 831	65 683
154	Senegal	0	0	0
155	Serbia	0	0	0
156	Seychelles	0	0	0
157	Sierra Leone	0	0	0
158	Singapore	0.445	16 369	25 617
159	Slovakia	0.159	7 290	9 153
160	Slovenia	0	0	0
161	Solomon Islands	0	0	0
162	Somalia	0	0	0
163	South Africa	0.362	15 858	20 839

<i>Party</i>	<i>Adjusted United Nations scale of assessments with 22% maximum assessment rate</i>	<i>2016 Contributions by parties Current level</i>	<i>2017 Contributions by parties</i>	<i>2018 Proposed Contributions by parties</i>
164	South Sudan	0	0	0
165	Spain	2.433	126 735	140 059
166	Sri Lanka	0	0	0
167	Sudan	0	0	0
168	Suriname	0	0	0
169	Swaziland	0	0	0
170	Sweden	0.952	40 924	54 803
171	Switzerland	1.135	44 632	65 338
172	Syrian Arab Republic	0	0	0
173	Tajikistan	0	0	0
174	Thailand	0.29	10 188	16 694
175	The former Yugoslav Republic of Macedonia	0	0	0
176	Timor-Leste	0	0	0
177	Togo	0	0	0
178	Tonga	0	0	0
179	Trinidad and Tobago	0	0	0
180	Tunisia	0	0	0
181	Turkey	1.014	56 611	58 372
182	Turkmenistan	0	0	0
183	Tuvalu	0	0	0
184	Uganda	0	0	0
185	Ukraine	0.103	0	5 929
186	United Arab Emirates	0.601	25 364	34 597
187	United Kingdom of Great Britain and Northern Ireland	4.444	220 774	255 825
188	United Republic of Tanzania	0	0	0
189	United States of America	21.906	937 830	1 261 047
190	Uruguay	0	0	0
191	Uzbekistan	0	0	0
192	Vanuatu	0	0	0
193	Venezuela (Bolivarian Republic of)	0.569	26 728	32 813
194	Viet Nam	0	0	0
195	Yemen	0	0	0
196	Zambia	0	0	0
197	Zimbabwe	0	0	0
<b>Total</b>		<b>100</b>	<b>4 276 933</b>	<b>5 756 630</b>