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Thirty-sixth meeting
Paris, 20–24 July 2015

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

I. Opening of the meeting

1. The thirty-sixth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer was held at the headquarters of the United Nations Educational, Scientific and Cultural Organization in Paris from 20 to 24 July 2015. The meeting was co-chaired by Mr. Paul Krajnik (Austria) and Ms. Emma Rachmawaty (Indonesia).

2. The meeting was opened at 10.05 a.m. on Monday, 20 July 2015, by Ms. Rachmawaty.

3. Ms. Tina Birmpili, Executive Secretary of the Ozone Secretariat, made an opening statement in which she drew attention to the key items on the agenda of the current meeting, such as consideration of the 2014 quadrennial assessment reports of the Montreal Protocol's three assessment panels (item 3), which presented the latest policy-relevant information from leading scientists and experts around the world that would be a basis for the decision on the potential areas of focus for the Panels' 2018 assessment that was expected to be adopted by the Twenty-Seventh Meeting of the Parties in November 2015. Regarding exemptions under Articles 2A–2I (item 5), she noted that not a single nomination had been received for an essential-use exemption for chlorofluorocarbons (CFCs) for metered-dose inhalers, which marked another milestone in efforts to phase out those substances.

4. Pointing out that the Open-ended Working Group would also consider four amendment proposals relating to the management of hydrofluorocarbons (HFCs) under the Protocol submitted by a total of 40 parties (item 8), she said that the Working Group would follow up on the discussion of all issues related to HFCs that had taken place at the workshop on technical aspects of HFC management and the thirty-fifth meeting of the Open-ended Working Group in April 2015 and, more recently, during intersessional informal consultations. The aim of that discussion, she recalled, had been to establish clarity and a common understanding of the issues and to bring to light the serious concerns of parties operating under Article 5 of the Protocol (Article 5 parties) regarding how their needs would be addressed in any phase-down of HFCs.

5. The continued leadership of parties in implementing the Protocol, she said, would be decisive in determining whether any further progress could be made on the matter. The Protocol and its institutions were widely recognized as having been instrumental in the successful phase-out of ozone-depleting substances, and its institutions were very familiar with most of the market sectors currently using HFCs. It was a core principle of the Montreal Protocol that Article 5 parties should have time to implement their commitments through measures such as grace periods and differentiated baselines, as well as financial and technical assistance; the Protocol also recognized that different

countries and regions had different needs, and it offered the flexibility that parties required to set their own sector and technology-specific strategies and priorities in tackling HFCs.

6. On the question of funding, she noted that the parties during the intersessional informal consultations had expressed strong support for maintaining the Multilateral Fund for the Implementation of the Montreal Protocol as the financial mechanism for implementing any HFC control measures. Article 5 parties, however, were concerned about the amount of funding required to implement any such measures and which costs might be covered, including whether second and third conversions of enterprises would be eligible. Bearing in mind the challenges in phasing out hydrochlorofluorocarbons (HCFCs) under the Multilateral Fund, the Working Group would discuss funding requirements for conversion to lower global-warming-potential (GWP) alternatives, guided by the expertise and updated scenarios provided by the Technology and Economic Assessment Panel in its report prepared in accordance with decision XXVI/9.

7. On the technical aspects of HFC management, she said that the Panel was providing greater clarity on the status of the increasing number of HFC alternatives already commercially available in a wide range of sectors, adding that regional and national HFC regulations, combined with market forces, were driving innovation and change in industry perspectives. In the sectors where economically or technically feasible alternatives had yet to be identified, however, such as the commercial and industrial refrigeration sector, she said that more work was required on equipment design, safety standards and servicing infrastructure and that exemptions should be available until that work had been completed.

8. In conclusion, she recalled that 2015 was the thirtieth anniversary of the Vienna Convention and a time to celebrate achievements in areas such as human health, green technology, sustainable consumption and production, job creation and capacity-building. Improved balance, equity and access to technologies in national and global markets had, she said, put Article 5 parties in a better position to compete as producers and to receive support for converting local industries as consumers. The big picture was therefore positive. If the parties decided to regulate HFCs under the Protocol, however, they would need to discuss the means of implementation for the fair global regulation of a phase-down. That called for a spirit of trust and cooperation to bridge any differences and to find a constructive path forward, and the Ozone Secretariat stood ready to assist with any information needed for a successful outcome.

9. Before she concluded her statement, the Working Group was invited to view a short video highlighting the nature of the ozone layer and the stewardship required to protect it, which had been produced as part of the thirtieth anniversary celebration campaign.

II. Organizational matters

A. Attendance

10. The following parties to the Montreal Protocol were represented: Afghanistan, Albania, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Belarus, Belgium, Belize, Benin, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Cabo Verde, Cambodia, Cameroon, Canada, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Czech Republic, Democratic People's Republic of the Congo, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, European Union, Finland, France, Gambia, Georgia, Germany, Ghana, Grenada, Guyana, Honduras, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Libya, Lithuania, Malawi, Malaysia, Maldives, Mali, Mexico, Micronesia (Federated States of), Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Paraguay, Philippines, Poland, Portugal, Republic of Korea, Republic of Moldova, Russian Federation, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Tajikistan, Thailand, the former Yugoslav Republic of Macedonia, Togo, Tonga, Tunisia, Turkey, Turkmenistan, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Zambia and Zimbabwe.

11. The following United Nations entities, organizations and specialized agencies were represented as observers: secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, United Nations Development Programme, United Nations Environment Programme, secretariat of the United Nations Framework Convention on Climate Change, United Nations

Industrial Development Organization, World Meterological Organization and the World Bank. Also in attendance were representatives of the Environmental Effects Assessment Panel, the Scientific Assessment Panel and the Technology and Economic Assessment Panel of the Montreal Protocol.

12. The following intergovernmental, non-governmental and industry bodies were represented as observers: AHRI, Air-conditioning and Refrigeration European Association, Air-conditioning , Heating & Refrigeration Institute, Alliance for Responsible Atmospheric Policy, ARAP, Anant Enterprises, Asahi Glass Co., Ltd, Australian Refrigeration Council, Ltd., Carrier Corporation, Center for Climate and Energy Solutions, Centre for Science and Environment, Changshu 3F Zhonghao New Materials Co. Ltd., Chemours Company, Children's Investment Fund Foundation, China Association of Organofluorine Silicone Material Industry, China Association of Fluorine and Silicone Industry, China Household Electrical Appliances Association, China Refrigeration and Air-Conditioning Industry Association, CSR Global Environment Centre, Daikin Industries, Embraco Europe S.r.l., Environmental Investigation Agency, EPEE Secretariat, Eurammon, European Partnership for Energy and the Environment, Fondation Institut Destree, GIZ Proklima, GMCC, Gujarat Fluorochemicals Ltd., Haier Smart Home Beijing Innovation Center, Honeywell, Industrial Technology Research Institute, Ingersoll Rand, Institute for Governance and Sustainable Development, International Institute for Sustainable Development, International Institute of Refrigeration, International Pharmaceutical Aeorosol Consortium, Japan Refrigeration and Air-Conditioning Industry Association, Johnson Controls, Lawrence Berkeley National Laboratory, Lennox International, MEBROM, Mexichem UK Limited, Mitsubishi Electric Europe, Natural Resources Defense Council, Nolan Sherry and Associates, Ltd., Secretariat of the Pacific Community, Oeko Recherche GmbH, Proklima Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Quanzhou Sicong Chemical Co. Ltd, Refrigerant Gas Manufacturers Association, Refrigerant Reclaim Australia, Refrigerants Australia, School of Engineering, Sun Yat Sen University, Shecco, SRF Limited, United Technologies Corporation, University of Copenhagen, World Avoided Project, Zhejiang Dongyang Chemical Co. Ltd., Zhejang Juhua Co., Ltd.

B. Adoption of the agenda

13. At the suggestion of one representative the Working Group agreed that in item 7 of the agenda as adopted the words "outcome of" in the provisional agenda would be replaced with the words "report on".

14. The Working Group accordingly adopted the following agenda on the basis of the provisional agenda set out in document UNEP/OzL.Pro.WG.1/36/1, as orally amended:

1. Opening of the meeting.
2. Organizational matters:
   (a) Adoption of the agenda;
   (b) Organization of work.
3. 2014 quadrennial assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel.
4. 2015 progress report of the Technology and Economic Assessment Panel.
5. Issues related to exemptions under Articles 2A–2I of the Montreal Protocol:
   (a) Nominations for essential-use exemptions for 2016;
   (b) Nominations for critical-use exemptions for 2016 and 2017.
6. Issues related to alternatives to ozone-depleting substances:
   (a) Report by the Technology and Economic Assessment Panel on the full range of alternatives to ozone-depleting substances (decision XXVI/9, subparagraphs 1 (a)–(c));
   (b) Updated information submitted by parties on their implementation of paragraph 9 of decision XIX/6 (decision XXVI/9, paragraph 3).
7. Report on the intersessional informal discussions on the feasibility and ways of managing hydrofluorocarbons (UNEP/OzL.Pro.WG.1/35/6, paragraph 128 and annex II).
8. Proposed amendments to the Montreal Protocol.

9. Issues related to the phase-out of hydrochlorofluorocarbons:

   (a) Possibilities or need for essential-use exemptions in respect of parties not operating under paragraph 1 of Article 5 of the Montreal Protocol (decision XIX/6, paragraph 12);

   (b) Review of the need for the 0.5 per cent for servicing equipment for the period 2020-2030 in respect of parties not operating under paragraph 1 of Article 5 provided for in paragraph 3 of decision XIX/6 (decision XIX/6, paragraph 13);

   (c) Consideration of further reductions of production of hydrochlorofluorocarbons for each party producing for basic domestic needs (decision XIX/6, paragraph 14).

10. Measures to facilitate the monitoring of trade in hydrochlorofluorocarbons and substituting substances (decision XXVI/8).

11. Potential areas of focus for the assessment panels' 2018 quadrennial reports.

12. Other matters.

13. Adoption of the report.

14. Closure of the meeting.

C. Organization of work

15. The Working Group adopted a proposal on the organization of work presented by the Co-Chair, agreeing to establish such contact groups as it deemed necessary to accomplish its work.

III. 2014 quadrennial assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel

16. Introducing the item, the Co-Chair drew attention to annex I of document UNEP/OzL.Pro.WG.1/36/2/Add.1, which contained shortened versions of the summaries of the 2014 quadrennial assessment reports of the Environmental Effects Assessment Panel, the Scientific Assessment Panel and the Technology and Economic Assessment Panel.

17. Members of the three panels then gave presentations on the 2014 quadrennial assessment reports. Mr. John Pyle and Mr. A.R. Ravishankara, co-chairs of the Scientific Assessment Panel, opened the presentation by describing the main findings of that panel. They were followed by Ms. Janet Bornman and Mr. Nigel Paul, co-chairs of the Environmental Effects Assessment Panel, who presented the result of that panel's investigations. Mr. Ashley Woodcock, co-chair of the Technical and Economic Assessment Panel, then introduced that Panel's portion of the presentation, with the co-chairs of the Panel's technical options committees summarizing the findings of each committee as follows: Mr. Keiichi Ohnishi – Chemicals Technical Options Committee; Mr. Paul Ashford – Foams Technical Options Committee; Mr. Daniel Verdonik – Halons Technical Options Committee; Ms. Helen Tope – Medical Technical Options Committee; Ms. Marta Pizano – Methyl Bromide Technical Options Committee; and Mr. Roberto Peixoto – Refrigeration, Air-Conditioning and Heat Pumps Technical Options Committee. Summaries of the presentations, prepared by the presenters, are set out in annex II to the present report.

18. Many of the representatives who took the floor following the presentation thanked the Panel members for their work and praised the quality of the reports. One representative echoed a call made at the end of the presentation for broader participation by experts to support the impartiality of assessment work. The Panel members then addressed a number of comments and questions from representatives, while also suggesting that some of the questions could be further discussed under agenda item 6 (a) and indicating their willingness to engage in further discussion with individual parties on a bilateral basis.

19. One representative, speaking on behalf of a group of countries, said that the reports confirmed that the ozone layer and climate change were highly interdependent, which should be an important aspect of the Panels' future work and other work under the Protocol. In that context the co-chair of the Scientific Assessment Panel said that not only did ozone-depleting substances affect the climate but the climate also affected ozone and ozone recovery. He noted that the Scientific Assessment Panel's report went into some detail about the role that non-ozone-depleting climate gases would play as ozone recovery unfolded, adding that there was extensive scientific research on the topic.

20. Representatives posed a number of questions on the continuing discrepancy between concentrations of ozone-depleting substances measured in the atmosphere and reported emissions, particularly with reference to carbon tetrachloride. In response, the co-chair of the Scientific Assessment Panel confirmed that atmospheric measurements combined with current knowledge of carbon tetrachloride indeed suggested that emissions were higher than what might be deduced from reported production and uses and that the Panel thought that it very unlikely that the atmospheric observations were far off. He drew the parties' attention to a workshop being planned in coordination with the Technology and Economic Assessment Panel, which was expected to provide clarification on the issue in the coming months. The co-chair of the Chemicals Technical Options Committee noted that reported figures for process agents were neither very high nor very significant when compared to the discrepancy between bottom up and top down concentrations. Measurements in feedstock use indicated very low emission rates, although that remained to be confirmed by the committee.

21. Several representatives asked for clarification on information contained in the Scientific Assessment Panel's report. In response to a comment on the Panel's mandate and a suggestion that it should frame more general recommendations, one of the co-chairs said that the Panel provided scientific assessments of policy options but policy decisions were the province of the parties. He went on to explain that the Panel referred to dichloromethane in its report because it was one of a family of short-lived chlorinated gas on which considerable research was being done because their concentrations were growing rapidly. Another co-chair provided a clarification on HFC abundance, saying that HFC concentrations were relatively small currently but were growing rapidly and at the current rate of growth would contribute almost as much to radiative forcing by 2050 as ozone depleting substances did currently.

22. One representative, speaking on behalf of a group of countries, asked why the 2010 report of the Environmental Effects Assessment Panel indicated uncertainty regarding the natural and anthropogenic sources of trifluoroacetic acid and its long-term fate and abundances, while the 2014 report characterized trifluoroacetic acid accumulation in the environment as posing a negligible risk. In response, the Panel's co-chair said that the discussion of trifluoroacetic acid in the report could have been more thorough and that the Panel was preparing an update for the Twenty-Seventh Meeting of the Parties. He went on to say that trifluoroacetic acid concentrations measured in water bodies were substantially lower than those believed to induce any effect in organisms; that view, however, was based on relatively few studies, and research was needed to expand the range of organisms studied. He stressed, however, that the greatest need was to integrate the work of the Technical and Economic Assessment Panel and the Scientific Assessment Panel on future scenarios of HFC use.

23. In response to questions regarding alternatives to halons, the co-chair of the Halons Technical Options Committee explained that there were many not-in-kind alternatives such as water and carbon dioxide, as well as in-kind alternatives like HFCs and HCFCs. Only HCFCs were covered by the terms of the Montreal Protocol. Halon alternatives were described in detail in the Committee's technical note, which was available on the Ozone Secretariat website and updated regularly. He also confirmed that the Committee members were continuing their consultations and work with the International Civil Aviation Organization, both at the headquarters level, where they were helping prepare for the next session of the Organization's General Assembly, in September 2016, and on the regional level in Asia, where they had prepared a questionnaire for member States and hoped to be invited to regional coordination meeting to be held in the Philippines in October 2015 to explain their concerns.

24. The co-chair of the Methyl Bromide Technical Options Committee responded to a representative who asked whether his country should be importing methyl bromide for quarantine and pre-shipment uses. Characterizing the question as complex and highly dependent on individual circumstances, the co-chair recalled that quarantine and pre-shipment was currently an exempted use; the Committee had nevertheless identified alternatives and was very open to helping parties identify the most appropriate substances for their specific situations.

25. Similarly, in response to a request for information on alternatives to HFC141b in the foam sector, the co-chair of the Foams Technical Options Committee indicated that the choice of alternatives was highly case dependent, and that the Committee could offer more targeted assistance on a bilateral basis. In general terms, the adoption of flammable foam blowing agents, such as hydrocarbons and oxygenated hydrocarbons, was a viable option, although it depended on plant size and capacity to manage safety hazards. He also noted improvements in CO_2 water-blown technology, as well as emerging hydrofluoroolefins (HFOs) and the growing use of blends in the foam sector, which were expected to continue.

26. Finally, the co-chair of the Refrigeration, Air-Conditioning and Heat Pumps Technical Options Committee addressed two queries. Explaining why the report of the Committee described HCFC-22 as still being dominant in Article 5 parties, he said that while equipment manufacturers were phasing out the substance it remained dominant in the installed base of air-conditioning equipment, with a resulting impact on the servicing sector. Responding to a suggestion that the Committee had not fully addressed the development of some alternatives and the potential for not-in-kind applications in downstream sectors such as district heating and cooling in its report, he said that there was a lack of information and proposed that the topic be considered during the next assessment. He also said that district cooling was not easy to implement, although there was some experience with a co-generation and decentralized power generation project in Chile.

27. The Working Group took note of the information presented.

IV. 2015 progress report of the Technology and Economic Assessment Panel

28. Members of the Technology and Economic Assessment Panel made presentations summarizing the main findings of the Panel's 2015 progress report on nominations for essential-use and critical-use exemptions and progress in the civil aviation sector with regard to the use of halons. Co-chairs of the Panel's technical options committees summarized the findings of their committees as follows: Mr. Keiichi Ohnishi – Chemicals Technical Options Committee; Mr. Mohammed Besri and Mr. Ian Porter – Methyl Bromide Technical Options Committee; and Mr. Daniel Verdonik – Halons Technical Options Committee. A summary of the presentations, as prepared by the presenters, is set out in annex II to the present report.

29. In the ensuing discussion, all the representatives who spoke expressed appreciation to the Panel and its technical options committees for their continued work and the progress report.

30. The representatives of Argentina, China and Mexico expressed appreciation to the Methyl Bromide Technical Options Committee for its recommendations concerning their countries' critical-use nominations, with Argentina stating that her delegation would hold bilateral discussions with the Committee to provide further information on her country's nomination. The representative of Mexico said that his country would follow the Committee's recommendations to the letter and welcomed the efforts by parties to phase out methyl bromide critical uses, which he said marked a downward trend that might lead to a complete phase-out of the chemical. The representative of China said that his country was using alternatives to methyl bromide for the fumigation of strawberries and other fruits but faced problems with regard to the treatment of ginger and was working to find alternatives to methyl bromide with the assistance of the United Nations Industrial Development Organization.

31. Regarding his country's carbon tetrachloride essential-use nomination, the representative of China said that his country's efforts to improve wastewater treatment had resulted in an increased need to use carbon tetrachloride in water quality monitoring in recent years and that while China was seeking to reduce such use, including by amending national regulations, it still required it currently. His delegation was prepared to hold bilateral consultations with other parties and Panel experts to discuss his country's carbon tetrachloride nomination.

32. Several representatives, including one speaking on behalf of a group of countries, expressed concern about the continued lack of alternatives to the use of halons in the civil aviation sector and encouraged the Halons Technical Options Committee to continue to liaise with the International Civil Aviation Organization to obtain and share with the parties the most up-to-date information on emerging alternatives. Two representatives said that they would submit information on such alternatives to the Committee and invited other parties to do the same. One of them urged the Committee to also continue to liaise with the International Maritime Organization and encouraged parties to identify opportunities to reduce unnecessary halon releases through emissions reduction strategies.

33. The Working Group took note of the information presented.

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

A. Nominations for essential-use exemptions for 2016

34. Introducing sub-item 5 (a) of the agenda, the Co-Chair recalled that an essential-use exemption nomination submitted by China was under consideration and had been mentioned during the presentation by the Technology and Economic Assessment Panel on its 2015 progress report.

35. The representative of China said that his country would submit a conference room paper on its carbon tetrachloride nomination for final consideration by the Twenty-Seventh Meeting of the Parties.

36. Subsequently the representative of China presented a draft decision on a 2016 essential-use exemption for her country for laboratory and analytical uses for the testing of oil, grease and total petroleum hydrocarbons in water. She said that while China had been actively conducting research on alternatives and working on the adoption of measures to control the use of ozone-depleting substances and the revision of related national standards, the process had been slowed by unexpected difficulties encountered when revising national standards on testing oil in water. She noted that the Chemicals Technical Options Committee of the Technology and Economic Assessment Panel had reviewed the Chinese proposal and that China had agreed with the panel's recommendation on the matter, and China intended to actively seek ways to overcome the difficulties encountered and accelerate the revision of the standards.

37. It was agreed that interested delegations and China would consult informally on the draft decision text and report back to the Working Group in plenary.

38. Following the informal consultations, which had been attended by the co-chair of the Chemicals Technical Options Committee, one representative, speaking on behalf of a group of parties, said that more time was required to discuss the date by which a revised national standard for the testing of oil in water should be put in place in China. The interested parties, he suggested, should meet early during the week of the Twenty-Seventh Meeting of the Parties for further consideration of the issue.

39. The Working Group agreed to forward the draft decision on an essential-use exemption for laboratory and analytical uses for 2016 in China, as set out in annex I to the present report, to the Twenty-Seventh Meeting of the Parties for further consideration.

B. Nominations for critical-use exemptions for 2016 and 2017

40. Introducing the sub-item, the Co-Chair said that seven parties had submitted nominations for critical-use exemptions for methyl bromide for 2016 and 2017, which had been mentioned during the presentation by the Technology and Economic Assessment Panel on its 2015 progress report.

41. In the ensuing discussion, the representatives of Canada, the United States, South Africa and Australia expressed appreciation to the Methyl Bromide Technical Options Committee for its assessment of the critical-use nominations submitted by their countries.

42. The representative of Canada said that her country was in favour of eliminating critical-use exemptions for methyl bromide and minimizing its use, saying that her country would stop submitting nominations when alternatives became available in her country. She expressed interest in holding discussions with the Committee to gain a better understanding of the information that it required to finalize the assessment of her country's nomination.

43. The representative of the United States said that his country's critical-use nomination for strawberries in 2014 had been the last such nomination thanks to the elimination of methyl bromide use in the sector, which was a remarkable success given the size of the industry and its considerable historic use of methyl bromide. While his country's need for critical-use exemptions had declined by more than 98 percent, methyl bromide use was still needed in the dry cured pork sector.

44. The representative of South Africa outlined his country's efforts to evaluate the use of phosphine, heat treatment and sulfuryl fluoride as alternatives to methyl bromide. He said that while his Government agreed to the Panel's interim recommendations of the Methyl Bromide Technical Options Committee it hoped that the Panel would reconsider the recommended exemption amount for mills for 2016 to enable the continued protection of mills while the alternative processes recommended by the Panel were being implemented and monitored for efficiency and effectiveness.

45. The representative of Australia said that his country welcomed the process followed by the Committee in the review of nominations, including its transparency and fairness and the fact that recommendations were made by consensus, stating that his country was happy to provide additional information to the parties and the Committee about its research programme to identify suitable alternatives to methyl bromide in the strawberry sector.

46. One representative, speaking on behalf of a group of countries, encouraged all parties to phase out the use of methyl bromide, which he said the countries for which he spoke had achieved in 2010; feasible alternatives to methyl bromide were available for all applications. Commending the United States for ceasing critical-use nominations for the strawberry sector, he expressed concern about continued nominations by parties not operating under paragraph 1 of Article 5 and about the compatibility of such nominations with the large methyl bromide stocks held in some of those parties. Noting that the Committee was being hampered in its assessment of 2016 and 2017 nominations by a lack of information, he urged all parties to provide timely information on their nominations to the Committee to enable it to conduct its work efficiently, and he praised those that were working closely with the Committee in that regard. Praising Mexico for its willingness to accept the Committee's recommendations, he underscored the desire of the European Union to discuss the current nominations with the nominating parties and also expressed his hope that the Argentina case would be resolved.

47. One representative said that while there was a downward trend in critical-use nominations, including by the United States, parties, and in particular those not operating under paragraph 1 of Article 5, continued to seek too many critical-use exemptions. It was agreed that nominations for critical-use exemptions and recommendations of the Methyl Bromide Technical Options Committee would be discussed with the parties concerned with the aim of facilitating the possible adoption of a decision by the Twenty-Seventh Meeting of the Parties.

VI. Issues related to alternatives to ozone-depleting substances

A. Report by the Technology and Economic Assessment Panel on the full range of alternatives to ozone-depleting substances (decision XXVI/9, subparagraphs 1 (a)–(c))

48. Introducing sub-item 6 (a) of the agenda, the Co-Chair recalled that in decision XXVI/9 the parties had requested the Technology and Economic Assessment Panel to produce a report on issues related to alternatives to ozone-depleting substances. The Panel had established a task force to implement the decision and the task force had produced a report, contained in volume 3 of the Panel's 2015 progress report, which would be updated for consideration by the Twenty-Seventh Meeting of the Parties.

49. Task force co-chairs Mr. Lambert Kuijpers, Mr. Roberto Peixoto and Ms. Bella Maranion then gave a presentation on the report. A summary of the presentation, prepared by the presenters, is set out in annex II to the present report. In the discussion that ensued, all of the representatives who spoke thanked the Panel for its hard work in preparing the report, and several said that it represented a significant improvement on previous assessment reports.

50. Responding to questions, Mr Kuijpers explained that the figure of 300 for the average GWP of low-GWP alternatives had been chosen as a reasonable estimate for the substances likely to be in use by 2020, given current progress with testing and commercialization. It was impossible to be precise about when particular substances would become commercially available, and the task force had based its estimate of 6–12 years for the conversion period on the experience of phasing out HCFCs. Similarly, estimates of the likely costs of conversion had been based on the factors of importance in previous experience; more detail was available in the report. Estimates could certainly be refined in the future, but that would be unlikely to make a significant difference to the outcome.

51. Responding to a question about possible confusion on the part of industry if it was faced with the 70 or so alternative substances the task force had considered, he said that as the market matured the range of alternatives in use would probably fall to fewer than ten and that as that happened the precise timetable for the transition would become clearer.

52. Responding to questions about assumptions underlying the business-as-usual and mitigation scenarios, he stressed that the task force had based those assumptions on the best information available. Estimates of business-as-usual growth in HFC use had been based on estimates of growth in specific sectors in specific countries, which had then been scaled up to provide an overall estimate for Article 5 parties until 2030. Data for the consumption and production of HFCs, however, was largely lacking, as developing country parties had no obligation to report it and the reports from developed

countries were not always accurate. The task force had used the best data it could obtain, but the margin of error was probably in the range of 25 per cent or more.

53. The task force had also worked on the assumption that 2020 was a reasonable average year for the start of the conversion in Article 5 parties; alternatives would be available before then in some sectors, however, in which case starting dates might be earlier for such sectors. In looking at the range of alternatives, the task force had borne in mind the full range of factors listed in decision XXVI/9, including commercial availability, cost-effectiveness, safety and energy efficiency, but currently it was not possible to be precise about each of those factors for every individual alternative; the details would become clearer with time.

54. He said that he agreed that the assumptions underlying the cost of conversion should be open to discussion, particularly in the light of decisions adopted by the Executive Committee of the Multilateral Fund. He also agreed that it was possible that the assumptions regarding the speed of conversion were too optimistic; the task force had made a simple assumption grouping all sectors together, but conversion would start earlier in some sectors than in others. The task force report was clear, however, that the later the starting date the greater the volume of HFCs needed for servicing equipment over its lifetime.

55. The task force hoped to be able to acquire better data to enable it to further refine its report, in particular with regard to smaller sectors such as technical aerosols and solvents, and the report of the task force to be presented to the Twenty-Seventh Meeting of the Parties would incorporate the mitigation scenarios that it had previously developed for non-Article 5 parties as well as those for Article 5 parties.

56. Responding to questions about the availability of alternatives for high ambient temperature conditions, Mr. Peixoto stressed the fact that the task force's report did not present a final solution. The outcome of the testing currently under way, summarized extensively in the report, would be crucial in determining the availability and affordability of alternatives and the need, if any, for the redesign of equipment. The testing covered the range of temperatures experienced in high-ambient-temperature countries; further details were provided in the report. Mr. Kuijpers added that currently there were no acceptable alternatives for all uses in high-ambient-temperature countries, but several potential alternatives were currently being tested.

57. Responding to a question about safety standards, Mr. Peixoto observed that several international standards had been released recently, covering charging and other operational procedures. It was up to national regulatory bodies whether to adopt them, but it was clear that some national standards would benefit from updating; some, for example, banned the use of flammable substances completely even where the risk of accident was very low.

58. The Working Group agreed that interested parties and Panel members should meet informally to continue discussion of the report.

59. Mr Kuijpers subsequently reported on the outcome of the informal discussions, reading from a one-page document that he said described all the requests made by the parties. The document, entitled "Considerations for updated report – decision XXVI/9 task force report", is set out in annex III to the present report, where it is presented as submitted, without formal editing.

B. Updated information submitted by parties on their implementation of paragraph 9 of decision XIX/6 (decision XXVI/9, paragraph 3)

60. Introducing sub-item 6 (b) of the agenda, the Co-Chair drew attention to an information document (UNEP/OzL.Pro.WG.1/36/INF/2) compiling information submitted by parties in response to paragraph 3 of decision XXVI/9 on their efforts, pursuant to paragraph 9 of decision XIX/6, to promote a transition from ozone-depleting substances that minimized environmental impact. The document updated the information issued at the thirty-fifth meeting of the Open-ended Working Group in April by adding two submissions that had been recently received, from Canada and the United States.

61. In response to a question, the representative of the Secretariat confirmed that the Secretariat would continue to compile submissions by parties and update the summary document that had been prepared in 2014 for publication at the Twenty-Seventh Meeting of the Parties in November. The Working Group took note of the document.

VII. Report of the intersessional informal discussions on the feasibility and ways of managing hydrofluorocarbons (UNEP/OzL.Pro.WG.1/35/6, paragraph 128 and annex II)

62. Introducing the item, the co-chair recalled that at the thirty-fifth meeting of the Open ended Working Group the parties had agreed to continue to work intersessionally in an informal manner to study the feasibility and ways of managing HFCs, with a view to the establishment of a contact group at the current meeting. She then asked the co-conveners of the informal discussions, Mr. Patrick McInerney (Australia) and Mr. Rafael da Soler (Brazil), to report on the intersessional work to date.

63. Mr. McInerney began by noting that a full account of the informal meeting held in Vienna on 12 and 13 June 2015 could be found on the website of the Secretariat. That meeting, he continued, had been very positive, with a good sense of cooperation. Noting that the consultations were continuing at the current meeting, with three sessions already held and positive progress made, he asked that discussion of the item in plenary be deferred so that informal discussions could continue.

64. The parties agreed to postpone further consideration of the item in plenary to allow further informal discussions to take place.

65. At the commencement of the afternoon plenary session on Thursday, 23 July, the co-convener of the informal consultations on HFCs reported that the consultations had not yet concluded and would need to resume immediately after the session.

66. One representative suggested that the plenary session be adjourned early to enable the informal consultations to resume earlier, saying that items 7 and 8 were interrelated and that it would be desirable to finalize item 7 before further discussing the amendment proposals under item 8. He also indicated that his delegation could not accept any outcome document in any form such as consolidated, compiled or technical text or any recommendations emanating from the informal consultations.

67. Many representatives objected to the proposal to adjourn the plenary session early, expressing a desire to discuss fully the four amendment proposals under item 8. Many also expressed concern that the informal consultations on HFCs had not yet finished and suggested that a deadline for their conclusion at the current meeting be imposed to enable the parties to make progress on HFCs in a formal setting prior to the Twenty-Seventh Meeting of the Parties. One representative said that most parties wanted to establish a contact group to continue the deliberations on HFCs and urged the parties to define the mandate of the group as soon as possible, arguing that to do so would in no way prejudice the positions of any parties.

68. It was agreed that the informal consultations would resume upon the closure of the current plenary session.

69. At the final plenary session of the current meeting, on the evening of Friday, 24 July 2015, the co-convener of the informal consultations reported that the consultations had continued until moments earlier. While steady progress had been made on a possible mandate for a contact group to discuss HFCs, a few items remained unresolved and it therefore had not been possible to conclude the consultations.

70. The Working Group accordingly agreed that the draft mandate document developed during the informal consultations as it stood at the suspension of the current meeting on 24 July 2015 would be appended to the report of the meeting. That document, presented as submitted and without formal editing, is set out in annex IV to the present report. The Working Group also agreed that the current meeting would be suspended, rather than adjourned, at the conclusion of the current session and that it would be resumed prior to the Twenty-Seventh Meeting of the Parties at a time and place to be determined for the sole purpose of continuing its work under agenda item 7.

VIII. Proposed amendments to the Montreal Protocol

71. Introducing the item, the Co-Chair recalled that four amendment proposals had been submitted for consideration by the Meeting of the Parties in 2015, inviting the nominating parties to present their respective proposals. He said that all the proposals sought to amend the Montreal Protocol to include a phase-down of HFCs and drew attention to a note by the Secretariat on issues for discussion by and information for the attention of the Open-ended Working Group (UNEP/OzL.Pro.WG.1/36/2), whose annex contained a table presenting some of the key elements of the proposals. The proponents of the proposed amendments then introduced them.

A. Presentation of the proposals

72. The representative of Canada, on behalf of her country, Mexico and the United States, presented the proposal submitted by the three parties. The proposal, she said, had evolved to incorporate comments by parties and new information presented by the Technology and Economic Assessment Panel and during HFC workshops, but at its core remained premised on the familiar elements that had enabled parties to successfully phase out ozone depleting substances, including baselines for consumption and production, reduction steps, a delay in implementation for Article 5 parties, a list of controlled substances, licensing and reporting requirements, and financial support from the Multilateral Fund to assist Article 5 parties in implementing their obligations under the amendment. The proposal was for a phase-down, rather than a phase-out, of HFCs, in recognition of the fact that alternatives for all applications in all circumstances were not yet available.

73. Elements that differed from earlier versions of the proposal included a technology review process to enable parties to make changes to the phase-down schedule should alternatives not become available as expected, a 3-year delay in the application of non-party trade provisions, and an increase in the number of parties that would need to ratify the amendment for its entry into force.

74. The representative of Mexico said that the proposal attached great importance to ensuring a sustainable transition from HFCs to more energy-efficient and climate-friendly alternatives with the support of the Multilateral Fund. Using the Fund to cover the cost of conversion was both a priority and a precondition for any amendment to go forward. In closing, he expressed the continued commitment of his country to working toward amending the Protocol to control and reduce HFCs, and he recalled that Nobel prize winner Mario Molina had encouraged the parties to adopt such an amendment.

75. Introducing his country's proposal, the representative of India said that it was premised on the understanding that controlling HFCs could be a cost-effective way of reducing greenhouse-gas emissions and leapfrogging from high-GWP substances to climate-friendly alternatives to HFCs, thereby furthering the objectives of the Montreal Protocol and the United Nations Framework Convention on Climate Change, which he said were complementary. Such alternatives should emerge from market-driven research and should be safe, environmentally sound and energy efficient, and should preferably be based on naturally available substances such as ammonia, which might require additional research.

76. He then described elements of the proposal, including a grace period of 15 years for Article 5 Parties, differentiated production and consumption freeze periods for Article 5 and non-Article 5 parties, with controlled periods of 19 years for both groups of countries, financial assistance for Article 5 parties and the continued use of HFC blends until viable alternatives to HCFCs became available. Two features that were unique to the Indian proposal were a provision to enable Article 5 parties to establish their own phase-down steps, which they should disclose five years in advance of their implementation, and a request that the Multilateral Fund cover all costs associated with HFC plant conversions and lost profits due to plant closures.

77. Introducing the European Union proposal, the representative of the European Union said that it sought to inject new ideas with the European Union proposal in order to overcome the reluctance of some parties to address HFCs, which unlike other greenhouse gases were drastically increasing and needed to be dealt with at the global level in order to protect the climatic environment. Because HFCs had been developed largely as alternatives to ozone-depleting substances, it was the responsibility of the Montreal Protocol to mitigate their negative effects.

78. The proposal recognized that while non-Article 5 parties were large users of HFCs and should take the lead in promptly reducing their production and consumption, with the first phase-down period to start in 2019, at a freeze level of 85 per cent of the baseline, many Article 5 parties had just started to phase out HFCs and would need to use them to some degree as alternatives in the rapidly growing refrigeration and cooling sectors. For Article 5 parties, a consumption freeze of HCFCs and HFCs, combined in a single basket and expressed in carbon dioxide equivalence, would apply, and a consumption reduction schedule would be agreed by 2020, allowing industry sufficient time to develop reliable and affordable alternatives where still needed. As for the Article 5 party production sector, which was in a more comparable position to the production sector in non-Article 5 parties, the proposal also included a reduction target by 2040 of 15 per cent of the baseline, with interim targets to be agreed by 2020.

79. The proposed basket approach was unique to the European Union proposal and would grant flexibility to Article 5 parties, enabling them to increase their use of HFCs, especially if they had lower global warming potential, thereby alleviating concerns about refrigerant availability for the

refrigeration and cooling sectors. The approach also gave Article 5 parties the flexibility of reaching consumption freeze targets by either leapfrogging to HFC alternatives or by reducing their use of HFCs where such chemicals were already in use. In addition, because the early freeze would help prevent the dumping of outdated high-GWP technologies in developing countries.

80. In closing, he said that the proposal did not define HFCs as a "controlled substance" under the Montreal Protocol, since the purpose of the proposal was to reduce rather than eliminate those chemicals, so emissions should continue to be monitored under the United Nations Framework Convention on Climate Change, contrary to ozone-depleting substances. The proposal was therefore not only compatible with that Convention but would also contribute to advancing the mutual supportiveness between the climate and ozone treaties.

81. Introducing the amendment proposal submitted by his country, Kiribati, the Marshall Islands, Mauritius, Palau, the Philippines, Samoa and the Solomon Islands, the representative of the Federated States of Micronesia said that it had elements in common with the other three proposed amendments, which he was confident could help the parties to deal with HFCs and thereby achieve their environmental goals.

82. He went on to describe the main elements of the proposal, including differentiated HFC baselines and phase-down schedules for Article 5 parties and non-Article 5 parties, with early action to be taken by non-Article 5 parties to generate climate benefits and facilitate the availability and market penetration of alternatives to be used by Article 5 parties, and a grace period for Article 5 parties. A difference between the current proposal and earlier Island versions was that the HFC phase-down schedule for Article 5 parties had been made to coincide with the remaining reduction steps under the accelerated HCFC phase-out process in order to capture synergies and efficiencies between the two processes, including with regard to financing, and to enable parties to coordinate their HFC phase-down with their HCFC phase-out management plans (HPMPs) and facilitate leapfrogging.

83. As with earlier versions, the Multilateral Fund would facilitate the phase-down of HFCs under the current version, but it also provided for enhancements to the Fund to promote low-GWP energy efficient technologies and to overcome barriers to their uptake, including through the training of technicians, demonstration and pilot projects and the review of antiquated standards and legislation.

84. The representative of the Philippines said that as one of the countries most vulnerable to climate change, her country had a strong interest in addressing HFCs and looked forward to building a strong consensus to deal with them for the benefit of all.

85. The representative of Samoa said that her country had decided to co-sponsor the proposal to phase down HFCs in favour of climate-safe alternatives after giving serious consideration to the benefits that it would have for the people of the Pacific region and the world. She urged the parties to discuss the proposed amendments in a contact group in order to move forward and help preserve the Montreal Protocol's reputation as the most successful multilateral environmental agreement. She also suggested that the four proposals be consolidated in a single document to facilitate their consideration.

86. Observing that the Montreal Protocol was known as the most successful environmental treaty and that its financial mechanism had been key to its success, the representative of Kiribati highlighted those elements in the Island States' proposal that referred to strengthening the Multilateral Fund to promote energy efficient and climate-friendly alternatives to HFCs, saying that the proposal addressed challenges identified by parties at previous meetings and expressed the willingness to discuss it with parties in whatever format was agreed.

87. Saying that climate change was the single greatest threat to the peoples of the Pacific and one of the world's greatest challenges, the representative of Palau said that the parties to the Montreal Protocol must seize the opportunity to deal with HFCs under the Protocol before the problem got out of control.

B. Discussion

88. Following the presentation of the amendments, the Co-Chair opened the floor for questions and answers regarding the details of the amendment proposals.

89. A number of representatives queried the need for further discussion under the item at the current time, given that the informal discussions under agenda item 7 were continuing. They argued that, because of the range of legal and technical issues that remained to be resolved, including in particular the challenges being faced in the phase-out of HCFCs, the lack of available alternatives for applications in high ambient temperatures and the fact that HFCs were already controlled under the United Nations Framework Convention on Climate Change and its Kyoto Protocol, it would be

impossible to reach agreement on any of the proposed amendments. It would be better to continue the discussions in the informal group, which were proceeding positively.

90. Other representatives said that while they supported the general principles behind the amendments, they agreed that it would be better to delay further discussion until after the informal consultations had concluded, given the wide range of relevant topics being discussed there. One representative argued that discussion of the amendments should be delayed until after parties had had the chance to collect reliable data on their consumption of HFCs, with support from the Multilateral Fund. One representative observed that the testing of alternatives that was currently under way in several countries would help to illuminate future discussions.

91. Several other representatives, however, said that it would be beneficial both to continue the discussions in the informal group under agenda item 7 and to discuss the proposed amendments under item 8 in parallel; the proposed amendments contained many features that it would be helpful to explore in detail. The four proposals had been submitted by a total of forty parties, reflecting a real desire to deal with the issues raised by HFCs.

92. Many representatives said that it would be helpful for the Secretariat to prepare a consolidated document presenting all four proposed amendments in a manner that would enable representatives to compare them easily, building on the document that the Secretariat had already prepared summarizing the main points of each proposed amendment. Other representatives, however, objected to the suggestion, reiterating that the proposed amendments should not be discussed at the current juncture.

93. The Co-Chair explained that the informal discussions under agenda item 7 were dealing primarily with the overall process for discussions on the management of HFCs, while agenda item 8 was specifically dedicated to the proposed amendments, which had been validly submitted in accordance with the relevant procedure for submission of proposals for amendments under the Vienna Convention and the Montreal Protocol and would be on the agenda for the Twenty-Seventh Meeting of the Parties. Given that the proposed amendments had been introduced, parties should have the opportunity to seek clarification on any aspects of the proposed amendments that concerned them. The Working Group of the Parties to the Montreal Protocol at its thirty-sixth meeting would therefore proceed with questions and answers on the details of the proposed amendments.

1. General comments

94. In addition to posing questions about the proposed amendments a number of representatives offered comments on various aspects of them and on the issues raised by HFCs. All representatives who took the floor thanked the proponents, and many observed that there was substantial common ground between the four proposals. Several representatives thanked the proponents of the North American and island States' amendments for their willingness to put forward revised proposals taking into account concerns expressed by parties during previous discussions. Other representatives drew attention to the findings of the Scientific Assessment Panel, which showed a rapid increase in the consumption of HFCs. Many representatives said that the institutions of the Montreal Protocol, with many years of relevant experience behind them, were well suited to the challenge of controlling the production and consumption of HFCs.

95. Several representatives said that the absence of certainty about the cost and availability of potential alternatives to HFCs for many applications posed significant problems. It was also said that many new alternatives were protected by intellectual property rights, including application patents, held by producers in non-Article 5 parties, which made it impossible for Article 5 parties to use them in a cost-effective manner or to develop alternatives themselves; Article 5 parties thus faced a potential monopoly situation that the proposed amendments would legitimize. The slow rate of adoption of some alternatives even in non Article 5 parties helped underline the problem.

96. Several representatives suggested that the Technology and Economic Assessment Panel could be asked to analyse the strengths and weaknesses of each proposal and on that basis prepare a unified proposed amendment on which parties could base their comments.

97. One representative, while agreeing that the Montreal Protocol was well suited to the challenge of controlling HFCs, said that the Indian proposal best reflected the needs of Article 5 parties.

98. Several representatives drew attention to the need for financial support, including for institutional strengthening.

99. The representative of the United States said that there was a need to talk about both challenges and solutions, which was partly why the North American proposal included a technology review in 2025 and 2030, for non-Article 5 and Article 5 parties, respectively, allowing for a possible adjustment of phase-down schedules in the light of experience, including with the adoption of alternatives. Saying

that there was a need to address the challenges faced by high-ambient-temperature countries, he noted that his Government was carrying out a programme for testing equipment under such conditions. With regard to financing, he drew attention to a statement by the leaders of the Group of 7 in June 2015, in which they had called for an HFC phase-down under the Montreal Protocol and had called on donor countries to assist developing countries in implementing it.

100. One representative said that none of the proposed amendments dealt adequately with the disposal of used HFCs as any phase-down schedule was met. The disposal of HCFCs was already causing a major problem, and if HFCs had to be disposed of too the problem would get worse. Adequate financial and technical support would be needed.

2. Proponents' answers to questions about the amendment proposals

101. To facilitate the discussion the proponents were asked to group their answers in the following categories: financial support, technology transfer and intellectual property rights; alternatives and exemptions; environmental benefits and energy efficiency; synergies between the United Nations Framework Convention on Climate Change and the Montreal Protocol; baselines for production and consumption; phase-down schedules and production baselines; and other miscellaneous issues.

Financial support, technology transfer and intellectual property rights

102. Responding to questions on the provision of financial support for the combined control of HCFCs and HFCs envisaged in the European Union proposal, the representative of the European Union said that the Multilateral Fund could provide the framework, using the procedures it had developed during the phase-out of other substances. By including HFCs within the scope of Article 10 of the Protocol funding would be provided for the obligations of Article 5 parties under the control measures proposed in the European Union proposal; more detail was provided in the European Union background document available on the Ozone Secretariat website. In addition, the Multilateral Fund was highly experienced with supporting technology transfer and had established procedures for doing so, although it would be necessary to explain in greater detail how they would apply to HFCs.

103. The representative of India stressed the importance of dealing with intellectual property rights. The proposal of India thus provided for parties to be compensated for the full cost of conversion, including the cost of acquiring intellectual property. That was important because all alternatives to HFCs were covered by both process and application patents. In some cases it had not proved possible even to find out the costs of alternatives owing to commercial confidentiality concerns. Full conversion cost as the basis for financial assistance was preferable to the existing procedures of the Multilateral Fund because the latter, he said, had failed to ensure satisfactory technology transfer and because the concept of incremental costs had never been defined, which meant that Article 5 parties could not know in advance how much funding they would receive. Industries in Article 5 parties had incurred losses in phasing out ozone-depleting substances, and the Executive Committee of the Multilateral Fund had never discussed either that issue or the problems of the production sector in the context of the accelerated phase-out of HCFCs. Responding to a request for clarification about funding for second conversions, he said that entities that had converted to HFCs in phasing out HCFCs owing to a lack of low-GWP alternatives should be eligible for funding for a second conversion to low-GWP alternatives once such alternatives became available.

104. The representatives of Mexico and the United States said that the North American proposal was designed to draw on the institutional strengths of the Montreal Protocol, including in particular the Multilateral Fund and its experience with funding and implementing the transfer of technology to Article 5 parties over the preceding 25 years. Their proposal would introduce new obligations regarding the phase-down of HFCs, and accordingly it would also amend Article 10 of the Protocol to make it clear that efforts to comply with those new obligations would be eligible for financial support, including support for institutional strengthening, which would be vital to building capacity before and after the new obligations came into force.

105. The representative of the United States added that under the normal procedures of the Multilateral Fund, financial support would include the capital costs of conversion plus agreed incremental operating costs and, for the production sector, compensation for the closure of plants. In practice, intellectual property rights had not proved a barrier to the phase-out of ozone-depleting substances; the Multilateral Fund had already demonstrated the flexibility to deal with all issues about which representatives had expressed concern, including the costs of licensing technology and research and development. It also had a good track record in funding demonstration projects for new technologies. It was also worth noting that in many cases new technology was being developed in and transferred from Article 5 parties rather than non-Article 5 parties. He said that there was a need for

further discussion of the transfer of obsolete technology to Article 5 parties, as well as the problems of low-volume-consuming countries, which did not manufacture any equipment themselves.

106. In response to a question about funding for the disposal of used substances, he observed that none of the amendments proposed the complete phase-out of HFCs; there was therefore no need for their disposal and destruction, in contrast to substances that were being completely phased out.

107. Responding to a question about additional sources of financing for the phase-down of HFCs, the representative of the Federated States of Micronesia explained that the island States' proposal saw the Multilateral Fund as the primary source but would also allow for supplemental sources. He would welcome further discussion on that issue.

108. Following the above answers from the proponents, one representative of an Article 5 party said that the issue of intellectual property rights was a critical one. Even though many new alternatives such as HFOs were being developed in Article 5 parties, it was generally the case that the patents on those alternatives were held by companies in non-Article 5 parties. She drew attention to the considerable investment of time needed in identifying, evaluating, testing, choosing and registering new substances, and the accompanying need for redesign of plant and equipment, which meant that conversion would be a slow and expensive process. There was a limit to the extent to which consumers in countries such as hers could be expected to bear the costs. She also said that some equipment produced in and exported from Article 5 parties was losing market share in some non-Article 5 parties as a result of domestic regulations controlling HFC use.

Alternatives and exemptions

109. Responding to questions regarding HFC alternatives and the potential use of exemptions for specific uses, the representative of the European Union clarified that the European Union proposal was aimed at making HCFC phase-out management plans more climate-friendly by freezing total CO_2-equivalent consumption of HCFCs and HFCs by Article 5 parties by 2019; because consumption of both was expressed in terms of carbon dioxide equivalence, parties could continue to use HFCs in coordination with their HCFC phase-out management plans when no low-GWP alternatives were available. There was thus no need for exemptions as such. In addition, the phase-down steps for Article 5 parties to be agreed by 2020 would be based on a sector-by-sector review of the availability of alternatives, based on information provided by the Technology and Economic Assessment Panel.

110. The representative of the Federated States of Micronesia said that HFC alternatives existed for most uses, which was the primary reason his country had co-sponsored a phase-down proposal. The island States' proposal would enable parties to choose from a basket of gases with various GWPs when low-GWP alternatives were unavailable; the proponents, however, could consider the introduction of exemptions for specific uses if parties thought it necessary.

111. In response to a query as to whether his country's proposal provided for a means of deterring growth in the use of HFCs during the 15-year grace period afforded to Article 5 parties, the representative of India said that the proposal contemplated an HFC freeze rather than a reduction scenario due to the uncertainty that existed regarding the availability of alternatives. With regard to exemptions, the Indian proposal included an exemption for HFC production and consumption for metered-dose inhalers and other medical applications, since no suitable alternatives for such uses were currently available.

112. Responding to queries concerning the technology review of climate-friendly alternatives to HFCs contained in the North American proposal, the representative of the United States said that it was scheduled to take place no later than 2025 for non-Article 5 parties and no later than 2030 for Article 5 parties and would be informed by quadrennial, annual and other relevant assessments, as well as other information provided by the Technology and Economic Assessment Panel.

113. With regard to exemptions, the North American proposal did not envisage them; while HFC alternatives might not exist for all end uses and applications and parties, the residual amount of allowed HFC consumption left at the end of the phase-down would permit parties to use HFCs or HFC blends in priority sectors such as medical applications, servicing of existing refrigeration equipment and fire protection. In addition, the proposed technology review would enable parties to revisit the phase-down schedules in response to the availability and uptake of alternatives. Given that some parties had requested additional flexibility for parties with high ambient temperatures, it was desirable that the parties discuss at the current meeting issues such as which countries and sectors were affected by high temperatures in order to find potential solutions to those challenges.

114. The representative of the Technology and Economic Assessment Panel said that research was still under way on alternatives to halons and HFCs for a limited number of fire protection applications; given the amounts involved, however, HFC consumption in the sector was not expected to pose a major problem.

Environmental benefits and energy efficiency

115. Responding to queries related to the environmental and energy efficiency benefits of the proposed amendments, the representative of the European Union said that the development of the European Union's domestic phase-down legislation had involved a sector-by-sector analysis of HFC alternatives and their energy efficiency and that the introduction of alternatives had been found to lead to savings through energy efficiency, information which was available in a note on frequently asked questions on the Secretariat website. He said that energy efficiency was an important factor that parties would need to consider when assessing potential HFC alternatives and that such assessments would require an examination not only of alternative gases but also of not-in-kind HFC alternatives that could lead to energy efficiency improvements.

116. The representative of the Federated States of Micronesia said that better coordination between energy efficiency policies and refrigeration policies would help to deliver climate benefits and cost savings for consumers and countries building new power infrastructure, so it was important that the Montreal Protocol promote such coordination. In addition, Multilateral Fund procedures should be revised to make the costs associated with the purchase of new equipment and upgrades that would deliver energy efficiency gains eligible for funding under the Fund, thereby creating an incentive for parties to adopt energy-efficient HFC alternatives.

117. The representative of India said that energy efficiency was prominently reflected in his country's amendment proposal, which sought to prevent the replacement of HFCs with less energy-efficient alternatives.

118. The representative of the United States concurred with the view that it was important not only to consider the intrinsic GWP of alternatives, but also how energy-efficient they were, observing that any loss in efficiency could lead to increased power-related greenhouse gas emissions. It was therefore essential to seek opportunities to further increase the energy efficiency gains that had resulted from the implementation of the Montreal Protocol, including by addressing the issue of financing and how the Multilateral Fund might fund targeted investments to produce higher energy efficiency gains.

119. In response to the proponents' answers on energy efficiency, one representative expressed support for the view that more attention should be paid to energy efficiency in efforts to replace HFCs, as well as HCFCs. The adoption of less energy-efficient alternatives to HCFCs might have been justified in the past, she suggested, because HCFCs were ozone-depleting substances and the parties' mandate was to eliminate such substances. As HFCs were not ozone-depleting substances, however, that rationale could not apply. She welcomed the comment by the United States that his country was open to discussing the possibility of the Multilateral Fund providing financial support for energy-efficient alternatives and said that her country would be interested in participating in such discussions.

120. Responding to a query regarding the availability of data with which to estimate HFC consumption in Article 5 parties, the representative of Mexico said that such data could be obtained through customs authorities in those parties that had registers of HFC imports and exports, from industry and from industrial organizations, as well as from surveys carried out by the Multilateral Fund, all of which could provide sufficiently reliable information for the calculation of baselines. He offered to hold bilateral discussions with interested parties on the various options at the current meeting.

Baselines and control measures

121. Responding to questions on the baselines and control measures specified in the North American proposal, the representative of the United States observed that all four proposed amendments used a combination of HFC and HCFC consumption and production figures for setting baseline levels for reductions in HFC consumption and production. Since all countries were in the process of converting from HCFCs to other substances, including HFCs, using HFC figures alone would result in an unrealistically low baseline. The proposed amendments differed in their choice of years used to calculate baseline consumption and production; in the case of the North American proposal, the years 2011–2013 had been chosen because they were recent enough to give a reasonably clear picture of current levels of use. She accepted that some countries might have difficulty in collecting data on HFCs but said that several sources were in principle available, including national

reporting programmes, where they existed, surveys of industry and customs data; she would welcome further discussion in detail on other possibilities.

122. In response to a question about why the North American proposal contained no date for a freeze of HFC consumption and production in non-Article 5 parties, she explained that a freeze had not been thought necessary because the first step envisaged was a 10 per cent reduction by 2019. If the amendment was adopted in 2015, the 10 per cent reduction in 2019 would in effect require a consumption and production freeze at some point between 2016 and 2018. The grace period for Article 5 parties before control measures came into effect was shorter than for other substances controlled by the Montreal Protocol, as some had pointed out, but the proposed phase-down steps for Article 5 parties were less stringent; the first step came only in 2026, seven years after the first step for non-Article 5 Parties. As with all other elements in her proposal, however, she was willing to discuss and consider these further.

123. The representative of Mexico added that calculating the baseline through a combination of HCFC and HFC use allowed for circumstances in which no alternatives to HCFCs had yet been developed or adopted. The phase-down steps had been worked out based on previous experience with the phase-out of ozone-depleting substances and an analysis of the availability and cost of alternatives in the various sectors in which they were used. Clearly, financial support would be necessary to enable Article 5 Parties to achieve them.

124. The representative of the Federated States of Micronesia explained that the baselines in the island States' proposal had been calculated as a combination of HFCs and HCFCs to reflect Parties' overall needs for refrigerants. The proposal used later years for baseline data for Article 5 Parties than for non-Article 5 Parties to allow for improved collection of data. In response to a question about the compatibility of the proposal with HCFC phase-out management plans, he said that one of the proposal's key strengths was the way in which the phase-down steps for Article 5 Parties were precisely synchronised with the HCFC phase-out schedule set by the Protocol, which would greatly facilitate national planning, reduce the administrative burden on the Executive Committee of the Multilateral Fund and help to avoid the need for any double phase-out of HCFC use; he also hoped that supplemental funding in addition to that provided by the Multilateral Fund would become available to reinforce that synergy. The grace period for Article 5 Parties was relatively short, but that was a result of synchronising the control schedules with those for HCFCs; in any case, it was offset by a relatively generous baseline.

125. The representative of the European Union explained that the European Union proposal did not include a freeze for non-Article 5 Parties because the first step – a 15 per cent reduction by 2019 – was relatively ambitious. Given the time needed for ratification of the proposed amendment, an earlier date for a freeze did not seem feasible. For non-Article 5 Parties' baseline figures, the HCFC figure was that allowed under the Protocol in 2009–2012 rather than the actual figure because the speed of phase-out had varied significantly between countries. The 45 per cent figure used in the calculation for HCFCs was roughly equivalent to 15 per cent of the original baseline figure for HCFCs set in 1989. It was important to bear in mind, however, that in all four proposed amendments the baseline and phase-down levels were expressed as CO2-equivalents. That allowed for considerable flexibility in meeting the phase-down steps; it would be possible, for instance, to meet a phase-down step while using the same volume of refrigerants by reducing the average GWP of the substances in use.

126. Another representative of the European Union added that it was not yet possible to calculate the total anticipated costs of the European Union proposal because the phase-down steps for Article 5 Parties would only be determined later; it was clear, however, that the proposal envisaged financial and technical support being made available through the Multilateral Fund, and it proposed the amendment of Article 10 of the Montreal Protocol to make that explicit.

127. The representative of India said that he still did not understand why some of the proposed amendments did not include a freeze of consumption and production for non-Article 5 Parties, suggesting that it was not possible to reduce consumption and production levels if they were not first frozen. Responding to questions on his own Party's proposal, he explained that the Article 5 baseline years were set at 2028–2030 because reliable HFC data did not currently exist for most Article 5 parties. For other phase-outs under the Protocol Article 5 Parties had enjoyed a fifteen-year grace period, and it also normally took several years to introduce the regulations that were needed before reliable data could be gathered. In addition, HCFC phase-out had proceeded much faster in non-Article 5 Parties than in Article 5 Parties, so it had seemed sensible to wait until after 2025 to set the baseline levels, as by then HCFC consumption and production in Article 5 Parties would have been reduced to 32.5 per cent of baselines. As he had explained earlier, barriers caused by intellectual property rights were expected to pose problems in the phase-down of HFCs.

128. Responding to a further question about the use of HCFC figures in the calculation of baseline levels for Article 5 Parties, the representative of Mexico explained that the use of 50 per cent of HCFC consumption during the baseline period in the North American proposal was intended to reflect the extent of conversion of HCFC applications to HFC applications. The figures were expressed as CO_2-equivalents and were therefore not directly linked to the Montreal Protocol's existing phase-out schedule for HCFCs, which was expressed in terms of ozone-depleting potential. The baseline also included 100 per cent of HFC use in the same years, but because some uses of HCFCs had still not been converted to HFCs it was reasonable to include a proportion of HCFC use as well.

129. Additional questions about baselines and control measures were posed at a subsequent session. In response to such questions with regard to the North American proposal, the representative of Mexico explained that the baseline for non-Article 5 parties took into account that those parties' HCFC elimination efforts had already begun during 2011–2013 and that HCFC consumption in those parties was therefore significantly lower than in Article 5 parties. The multiplier to be applied to HFC consumption was therefore higher to avoid understating possible demand for HFCs. In that context it was also important to bear in mind that the starting point for HFC consumption for non-Article 5 parties was a 10 per cent reduction rather than a freeze.

130. Responding to the same question, the representative of the European Union indicated that the reference period was in the past because the European Union had reliable consumption data for that period in the refrigeration sector and all other relevant sectors. Developing countries generally still had remaining HCFC consumption during that period, much of which would have been converted to high-GWP HFCs by the start date; that also had to be taken into consideration, and it was the reason for using a mix of HCFCs and HFCs. Using the basket approach on consumption ensured that entire sectors were assessed in terms of CO_2 equivalent, which allowed room to extend the refrigeration capacity needed to achieve development goals. To reach the freeze level and maintain it in the future would require the conversion of relevant sectors to low-GWP alternatives, which was already happening in the context of the current HCFC phase-out; that was the advantage of linking HFC phase-down to HFC phase-out. He drew attention to case studies available on the informal discussion website, which showed that efforts to reach the freeze level would to an automatic decline in consumption, because sectors converting to sustainable alternatives did not require further servicing.

131. The representative of the United States addressed several questions regarding the 2011–2013 baseline period. She began by stressing that for the proponents of the North American proposal, historical information was used solely to create a formula for calculating HFC levels. In response to concerns regarding the use of historical consumption of two different substances to create a baseline for control obligations for only one of those substances, she pointed by way of precedent to the 1992 calculation of the HCFC baseline for non-Article 5 parties, which used a combination of 1989 HCFC and CFC consumption to create a baseline for allowable HCFC consumption. The CFC part of that formula was simply to show that there would be some transition from CFCs to HCFCs; the formula itself was intended solely to provide an amount to use as a starting point, and it was not intended to represent current market penetration or amounts used. Similarly, the baselines in the North American proposal used historical data for HCFCs while recognizing that HCFCs would give way to HFCs and that some HFC consumption was already occurring. The baselines thus allowed for the fact that HFC consumption would grow from the reference years 2011–2013.

132. The representative of the United States also provided additional clarification regarding the phase-down starting point for non-Article 5 parties. Addressing a suggestion that a phase-down starting from a reduction from baseline instead of a freeze was unprecedented under the Protocol, she cited bromochloromethane and the substances characterized as "Other CFCs" under the Protocol, the phase-downs for both of which had begun with immediate reductions from baselines rather than freezes at baselines. In relation to the difference in the starting point for Article 5 parties and non-Article 5 parties, she said that the proponents had felt it was fairer for Article 5 parties to start from a freeze while the non-Article 5 parties would have to begin with an immediate reduction from baseline.

133. The representative of the United States also responded to questions on why the percentages used to develop the HCFC baselines for non-Article 5 and Article 5 parties were different. She reiterated that the formula was intended to create a figure or starting point that recognized growth and was not intended to be about market share, and she concurred with comments to the effect that Article 5 and non-Article 5 parties were at very different stages of their HCFC phase-downs. For non-Article 5 parties, the percentage used in the baseline calculations was 75 per cent of HCFC consumption during 2011–2013; it was important to recognize, however, that non-Article 5 party consumption during that period was no more than 25 per cent of the original baseline. The percentage used to calculate the baseline for non-Article 5 parties was therefore 75 per cent of no more than 25

per cent of the HCFC baseline, or 37.5 per cent. For Article 5 parties, on the other hand, the percentage was 50 per cent of HCFC consumption for 2011–2013; during 2011 and 2012 consumption could continue to grow, while 2013 was the freeze year. The baseline for Article 5 parties was therefore was 50 per cent of 100 per cent of HCFC use, which was very different from the baseline for non-Article 5 parties.

134. As a final point, in response to several comments to the effect that it would be undesirable to combine the four proposed amendments in a single document, the representative of the United States said that displaying the various texts together, building on the table provided in document UNEP/OzL.Pro.WG.1/36/2, would lead to a better understanding of the proposals.

135. In response to a question about which sectors would be included in the baseline calculations, the representatives of the European Union and the United States said that all sectors where HFCs were used would be included.

136. The representative of the European Union went on to respond to a question about the percentage of HCFC consumption converted to HFCs in the HCFC phase-down process, acknowledging that HCFC consumption had not been fully converted to HFCs. There were large variations among countries, even within the European Union, he said, with conversion rates ranging from about 30 per cent to around 80 per cent. The European Union had had a reporting system in place since 2006 and could easily establish a baseline, but he recognized that other countries, particularly Article 5 parties, were not in the same position.

137. He also responded to a question regarding the use of permitted HCFCs in the European Union proposal's baseline rather than actual HCFC consumption, saying that they had felt it unfair to penalize parties that had phased out HCFCs and other ozone-depleting substances earlier and faster than required under the phase-out schedules of the Montreal Protocol. He noted that in such exercises, it was natural to choose the easiest areas first, so that when a discussion of additional reduction measures arose, the more difficult areas remained. Consequently, it was fairer to look at what was allowed and what had already been converted rather than at real consumption. The representative of the Federated States of Micronesia also addressed the matter, saying that the island States had recognized the early action of the European Union on HCFCs but had been unable to reflect them in their proposal. He was, however, willing to discuss how the baseline in the island States proposal might be further adjusted.

138. In response to a question, the representative of India said that the phase-down for Article 5 parties would begin 15 years after that for non-Article 5 parties in recognition of the principle of common but differentiated responsibilities; it was also consistent with traditional practice under the Montreal Protocol, pursuant to which Article 5 parties had enjoyed grace periods of 15 to 17 years in the implementation of phase-downs of ozone-depleting substances. Regarding the grouping of chemicals in the Indian proposal, he said that group 1 contained HFCs for which some low-GWP alternatives had been commercialized, group 2 comprised HFCs with limited uses in some countries, group 3 included HFCs for which no alternative technologies were yet on the horizon and group 4 consisted of low-GWP HFCs that were expected to remain in use.

Synergies between the Montreal Protocol and the United Nations Framework Convention on Climate Change

139. Responding to queries related to synergies between the Montreal Protocol and the United Nations Framework Convention on Climate Change and its Kyoto Protocol, the representative of India said that the climate change-related objectives set out in his country's proposed amendment would at some stage require an amendment to the climate change treaties. Responding to a further question on legal relations in the event of such an amendment, he said that that would be a matter for legal experts but believed that an amendment to the Framework Convention on Climate Change and the Kyoto Protocol was required.

140. The representative of the United States of America, highlighting the complementarity between the ozone and climate change regimes, said that they both sought to achieve similar goals with regard to mitigating consumption and production of HFCs which, as greenhouse gases, should continue to be dealt with under the Framework Convention on Climate Change and its Kyoto Protocol. Regarding the division of labour, the extensive expertise of the Montreal Protocol and its institutions in working with the sectors using ozone-depleting substances contributed to broader efforts on climate change, while the reporting of and accounting for emissions, together with broader efforts to address global climate change, would be left to the Framework Convention. Regarding legal clarity, he drew attention to the fact that the North American proposal listed the articles of the Framework Convention and its Kyoto Protocol that referred specifically to greenhouse gases controlled by the Montreal Protocol and

stipulated that parties to the amendment should continue to apply those provisions for as long they remained in force for them. That should respond to concerns over ambiguity and ensure that the Framework Convention on Climate Change and the Kyoto Protocol would not need to be amended, although the parties to the Framework Convention on Climate Change and the Kyoto Protocol might wish to adopt a decision welcoming and complementing the proposed amendment to the Montreal Protocol.

141. The representative of the European Union stressed that the European Union had carefully considered the relationship between the climate and ozone regimes in preparing its proposal. Its views on the subject were set out in an information document (UNEP/OzL.Pro/WG.1/36/INF/4). The proposal had taken as its starting point subparagraph (b) of Article 2 of the Vienna Convention, calling on parties to " cooperate in harmonizing appropriate policies to control, limit, reduce or prevent human activities" likely to cause adverse effects resulting from modification of the ozone layer; since HFCs were alternatives to ozone-depleting substances, the parties to the Montreal Protocol were responsible for acting to prevent their significant growth, and article 2 (b) enabled the parties to take necessary measures. Indeed, action on HFCs had already been taken under the Montreal Protocol. As the proposal concerned a phase-down of HFCs rather than a phase-out, it made perfect sense that emissions would continue to be dealt with by the Framework Convention on Climate Change, and the two regimes would thus complement one another. Furthermore, there was no reason to amend the Framework Convention or its Kyoto Protocol. As a number of parties were seeking clarification on possible legal issues associated with the proposed amendments, he suggested that the Secretariat might be asked to identify potential legal issues to be addressed and report back.

142. The representative of the Federated States of Micronesia said that the island States' proposed amendment would not affect the status of HFCs under the Kyoto Protocol. Regarding complementarity between the climate change and ozone instruments, he drew attention to the preambular language in the Framework Convention on Climate Change that welcomed the widest possible cooperation among countries to tackle climate change, i.e., across the various regimes dealing with environmental problems, adding that efforts to reduce the consumption and production of HFCs under the proposed amendment would be in keeping with the Framework Convention's objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that prevented dangerous anthropogenic interference with the climate system.

143. Responding to the concerns expressed by one representative as to how the question of common but differentiated responsibilities was reflected in the proposals, the representative of the United States said that while that specific term was not used in the North American proposal, the differences between Article 5 and non-Article 5 parties were acknowledged and addressed by, among other things, allowing Article 5 parties additional time to implement their commitments through grace periods; offering flexibility through licensing systems; and providing financial and technical assistance for country-specific institutional strengthening and conversion and adaptation to new technologies. The representative of the Federated States of Micronesia said that the island States' proposal stipulated that action under the amendment would be led first by non-Article 5 parties and that it contained language that was consistent with the Framework Convention on Climate Change. The representative of the European Union said that the concept of common but differentiated responsibilities was reflected, in that there were differing requirements of Article 5 and non-Article 5 parties, including among other things an immediate phase-down schedule on the one hand versus a freeze and later phase-down steps – to be agreed – on the other. In addition, the Multilateral Fund would assist Article 5 parties in meeting their HFC phase-down commitments. The representative of India said that, in addition to providing for a 15-year grace period, his country's proposal also took into account the costs associated with intellectual property rights.

3. Conclusion

144. On the evening of 24 July 2015, the Co-Chair observed that the time available for discussion of agenda item 8 at the current meeting had been exhausted. It was accordingly agreed that the item would be taken up again at the Twenty-Seventh Meeting of the Parties.

145. Several representatives reiterated at that time the suggestion made earlier in the meeting that the Secretariat be requested to prepare a document consolidating the four proposals for amendments so that Parties could more easily compare them and understand their common features and differences. Such a consolidation, it was stressed, would serve purely to facilitate comparison of the proposals and would in no way have any legal status or prejudice any parties' positions.

146. Other representatives, however, objected to the idea, saying that the proposed amendments were too controversial to allow it.

147. The representative of an environmental non-governmental organization announced that his organization had developed a spreadsheet enabling comparisons of the impact of different baselines and phase-down schedules, including those incorporated in the proposed amendments, saying that it was available for use by parties.

148. The Co-Chair concluded that as there was no consensus on the proposal to request the Secretariat to prepare a consolidated text no such request would be made at the current time.

IX. Issues related to the phase-out of hydrochlorofluorocarbons

149. Under agenda item 9 the parties discussed three sub-items, which under decision XIX/6 they were to review in or no later than 2015: sub-item (a), on the possibilities or need for essential use exemptions in respect of non-Article 5 parties; sub-item (b), on the need for the allowance of up to 0.5 per cent of baseline amounts for non-Article 5 parties for continued HCFC production and consumption for servicing of equipment for the period 2020–2030); and sub-item (c), on further reductions in HCFC production for basic domestic needs for the period beyond 2020.

150. The representative of Australia, saying that discussion among parties had revealed a general lack of information on all three sub-items, reported that her delegation would introduce a draft decision that would ask the Technology and Economic Assessment Panel to undertake an analysis and provide the parties with additional information to inform further discussion in 2016; it would also create a process for gathering information from non-Article 5 parties. Several representatives spoke in support of the draft decision and expressed interest in holding informal discussions prior to its submission.

151. With regard to essential-use exemptions, two representatives indicated a possible need for exemptions for laboratory and analytical uses of HCFCs in the future.

152. With regard to the 0.5 per cent allowance for servicing of equipment, one representative, supported by another, spoke in favour of retaining it, saying that it allowed existing equipment to be serviced until the end of its life, thus reducing costs to industry by not forcing the premature replacement of functional equipment. In addition, she noted uncertainty regarding the potential need for HCFCs after 2020 in other sectors, particularly the fire protection sector, and expressed the hope that additional information from the Technology and Economic Assessment Panel and from parties would clarify the situation.

153. Addressing the 10 per cent production allowance for basic domestic needs, one representative said that the situation had changed since the introduction of the allowance; Article 5 parties currently had sufficient HCFC production and the 10 per cent production allowance for non-Article 5 parties was therefore no longer needed to cater to the needs of Article 5 parties.

154. The Working Group took note of the information presented.

155. Subsequently the representative of Australia, on behalf of her own delegation and those of Canada and the United States, introduced the draft decision alluded to above, on issues related to the phase out of hydrochlorofluorocarbons, noting that it was the product of consultations among the parties that had taken the floor on the matter.

156. The Working Group agreed to forward the draft decision, as set out in annex I to the present report, to the Twenty-Seventh Meeting of the Parties for further consideration.

X. Measures to facilitate the monitoring of trade in hydrochlorofluorocarbons and substituting substances (decision XXVI/8)

157. Introducing the item, the Co-Chair drew attention to the report by the Ozone Secretariat on its work in liaising with the World Customs Organization to examine the possibility of designating Harmonized System codes for the most commonly traded fluorinated substitutes for HCFCs and CFCs classified under Harmonized System code 2903.39 for the sole purpose of preventing illegal trade in HCFCs and CFCs (UNEP/OzL.Pro.WG.1/36/2, paragraphs 30 and 31).

158. In the ensuing discussion, general appreciation was expressed for the work of the Secretariat for its work on the important issue of the Harmonized System codes; excellent relations had been developed with the World Customs Organization. One representative, speaking on behalf of a group of parties, offered to make available to the Secretariat the domestic customs codes for traded HFCs and HFOs currently being finalized for adoption by those parties. Another representative expressed an

interest in examining those codes in the context of his country's work on the issue. He also requested the Secretariat to provide the list of substances shared with the World Customs Organization for consideration; and another pointed out the importance of the substitutes including mixtures in his region and also requested the Secretariat to provide the list of substances shared with the World Customs Organization for fluorinated substitutes commonly used so that Harmonized System codes could be assigned to them.

159. One representative said that his country's customs authorities considered customs codes to be crucial to national efforts to strengthen the enforcement of import controls in respect of ozone-depleting substances. Another highlighted his country's positive experience with eight-digit custom codes for imported HCFC alternatives. Two others said that the effectiveness of the codes in tackling illegal trade in the fluorinated substitutes would depend on extensive cooperation among the parties, with one adding that it also called for institutional strengthening, capacity-building and widely available alternatives.

XI. Potential areas of focus for the assessment panels' 2018 quadrennial reports

160. Under the item, many representatives once again praised the assessment panels for their hard work and the quality and clarity of their assessment reports to date.

161. The representative of the European Union said that his delegation would be submitting a conference room paper containing proposed terms of reference for the next quadrennial assessment. Several other representatives expressed interest in contributing to their drafting. One representative, supported by another, suggested that the parties also consult the Panel members present at the current meeting for their ideas on what the focus in the next quadrennial assessment should be.

162. A number of representatives took the opportunity to enumerate the areas that they wished to see included in the scope of the next quadrennial assessment, including ozone and health; the production sector; issues related to breakdown products, notably from HFOs; the methodology and parameters used when assessing substitutes; substitutes for the period from 2050 to 2070; the requirements of high-ambient temperature regions; ideas and methodologies for dealing with current HCFC banks; recovery, recycling, storage, disposal and destruction of substances proposed as alternatives; training and capacity-building needs for the future; and the penetration and effectiveness of low-GWP alternatives, particularly from the point of view of technical feasibility and cost, broken down according to Article 5 and non-Article 5 party.

163. The representative of the European Union subsequently introduced, on behalf of the European Union and Switzerland, a draft decision on potential areas of focus for the 2018 quadrennial assessments of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel. He noted that his delegation had had the opportunity to consult some but not all parties during the drafting of the proposed terms of reference, and he welcomed the opportunity to consult other parties during the course of the current meeting.

164. The many representatives who spoke thanked the European Union and Switzerland for preparing the conference room paper, with several expressing particular appreciation for its early submission, which would afford the parties ample time to consider it prior to the Twenty-Seventh Meeting of the Parties.

165. A number of representatives, while welcoming the draft decision, indicated that they needed more time to consider it. Other parties said that the draft decision proposed matters for the panels to consider that went beyond the scope of the Protocol, with several saying that they did not wish to discuss them further. In response to a query, the representative of the Secretariat said that a proposal along the lines of the draft decision was contemplated by Article 6 of the Protocol, which called on the parties to determine the terms of reference of the assessment panels every four years. Several representatives also observed that while the draft decision contained some new elements it was based to a considerable degree on past terms of reference for the assessment panels adopted by the Meeting of the Parties.

166. The Open-ended Working Group agreed that the European Union and interested parties should continue to consult on the matter in informal discussions at the current meeting.

167. Following the informal consultations, the representative of the European Union said that the comments made, together with additional inputs received intersessionally, including through meetings in other forums dealing with similar issues, would be carefully considered with a view to preparing a

revised version of the draft decision, which would be circulated one week before the Twenty-Seventh Meeting of the Parties.

168. The Working Group agreed to include potential areas of focus for the assessment panels' 2018 quadrennial assessments on the agenda of the Twenty-Seventh Meeting of the Parties.

169. The representative of the European Union also introduced a draft decision on releases of ozone-depleting substances from production processes and opportunities for reducing such releases, recalling the presentations by the assessment panels during the current meeting on discrepancies between the concentrations of certain ozone-depleting and other substances measured in the atmosphere and the quantities of consumption and production of those substances reported by parties to the Montreal Protocol. He also recalled that a draft decision on the matter had been submitted to the Twenty-Sixth Meeting of the Parties and had generated considerable discussion. He characterized the new draft decision as shorter and simpler than the previous one and emphasized that it focused solely on ozone-depleting substances. He referred the parties to a non-paper prepared by the European Union containing background information on the matter, which was among the pre-session documents for the current meeting. Finally, he expressed his willingness to work with other parties during the current meeting and intersessionally with a view to presenting a draft decision to the Twenty-Seventh Meeting of the Parties.

170. In the ensuing discussion, one representative expressed strong support for the draft decision, noting that many thousands of tonnes of ozone-depleting substances were still being released into the atmosphere each year. A second representative, while not opposed, suggested that the scope of the draft decision should be narrowed to focus on carbon tetrachloride, which seemed to be the principal subject of such discrepancies.

171. A number of other representatives, however, opposed the draft decision. Two, including one who said that the reported carbon tetrachloride discrepancy was unrealistic, suggested that the working methodology and calculation method should be examined first to ensure that the discrepancy was not the result of an error.

172. Several representatives argued against opposed forwarding the draft decision to the Meeting of the Parties for further discussion. One of them said that the draft decision dealt with feedstock, which he said was not a controlled substance in accordance with decisions I/12, IV/12 and VII/30 and was therefore outside the remit of the Protocol. Another said that the draft decision was beyond the scope of the Protocol because it dealt with emissions. The latter point was countered by a representative who cited a portion of decision IV/12 urging parties to take steps to reduce emissions as an indication that the draft decision was appropriate and in line with other decisions of the parties.

173. It was agreed that the European Union and any interested delegations would consult informally with the aim of resolving the issues raised.

174. Following the informal consultations the representative of the European Union said that the many comments made at the current meeting and any others submitted intersessionally would be incorporated into a revised version of the draft decision, which would be circulated one week before the opening of the Twenty-Seventh Meeting of the Parties. He asked that parties submit any additional comments as soon as possible.

XII. Other matters

175. The Working Group took up no other matters.

XIII. Adoption of the report

176. The Working Group adopted the present report on the evening of Friday, 24 July 2015, on the basis of the draft report contained in documents UNEP/OzL.Pro.WG.1/34/L.1 and Add.1–3. The Ozone Secretariat was entrusted with the finalization of the report following the closure of the meeting.

XIV. Closure of the meeting

177. The Working Group agreed at 11.50 p.m. on Friday, 24 July 2015, to suspend the current meeting and, as indicated in section VII above, to resume it prior to the Twenty-Seventh Meeting of the Parties for the purpose of continuing its work under agenda item 7 only.

Annex I

Draft decisions

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

The Twenty-Seventh Meeting of the Parties decides:

A. Essential-use exemption for laboratory and analytical uses for 2016 in China

Submission by China

Noting with appreciation the work done by the Technology and Economic Assessment Panel and its 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 a party 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,

1. To encourage that party, which has applied for an exemption, 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 authorize the level of consumption for 2016 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

Essential-use authorizations for 2016 for carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water

(Metric tonnes)

Party	*2016*
China	[70]

B. Issues related to the phase-out of hydrochlorofluorocarbons

Submission by Australia, Canada and the United States of America

The Twenty-Seventh Meeting of the Parties decides:

Aware that parties operating under Article 5 of the Montreal Protocol 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 that there is some uncertainty about the future use by parties not operating under Article 5 of Annex C, group I, ozone-depleting substances after 2020 for essential uses and for servicing existing refrigeration and air-conditioning equipment, in accordance with Article 2 F, paragraph 6 (a), of the Montreal Protocol,

Recalling decision XIX/6, paragraphs 12, 13 and 14, in which the Meeting of the Parties indicated that further consideration by the parties of the issues of essential uses, servicing and basic domestic needs should occur by 2015, at the latest,

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

(a) To identify sectors, including subsectors, if any, where essential uses for parties not operating under Article 5 may be needed after 2020, including estimations of the volumes of hydrochlorofluorocarbons to be used;

(b) To assess the future servicing requirements between 2020 and 2030 for parties not operating under Article 5 of refrigeration and air-conditioning equipment, and to assess whether there is a need for servicing in other sectors;

(c) To report on recent volumes of production to satisfy basic domestic needs, projected estimates of such future production and estimated needs of Article 5 parties to satisfy basic domestic needs beyond 2020;

2. To invite parties to provide relevant information to the Ozone Secretariat by 15 March 2016 for inclusion in the Panel's assessment;

3. To request the Panel to submit its report to the Open-ended Working Group at its thirty-seventh meeting, in 2016.

Annex II

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

I. Presentations on the 2014 assessment reports of the Technology and Economic Assessment Panel and its technical options committees (agenda item 3)

A. Technology and Economic Assessment Panel

1. Overview of the Panel's key findings

1. Ashley Woodcock, co-chair of the Technology and Economic Assessment Panel, began the presentation of the 2014 assessment reports by providing an overview of the Panel's key findings. He said that the Montreal Protocol was working because controls created incentives for new technology, there had been widespread implementation of the new technology and the Multilateral Fund was meeting the incremental costs of the transitions to achieve the objectives of the Protocol in Article 5 parties. He noted that since the previous assessment report, there had been significant technical progress in transitions across all sectors. Key milestones were the approaching phase-out of chlorofluorocarbon (CFC) metered-dose inhalers and controlled uses of methyl bromide. He reported that HCFC phase-out was progressing with implementation of the HCFC phase-out management plans generally running smoothly. Both ozone-friendly and climate-friendly options continued to emerge, but parties would need to continue to be vigilant on remaining sector challenges and technology choices in order to avoid nullifying the ozone and climate benefits achieved under the Protocol.

2. Mr. Woodcock's overview presentation was followed by presentations by the co-chairs of the Panel's six technical options committees on the current status of transition in the various sectors and consideration of specific topics and challenges for each sector in moving forward: Mr. Keiichi Ohnishi, co-chair, Chemicals Technical Options Committee; Mr. Paul Ashford, former co-chair, Flexible and Rigid Foams Technical Options Committee; Mr. Dan Verdonik, co-chair, Halons Technical Options Committee; Ms. Helen Tope, co-chair, Medical Technical Options Committee; Ms. Marta Pizano, co-chair, Methyl Bromide Technical Options Committee; and Mr. Roberto Peixoto, co-chair, Refrigeration, Air-conditioning and Heat Pumps Technical Options Committee.

2. Chemicals Technical Options Committee

3. Mr. Ohnishi presented a summary of the Chemicals Technical Options Committee assessment report, including the current status and the way forward for process agent uses, feedstock uses, solvent, laboratory and analytical uses, destruction technology and carbon tetrachloride and dichloromethane emissions. Emissions of ozone-depleting substances from feedstock use and process agent use were discussed at the question and answer session in response to the concern that they might be closely related to the carbon tetrachloride discrepancy issue.

3. Flexible and Rigid Foams Technical Options Committee

4. Mr. Ashford made a presentation on the Flexible and Rigid Foams Technical Options Committee 2014 assessment report, focusing on several key aspects that had emerged over the four years since the previous assessment, including the overall growth in the demand for insulation foams both in new and existing buildings, which had driven parallel growth in the consumption of blowing agents, particularly in Article 5 parties. Much of this demand was for extruded polystyrene (XPS) foams, especially across Asia where substantial further investment in production capacity had occurred.

5. Further information was provided on the progress being made in Article 5 parties' transitions under decision XIX/6, highlighting the focus on HCFC-141b in stage 1 HCFC Phase-out Management Plans based on the "worst first" principle. The available low-GWP alternatives were reviewed; challenges remained in identifying and implementing low-GWP alternatives in both the XPS and polyurethane spray sectors. Emerging hydrofluoroolefins (HFOs) and hydrochlorofluoroolefins (HCFOs) were, however, expected to help in these sectors.

6. With demand for blowing agents expected to exceed 500,000 tonnes per year by 2020 and the banks of installed blowing agents likely to exceed 5 million tonnes (including hydrocarbons) by 2020, it would be important to ensure that low-GWP solutions were prioritized going forward, especially

because the management of blowing agents in foams at end-of-life was likely to become less economical with time.

4. Halons Technical Options Committee

7. Mr. Verdonik made a presentation on the Halons Technical Options Committee 2014 assessment report. He said that within the overall fire protection sector, there was a multitude of alternatives that collectively could meet the requirements of all non-aviation future applications, although they did have technical or economic penalties, which the fire protection community had accepted.

8. There were some applications, including in the military, aviation, and oil and gas sectors, that would require either the use of high-GWP chemical alternatives or the original halons to meet the fire protection requirements. In the oil and gas sector all new applications were halon-free, but there were legacy systems that would require the use of halons for years to come. This was particularly true for far northern regions with low ambient temperatures. One complication in this sector was that the facility owners or operators did not own or control the amounts of recycled halons they needed to support the legacy systems over the ever-increasing lifetimes. This was contributing to the demand for recycled halons. Halon was only required to support legacy systems and their variants, and new military aircraft based on commercial designs with airworthiness certifications. Generally, it was expected that there were alternatives for all other new system designs. A complication in the sector was that it was unclear how many military forces had secured long-term supplies of halon, but it was known that some reported being completely reliant on halon from outside of their own countries. The civil aviation sector was the least prepared to deal with diminishing halon supplies. With the ultimate exhaustion of supplies, that sector would be the most likely to request an essential-use nomination for production of new halon in the future.

9. Since banks of halons would be very important for the foreseeable future, Mr. Verdonik described the basic method of calculating the global bank, which was simply a mass balance of the total quantities of halons produced minus the total amount emitted to date. The amounts produced had been reported under the Montreal Protocol, but had also been collected and reported voluntarily since production began in the early 1960s. That part of the mass balance was available. What was not directly measured or recorded, however, were the emissions. There were two different ways of estimating these emissions: (a) measuring the concentration in the atmosphere (Scientific Assessment Panel mixing ratios) and deriving emissions based on calculated atmospheric lifetimes; and (b) applying emission factors (Halons Technical Options Committee model) developed by fire protection engineers based on best or common practices, to the installed quantities. For halon 1301 the result provided only a small difference in the bank between 41,000 to 43,000 tonnes, while for halon 1211 the difference was much more significant, ranging from 22,000 to 33,000 tonnes.

10. As a way forward, the parties might wish to consider addressing a re-emphasis on halon bank management in Article 5 parties and methods to increase active management of halons, especially halon 1211 owing to its current worldwide limited demand and global supply. The Halons Technical Options Committee was of the opinion that it was nearly indisputable that there would be an undersupply of halon 1301 as a result of lack of progress in civil aviation.

5. Methyl Bromide Technical Options Committee

11. Ms. Pizano said that non-quarantine and pre-shipment uses of methyl bromide accounted for less than 1,000 tonnes of the global baseline of 56,000 tonnes and that only seven parties had continued to apply for methyl bromide use after 2015, although concerns existed regarding illegal use. Worldwide, strawberry and raspberry runners presented the greatest challenge for complete phase out of non-quarantine and pre-shipment use due to the need for complete sanitation in transplants. Non-chemical alternatives to methyl bromide had gained importance mainly because of the negative health and environmental consequences of most chemical alternatives. However, alternative fumigants continued to be a key option to replace methyl bromide in many instances worldwide.

12. Ms. Pizano further indicated that quarantine and pre-shipment use of about 12,000 tonnes of methyl bromide per year was exempted under the Montreal Protocol, and that the Methyl Bromide Technical Options Committee estimated that alternatives were available for about 40 per cent of present uses. She further noted that approximately 1500 tonnes of methyl bromide were exempted as quarantine and pre-shipment for soil nursery applications despite the target pathogens being similar to those in other countries that had phased out methyl bromide for that use.

13. Methyl bromide emissions had declined from 120 ktonnes/year in 1998 to 85 ktonnes/year in 2012 as a result of decreasing anthropogenic emissions by around 70 per cent (brought about by the declining consumption in non-quarantine and pre-shipment methyl bromide use). In analysing a way

forward for the methyl bromide sector, she said that the Methyl Bromide Technical Options Committee suggested that the parties could consider the phasing down of quarantine and pre-shipment use of methyl bromide (12,000t/year, with 40 per cent having alternatives) as this was undoing the benefits gained by non-quarantine and pre-shipment use control. This would, however, require all quarantine and pre-shipment uses to be categorized in order to prevent exempted quarantine and pre-shipment methyl bromide transferring into controlled uses and finding ways to ensure more consistent tracking of imported methyl bromide and its uses, to prevent illegal use and trade.

6. Medical Technical Options Committee

14. Ms. Tope presented the current status of medical uses of alternatives to ozone-depleting substances available worldwide for metered-dose inhalers, non-metered dose inhaler medical aerosols and sterilization. Global chlorofluorocarbon (CFC) metered-dose inhalers manufacturing phase-out had been completed, except for in China and the Russian Federation, both of which were in late-stage completion of conversion to HFC metered-dose inhalers. HCFCs were still being used in non-medical aerosols, and also in sterilization where complete phase-out was readily achievable to meet the Montreal Protocol schedule. She commended the major efforts of stakeholders in the phase-out of CFC metered-dose in halers over the last two decades, noting that the transition has occurred concurrently with an almost doubling in the number of doses of medicine, with doses of all treatment types, metered-dose inhalers, dry powder inhalers, and to a lesser degree nebulizers, growing overall.

7. Refrigeration, Air-conditioning and Heat Pumps Technical Options Committee

15. Mr. Peixoto presented the summary of the Refrigeration, Air-conditioning and Heat Pumps Technical Options Committee 2014 assessment report. He said that, currently, 21 refrigerants had obtained standardized designations and safety classifications since the Committee's 2010 assessment report. The use of HCFC-22 was still dominant in Article 5 parties, and the use of HFCs was increasing. Considering refrigerants, and the way forward in that area, he said that new refrigerants would require careful consideration of the balance between cost, safety and energy efficiency, and that the market was unlikely to support multiple different refrigerant options for the same application. Regarding flammable refrigerants, he said that they would require special safety considerations and that A2L class refrigerants were not expected to be widely used before changes to safety standards and building codes had been accepted.

16. Elaborating on the current status of the various refrigeration and air-conditioning subsectors, he said that R-410A was the common global alternative in air conditioners, and HFC-32 and HC-290 were also being used. For this subsector, the shift from HCFC-22 to zero-ozone-depleting potential alternatives was already under way in many Article 5 countries. During the last ten years, there had been a significant growth in air-to-water and water-to-water heat pumps in Australia, China, Japan and Europe. Refrigerant emissions from chillers were minimal and the energy consumption-related emissions were the main issue for that application. In the commercial refrigeration subsector (supermarkets, shops, stand-alone equipment), HCFC-22 used to be replaced in non-Article 5 parties by high-GWP refrigerants such as R-404A or R-507A. It was now being replaced by a refrigerant from the R-407 series, by R-449, or by one of the low-GWP options R-744 and hydrocarbons. Some global companies were committed to phasing out high-GWP refrigerants in stand-alone equipment (hydrocarbons and R-744 were the leading low-GWP alternatives). In domestic refrigeration, some initial assessments on the use of HFC-1234yf had been carried out. The main choices in industrial refrigeration systems were R-717, hydrocarbons, as well as R-744. The use of high-GWP HFCs, such as R-404A, was decreasing. A number of car manufacturers were using HFC-1234yf, and others were still working on R-744 systems aiming at a 2017 market introduction.

17. Turning to the trends in the various refrigeration and air-conditioning subsectors, he said that the use of HCFC-22 was still dominant in air-conditioning units in Article 5 parties. However, the use of HFCs was increasing, new mixtures of HFCs and unsaturated HFCs, such as R-444B, R-446A and R-447A, were being assessed, and the energy consumption-related emissions would further decrease due to continuously improving designs (in combination with certain low-GWP refrigerants). For commercial refrigeration, it was expected that R-744 and hydrocarbons would further proliferate. In the domestic refrigeration subsector, the use of hydrocarbons in new equipment was expected to cover 75 per cent of the market by 2020. In the industrial refrigeration subsector, R-717 would further increase its market share. The transport refrigeration subsector would progressively introduce lower-GWP alternatives to R-404A, such as R-452A, R-448A, R-449A and R-744. The use of HFC-1234yf versus R-744 in mobile air-conditioning would be determined by considerations related to safety, cost, regulatory approval, system reliability, heat pump capability (especially for electric vehicles) and servicing issues.

8. Technology and Economic Assessment Panel organizational issues

18. Mr. Woodcock made a presentation on matters related to the role and organization of the Technology and Economic Assessment Panel. He noted that in the assessment report period of 2011-2015, the Panel and its technical options committees had delivered 55 reports (24 technical options committees progress reports, 6 technical options committees assessment reports, 8 critical-use nomination reports and 10 essential-use nomination reports, and 17 task force reports). During the period, the Panel had refocused its organization, operations and activities, including the following: revised terms of reference; updated guidelines for disclosure and conflict of interest; completion of technical options committees reappointments considering expertise, technical options committees configuration, workload, geographical and gender balance; and emphasizing streamlined reports and clear messages. He drew attention to continuing challenges for the Panel and the committees, including attrition through the retirement of members, with loss of expertise and experience. The Panel had updated the matrix of needed expertise and had made it available in its assessment report as well as on its website. There was some difficulty in recruiting candidates with relevant expertise, experience and support for the role. The increased demands and short timelines for activities of the task forces were often incompatible with voluntary time commitments in the context of some members' full-time occupations. The lack of funding and support for non-Article 5 chairs and members was a growing concern with the potential risk in loss of balance or consensus in technical options committees, for which a range of independent expert opinions was necessary. With regard to specific technical options committees, he highlighted the challenges faced by the Chemicals Technical Options Committee, for which recent reorganization and the retirement of an experienced co-chair had resulted in shortfalls in expertise (i.e., in relation to laboratory and analytical uses of ozone-depleting substances, destruction technologies, solvents). With regard to the Flexible and Rigid Foams Technical Options Committee, he noted that the co-chairs, Paul Ashford (United Kingdom of Great Britain and Northern Ireland) and Miguel Quintero (Colombia), had resigned, citing the increasing workload and short timelines for reports as challenging to manage in the context of their own full-time occupations. On behalf of the Panel, he expressed gratitude to them both for their long-term commitment and dedication. Given that potential Flexible and Rigid Foams Technical Options Committee co-chair candidates had declined to be nominated, the Panel was seeking candidates for nomination at the Twenty-Seventh Meeting of the Parties. Mr. Woodcock emphasized that the Panel and its technical options committees were committed to providing parties with the best possible, independent, technical consensus reports in a timely manner to inform their discussions. However, in order to address these continuing challenges, it would be helpful for parties to consider the level of support for the Panel in relation to the volume and timing of its expected annual workload when making decisions requesting this work. He reiterated that the Panel welcomed the opportunity to engage with parties to address these challenges to the success of its work and that of its technical options committees in moving forward.

B. Scientific Assessment Panel

19. The co-chairs of the Scientific Assessment Panel gave a presentation on the evolution of trace species in the atmosphere, "From CFCs to HCFCs to HFCs", noting that it was largely derived from the report entitled "Scientific Assessment of Ozone Depletion: 2014."

20. The first part of the presentation focused on the evolution of ozone-depleting substances. From 1996 to 2012, atmospheric chlorine levels had declined from about 3.5 parts per billion (ppb) to 3.2 ppb, a reduction of 312 parts per trillion (ppt) or 9 per cent. Most of this change had resulted from the disappearance of methyl chloroform (CH_3CCl_3). Similarly, atmospheric bromine had declined by 2 ppt or 12 per cent as a result of the sharp decrease of methyl bromine (CH_3Br). The decrease in CFCs had also contributed to the decline in ozone-depleting substances. In the stratosphere, equivalent effective stratospheric chlorine continued to decline with recovery to 1980 levels anticipated in the 2040–2050 period. The decline in equivalent effective stratospheric chlorine was due in roughly equal amounts to decreases in methyl chloroform, methyl bromide and CFCs. It was noted that the stratospheric ozone layer was responding to the changes in ozone-depleting substances, and that there were early indications of the recovery of the ozone layer in the upper stratosphere.

21. Ozone-depleting substances were also greenhouse gases and their continued decrease was reducing climate forcing. In 2012, emissions of CFCs, HCFCs and HFCs were all approximately equal (in Gtonnes CO2-equivalent per year). Their sum in 2012 was about 2.5 Gtonnes CO2-equivalent per year with CFC emissions declining, HCFC emissions approximately level and HFC emissions on the increase. The increased emissions of HFCs had led to rising levels of HFCs in the atmosphere, although the contribution of HFCs to climate change were noted to be very small (<1 per cent) at present. It was also pointed out that the projections of HFC usage would lead to a very significant climate forcing contribution in the coming decades, perhaps reaching as much as 0.4 watts per square

metre by 2050. It was also noted that such increases would hinder the 450 ppm CO2 stabilization target. Furthermore, it was noted that alternatives to the use of high-GWP HFCs were becoming available.

C. Environmental Effects Assessment Panel

22. Ms. Janet Bornman and Mr. Nigel Paul gave an overview of the key elements of the assessment of the Environmental Effects Assessment Panel. They summarized the impact of ultraviolet radiation and climate change interactions on human health, air and water chemistry, terrestrial and aquatic ecosystems and construction materials. They reported projected effects to the end of the twenty-first century, both with and without the successful implementation of the Montreal Protocol, and then noted a number of currently observable effects, particularly in the southern hemisphere.

II. Presentation on the 2015 progress report of the Technology and Economic Assessment Panel (agenda item 4)

A. Critical-use nominations for 2016 and 2017

23. The Co-Chairs of the Methyl Bromide Technical Options Committee, Mr. Mohammed Besri, Mr. Ian Porter and Ms. Marta Pizano, presented the final recommendations for critical-use nominations and other issues.

24. Mr. Besri introduced the presentation by summarizing methyl bromide consumption trends in Article 5 and non-Article 5 countries up to 2013. He reported that the global consumption for methyl bromide controlled uses had fallen from 64,420 tonnes in 1991 to 2,388 tonnes in 2013. He also noted that quarantine and pre-shipment methyl bromide usage was approximately 12,000 tonnes and was offsetting gains in controlled uses.

25. He explained that critical-use requests for methyl bromide received from non-Article 5 parties had fallen from 17,000 tonnes in 2005 to 40 tonnes from three parties in 2017 and that eight nominations had been received from four Article-5 parties totalling 500 tonnes.

26. He showed that stocks in non-Article 5 parties applying for critical-use nominations had fallen from 10,400 tonnes in 2005 to less than 150 tonnes in 2013. He added that critical-use exemption recommendations had not been adjusted to account for stocks, and reminded Article-5 parties of the need to report on stocks if applying for critical-use nominations in 2016.

27. Mr. Porter provided an overview of the interim recommendations for critical-use exemptions for 11 nominations for pre-plant soils and structures and commodities uses. These came from three non-Article-5 parties (Australia, Canada and the United States of America) and four Article 5 parties (Argentina, China, Mexico and South Africa), which had submitted nominations for 2017 and 2016, respectively.

28. For commodity uses, three nominations had been received. The United States dry cure pork nomination for 3.240 tonnes for 2017 had been recommended in full as, although research had identified several promising chemical and non-chemical alternatives (phosphine, insecticides and sulfuryl fluoride with heat), the party had been able to justify that they were not yet effective on a commercial scale.

29. The nomination by South Africa for insect pests in mills for 2016 had been reduced from 13.0 tonnes to 5.462 tonnes based on a reduced dosage rate of 20 g/m³ for the fumigations and a maximum of two fumigations per year. The South African nomination for 2016 for insect pests in houses had been recommended in full, as regulations existed requiring the use of methyl bromide to ensure that houses were free from insects for sales agreements.

30. For pre-plant soil uses, eight nominations had been submitted: two non-Article 5 parties and three Article 5 parties had requested critical uses in amounts totalling 35.021 tonnes and 505 tonnes, respectively.

31. The Australian nomination of 29.76 tonnes for strawberry runners in 2017 had been recommended in full on the understanding that efforts to find alternatives would continue. Some alternatives (for example, new application methods for methyl isothiocyanate (MITC) generators; 1,3-D/Pic (TF-80®); EDN) were promising and should impact future nominations. Although certification authorities require two years of data demonstrating that alternatives deliver equivalent efficacy to a methyl bromide plus chloropicrin mixture (MB/Pic) before changes to the rules can occur, the party is urged to accelerate the schedule in order to phase out methyl bromide as soon as possible.

32. The Canadian nomination for 5.261 tonnes for strawberry runners in 2017 was classified by the Committee as "unable to assess", as an update on the effort made to secure alternatives was lacking. Thus, as presently submitted, the nomination does not meet the requirements of decision IX/6 b (iii). The Prince Edward Island Adapt Council funding has been discontinued with no new funding available since March 2014. No further work has been pursued with the expert who was hired in the past, and there is no research programme on alternatives at present. In addition, since 2009 regulatory issues have prevented chloropicrin use; the Committee has sought clarification of why chloropicrin is allowed on Prince Edward Island in MB/Pic formulations, but no clear explanation has been provided.

33. One nomination from Argentina for 70 tonnes for the strawberry fruit industry for 2016 was unable to be assessed as further information on plant-back times for use of 1,3-D/Pic in Lules (warm conditions) and Mar del Plata (cooler conditions) compared to methyl bromide, as well as economic data to support the annual use of alternative treatments, are required.

34. An additional nomination from Argentina for 100 tonnes of methyl bromide to be used for tomatoes in 2016, was reduced to conform with the Committee's standard presumption of 17.5 g/m^2 (which is half of the requested amount of the party's dose rate) and a further 10 per cent for adoption of alternatives considered effective, including grafting, resistant cultivars, and 1-3,D+Pic. The Committee considers that a 3-year adoption period from 2015 should allow the party sufficient time to apply all possible alternatives for this sector.

35. Two nominations from China for 120 tonnes of methyl bromide for use in open field and protected ginger production in 2016 were recommended at a reduced amount of 78.75 and 21 tonnes of methyl bromide, respectively. This dosage rate adjustment was done to conform to the Committee's standard presumption for a dosage rate of 35 g/m^2.

36. Two nominations received from Mexico for 56.018 tonnes for the raspberry nursery sector and 64.860 tonnes for the strawberry nursery sector were recommended at reduced amounts of 43.539 and 41.418 tonnes, respectively. The nominations were adjusted to conform to the standard presumption for a dose rate of 200 kg/hectare for nursery material and to comply with decision Ex. I/4, which limits increases in consumption of methyl bromide and disallows use of methyl bromide in new areas. The Committee considered that one more year of trials should be sufficient to support the rapid adoption of alternatives as trials initiated three years ago are showing promising results.

37. Mr Porter finalized the presentation by discussing key issues for this year's round of nominations and identifying that difficult sectors in Article 5 countries were similar to those in non-Article 5 countries (nursery sectors, ginger). No nomination had been received from the United States for strawberry fruit indicating that one of the biggest uses of methyl bromide will have been phased out by the end of 2016. He reminded parties that they were required to provide information to the Committee as specified in the timetable at the Meeting of the Parties preceding the year of application and that accounting frameworks were required in 2016 by Article 5 parties (decision Ex. 1/4 (9f)) seeking any critical-use exemptions.

B. China's essential-use nomination

38. Mr. Ohnishi presented the Chemicals Technical Options Committee review and recommendation for the 2015 essential-use nomination from China for 70 tonnes of carbon tetrachloride used in water analysis. China had put forward revised standards for the testing of oil in water that did not provide for the use of ozone-depleting substances, and had also indicated its intention to apply the new standard by the end of 2016. As the global exemption for the use of ozone-depleting substances for laboratory and analytical purposes had been extended to the end of 2021, it was unlikely that China would seek an essential-use nomination for carbon tetrachloride for that use in the future.

C. Progress in phasing out halons

39. Mr. Daniel Verdonik, co-chair of the Halons Technical Options Committee, gave a presentation on the report on decision XXVI/7 on the availability of recovered, recycled or reclaimed halons. In response to the decision, the Committee had put together a work group consisting of the Committee's co-chairs, members and a consulting expert, as well as a former Committee member who was currently serving as co-chair of the Technology and Economic Assessment Panel.

40. Mr. Verdonik reviewed the status of alternatives to halons in civil aviation and indicated which would meet, could meet or would not meet the International Civil Aviation Organization (ICAO) and European Union deadlines for the replacement of halons both in production and newly designed aircraft. He said that halons were used in lavatory fire protection systems, handheld extinguishers, engine nacelles and cargo bays. Of those, alternatives were only available for the lavatory use of halon

1301. There was no alternative for the use of halon 1301 in engine nacelles in civil aviation even though the United States military had been using HFC-125 in several of its aircraft for many years and was currently having Boeing develop a HFC-125 system for a fuel tanker based on the Boeing 767 aircraft model. For cargo bays, the largest application of halon 1301 in aircraft, the civil aviation industry had reported that it would take nine years to develop a non-halon system suitable for brand new designs only. For halon 1211, used in on-board portable fire extinguishers, the industry had indicated that it would not meet the ICAO or European Union deadlines as it was choosing to wait for the potential alternative 3,3,3-trifluoro-2-bromo-propene (2-BTP) to be approved, which would take up a similar space and weigh only slightly more than the halon 1211 extinguisher in current use. For halon 1211, used in aircraft rescue and fire fighting (for large, wheeled fire extinguishing units and vehicles), the only in-kind non-halon alternative in use was an HCFC-123-based blend (HCFC Blend B). In terms of ozone-depleting potential (ODP) and global-warming potential (GWP), should 2-BTP not gain regulatory approval, the next best choice for replacing halon 1211 would be HCFC Blend B.

41. The work group had obtained data on merchant ships that had used halons until the ban by the International Maritime Organization (IMO) on new installations on ships in 1992. Halon 1301, sourced from shipbreaking, would only last between 8 and 18 more years, well short of the estimated more than 40 years required to support aircraft coming off the production lines at present, without taking into consideration the aircraft that would continue to be manufactured until a non-halon cargo bay system could be designed - no earlier than 2024.

42. In considering what portion of the halon 1301 global bank might be available to support civil aviation, the work group had estimated that only 33–40 per cent of the current 41,000–43,000 tonnes could be expected to be available. The remainder was reserved for, and/or in use by, other long-term users of halons, such as ground-based systems in Japan, military forces, and oil and gas producers, which also had long-term needs in terms of halon 1301. Based on the worst case scenario of only 33 per cent (41,000 tonnes) of the bank being available to civil aviation and a 5 per cent emission rate of halon from civil aviation, it was estimated that the halon available for civil aviation would run out in 2036. In the best case scenario of 40 per cent being available to civil aviation and a low emission rate of less than 3 per cent in civil aviation, the halon for civil aviation would run out in 2045, which was still well short of the 40-plus year lifetimes of aircraft being produced today. The work group was of the opinion that as a result of a lack of progress in implementing halon alternatives in civil aircraft, there would not be sufficient halon 1301 available in the global bank to support aircraft currently being manufactured over their 40 or so year lifetimes.

43. The take-away messages for the parties were as follows:

(a) Globally, there were adequate supplies of halon 1211 to support current civil aviation needs. On an ODP/GWP basis the best option for meeting the ICAO deadline for on-board halon 1211 replacement was the HCFC-123-based Blend B if 2-BTP were not approved;

(b) Industry was producing aircraft for which recycled halon 1301 would not be available over their lifetimes;

(c) The work group therefore found that it was nearly indisputable that the civil aviation industry would require the production of new halon 1301 in the future as a result of a lack of progress in implementing halon alternatives in the sector.

III. Presentation on the report by the Technology and Economic Assessment Panel on the full range of alternatives to ozone-depleting substances (decision XXVI/9 subparagraphs 1 (a)–(c)) (agenda item 6 (a))

44. Mr. Lambert Kuijpers, co-chair of the task force on decision XXVI/9, noted that the task force consisted of 3 co-chairs and 18 members, most of which were also members of the Refrigeration, Air-conditioning and Heat Pumps Technical Options Committee. He described the various chapters of the report, noting that it built on previous reports responding to decisions XXIII/9, XXIV/7 and XXV/5, and considered updated information from various sources, recognizing the limits in data availability for some sectors that did not currently allow for consideration of business-as-usual and mitigation scenarios. It also built on the report of the task force on decision XXV/5 to further investigate the implications of avoiding high global warming potential (GWP) alternatives to ozone-depleting substances. He said that the report, while updating the information on alternatives provided in the report of the task force on decision XXV/5, specifically focused on the refrigeration and air-conditioning sector, the growing Article 5 refrigeration and air-conditioning equipment base and

the resulting refrigerant demand. The report revised scenarios of avoiding high-GWP refrigerants, with a new emphasis on the duration or length of manufacturing conversion periods. It considered all relevant topics related to high ambient temperature conditions and updated information on alternatives in the fire protection, metered-dose inhalers, other medical and non-medical aerosols sectors.

45. He said that, in the refrigeration, air-conditioning and heat pumps sector, 70 fluids were under consideration in industry test programmes or for inclusion in standards. Testing of unsaturated HFCs (hydrofluoroolefins (HFOs)) and blends containing these compounds was continuing, with emphasis on high ambient temperature conditions. He provided a number of highlights with regard to specific subsectors. Some 75 per cent of new production was predicted to use HC-600a by 2020 in domestic refrigeration. In commercial refrigeration, hydrocarbons were being used in condensing units for smaller capacities. In this subsector, supermarket refrigeration systems were seeing strong growth in R-744 systems, with a focus on energy efficiency improvements, while cost decreases had been reported. In air-conditioning systems, HFC-32-based split systems were being commercialized in Japan and other countries and a wide range of blends containing unsaturated HFCs was now being proposed. Certain HCFC-22 equipment production capacity was being converted to HC-290 in China. The mobile air-conditioning industry was reporting more testing data on the R-445A blend.

46. Turning to the business-as-usual and mitigation demand scenarios, he said that the revised refrigeration and air-conditioning scenarios included a number of assumptions and considerations, including an average GWP of 300 for low-GWP refrigerants and different manufacturing conversion periods of three years in non-Article 5 parties and six years in Article 5 countries. The manufacturing conversions were supposed to commence in 2020 for all refrigeration and air-conditioning subsectors (MIT-3 scenario), except for the subsector on stationary air-conditioning, which was due to commence in 2025 (MIT-4 scenario). The refrigeration and air-conditioning demand scenarios were cross-checked against currently available best HFC production data estimates. Continuing with some overall data, he said that, in overall climate impact, the total integrated high-GWP HFC demand for business as usual in Article 5 parties over the period 2020–2030 had been estimated at 17,900 metric tonnes of carbon dioxide equivalent (Mt CO_2 eq.), with a 60 per cent reduction in the case of the MIT-3 scenario and a 40 per cent reduction in the case of the MIT-4 scenario, compared to business as usual. Delaying (to 2025) and extending the conversion period for the dominant stationary air-conditioning sector (as in MIT-4) would significantly increase the overall climate impact and there would be a substantially increased climate impact extending beyond 2030.

47. Mr. Kuijpers showed graphs of the refrigeration and air-conditioning business-as-usual scenarios for non-Article 5 parties, as of 1990, and for Article 5 parties, as of 2010. He noted the difference in demand between both regions in the period 2015–2030. He also showed graphs for the MIT-3 and MIT-4 scenarios for Article 5 parties, specifically the total demand in the subsectors for these scenarios in Article 5 parties. He drew attention to a graph showing the impact of the length of the conversion period on the demand for high-GWP HFCs, noting that the demand in 2025 would be twice as much for a 12-year conversion period than for a 6-year conversion period in the MIT-3 scenario, owing to a much higher servicing demand in the 12-year conversion period. He presented a table showing cost estimates for the conversion of production (manufacture) in the different refrigeration and air-conditioning subsectors, noting that around 70 per cent of costs would apply to the air-conditioning subsectors alone. For MIT-3, the total costs for conversion were estimated at $2400 ± 340 million. Under the assumption that 40–60 kilotonnes of HFC consumption could be reduced in the servicing sector, the reduction would imply additional costs of $40–60 million per triennium. For the MIT-4 scenario, with the stationary air-conditioning manufacturing conversion starting in 2025, the conversion cost profile would change substantially. It would result in an additional $350 million on average per triennium, or $700 million over six years, corresponding to a 30 per cent increase in total costs for manufacturing conversion. In closing, he said that additional costs would occur as a result of the servicing of a larger installed base beyond the year 2030.

48. Mr. Roberto Peixoto, co-chair of the task force on decision XXVI/9, said that to meet energy performance standards in high ambient temperature regions, it was necessary that designs avoid excessively high condensing temperatures in order to minimize the impact of the critical refrigerant temperature on performance. Safety issues needed to be addressed if flammability played a role and higher charge quantities were to be used. He said that a comparison of the cycle energy efficiency for various condensing temperatures – in comparison to refrigerants HCFC-22 and R-410A – was presented in the report and that additional research and assessment of refrigerants at high ambient temperature conditions was being undertaken by the Air-conditioning, Heating and Refrigeration Institute (AHRI) and the United States Department of Energy, as well as in the context of the project entitled “Promotion of Low-GWP Refrigerants for the Air-Conditioning Industry in Egypt” (EGYPRA) and the project entitled “Promoting low-GWP Refrigerants for Air-Conditioning Sectors in High-Ambient Temperature Countries” (PRAHA). He presented a table with the options considered

in the AHRI Low-GWP Alternative Refrigerants Evaluation Programme (AREP) Phase II testing and a summary table for the United States Department of Energy, EGYPRA and PRAHA programmes, with a large amount of parameters chosen, including the dates for completion. He said that in air conditioners, R-407C, R-410A, HFC-32, HC-290, HC-1270, R-446A, R-447A, and R-444B were being used or studied. The HFOs (HFC-1234yf and HFC-1234ze(E)) had not been seriously considered for use in air conditioning because of their low volumetric capacity, which would result in bulkier systems at higher anticipated refrigerant cost. In chillers, R-447A, R-410A, HFC(HFO)-1234ze(E), R-717, R-718 and HCFC(HFO)-1233zd were being used or studied. R-744 was not currently seen as suitable for high ambient temperatures due to the high costs involved. In commercial refrigeration, systems at high ambient temperature conditions had the same issues as air-conditioning. He concluded by saying that methods to improve performance and reliability (for example compressor liquid or vapour injection) were becoming common.

49. Ms. Bella Maranion, co-chair of the task force on decision XXVI/9, said that, with the exception of civil aviation, the halon transition was well under way for new installations, but that, for the time being, reliance on high-GWP HFC solutions remained. Proven alternatives to ozone-depleting substances for fire protection were unchanged from those fully described in the 2014 updated Halons Technical Options Committee Technical Note 1. She noted that two chemicals – FK-6-1-14 and 2-BTP – were at an advanced stage of testing and development and might be commercialized as fire extinguishing agents in the future, and that other halocarbon agents were in the early stages of testing and development. Due to the lengthy process of testing, approval and market acceptance, it was not anticipated that these agents would have any appreciable impact in the near-term. She said that metered dose inhalers for asthma and chronic obstructive pulmonary disease used about 10,000 tonnes of HFC-134a and HFC-227ea per year and that cumulative HFC emissions between 2014 and 2025 were predicted to be 173 Mt CO2-eq under a business-as-usual scenario. Completely avoiding HFC metered-dose inhalers was not yet technically or economically feasible. She also said that non-metered dose inhaler medical aerosols were estimated at 1–2 per cent of total aerosol production. Most of these used propellants such as hydrocarbons and dimethyl-ether, with less than 10 per cent using HFC propellants (<1,000 tonnes). HFCs were used where a non-flammable or safe-to-inhale propellant was needed. In sterilants, there was almost no use of HFCs, a wide variety of alternatives was available and the impact of avoiding HFCs was expected to be minimal.

50. For non-medical aerosols, HFCs used in aerosol production in 2010 had been estimated at 5 per cent of the total GWP-weighted HFC consumption. It was the third largest sector and was totally emissive. Global production of HFC-containing aerosols was growing very slowly, if at all. While production was likely to increase in Article 5 parties, it was likely to flatten or decline in non-Article 5 Parties. She said that it was certainly possible to avoid high-GWP propellants and solvents. Low-GWP propellants and solvents and “not-in-kind” options were widely available, although significant challenges might be faced in adopting low-GWP options in some markets or for some products.

51. In closing, she said that the task force on decision XXVI/9 report provided information on some areas that parties might wish to consider in an updated decision XXVI/9 task force report for the Twenty-Seventh Meeting of the Parties. Any request to the Technology and Economic Assessment Panel and its task force on decision XXVI/9 for an updated report must take into account the limited time available for the task force to complete its work between the thirty-sixth meeting of the Open-ended Working Group and the late-September deadline for submission of documents for the Twenty-Seventh Meeting of the Parties. Areas that might be included in the updated report were the outcomes of high ambient temperature testing programmes, a refinement of HFC phase-out scenarios in the refrigeration and air-conditioning sector in Article 5 and non-Article 5 parties and further quantification of other sector demands; the latter only as far as new information might become available to the task force on decision XXVI/9.

Annex III

Considerations for updated report – decision XXVI/9 task force report

In accordance with Decision XXVI/9, a report has been made available to the meeting of the 36th OEWG, and an update report will be submitted to the Twenty-Seventh Meeting of the Parties, that addresses the information requested by Parties in that decision.

Considerations for the updates have been submitted in writing and were discussed with Parties during an informal discussion session, Wednesday lunchtime. TEAP XXVI/9 Task Force members discussed with interested Parties the feasibility of potential updates considering both the update requested within the scope of Decision XXVI/9 as well as the timeline for completing the updated report in early September to meet the deadline for submission of documents to the 27th MOP. The considerations can be summarized as follows:

Scenarios

1. In general, all assumptions made in scenarios should be well explained, so that Parties are fully aware how scenarios are constructed, in how far these scenarios might reflect reality, or whether they are mainly used to demonstrate the impact of certain parameters –or the impact of changing parameters-- on high GWP HFC demand during the period 2010-2030.

2. Further explanation why the GWP of 300 had been selected was considered as one of the first requirements. This would also hold for other parameters and why they were chosen.

3. One Article 5 Party asked to consider longer conversions periods (6 years was considered too short), later starts of conversion than 2020 or 2025 as well as conversion of only certain percentages of manufacturing equipment, since there was not yet evidence that alternatives would be fully available in 2020 or soon thereafter. The lag was noted from when Article 2 countries adopt the alternatives in the market before the Article 5 countries transition; this lag should be about 10 years. A sensitivity analysis was suggested.

4. Introduction of a longer time period than up to 2030, e.g. until 2050, was also considered necessary, in particular also if longer conversion periods would be studied. This is also related to the fact that certain amendment proposals consider time schedules that go far beyond 2030.

5. One Party mentioned that it would be revealing if a separate study could be made for the update report which identified crucial sectors that would be important to transition in order to meet a certain reduction obligation in a certain year.

6. Where the XXVI/9 report shows many results for Article 5 countries, expansion of the scenario material for non-Article 5 countries was considered necessary (a suggestion already made directly after the XXVI/9 presentation). It was asked whether market interactions related to equipment (exports, imports) had been considered, if not, whether this could be investigated for the update report.

Costs

7. Costs calculations for non-RAC and production sectors need to be clearer, while taking into account relevant ExCom decisions, such as the ones related to financing stage II HPMPs and demonstration projects. This is also related to the costs of the alternatives on the market and those not yet on the market.

8. Costs should also be analysed dependent on the start of the conversion and the duration of the conversion period. A global estimate of costs and benefits up to the year 2050 was also considered desirable.

9. One request was submitted to present the non R/AC costings in a clearer way.

High Ambient Temperature (HAT) Conditions

10. A more precise analysis and parameters for definition of a high ambient temperature country or region was considered desirable.

11. Another Party mentioned the consideration of the alternatives for HAT countries or regions, the HCFC consumption by sector of these countries/regions as well as the types of equipment used.

12. Testing data of projects, if completed, should be listed and analysed if possible. Performance of various alternatives will be important, however, a Life Cycle Climate Performance evaluation of possible alternatives was considered even more important.

Alternatives

13. The status of the various alternatives as well as their markets should be more precisely described. This in particular related to the 70 alternatives mentioned. Expansion of information on regional and international standards in the update report was also emphasized by several Parties.

Annex IV

Mandate for a possible contact group on the feasibility and ways of managing HFCs

The Open-ended Working Group of the Parties to the Montreal Protocol at its thirty-fifth meeting held in Bangkok from 22 to 24 April 2015, agreed that "it would continue to work inter-sessionally in an informal manner to study the feasibility and ways of managing HFCs, including, inter alia, the related challenges set out in annex II to the [report of the thirty-fifth meeting of the Open-ended Working Group], with a view to the establishment of a contact group on the feasibility and ways of managing HFCs at the thirty-sixth meeting of the Open-ended Working Group" (paragraph 128, UNEP/OzL.Pro.WG.1/35/6).

The informal meeting was convened on the 12-13 of June in Vienna on the above mentioned basis.

The parties have recognised in their interventions the success of the Montreal Protocol and its institutions in phasing out ODSs.

Parties agree that nothing should be considered agreed until everything is agreed.

~~[Parties agree that they shall resolve the list of challenges as mentioned below first.~~

~~Parties agree to consider the feasibility and ways of managing HFCs in a contact group, where the parties shall resolve the following issues:]~~

[Parties in a contact group shall consider the feasibility and ways of managing HFCs, where the parties first shall resolve the following issues by formulating processes, mechanisms and approaches as required thereof:]

- Relevance and recognition of the special situation of developing countries and the principles under the Montreal Protocol which have enabled sufficient additional time in the implementation of commitments by A5 countries,
- [Enhancing the commitments by non A5 parties to maintain the MLF as the financial mechanism and provide sufficient additional funding through the MLF [commensurate with what is needed to enable [A5 party compliance with any control measures, if agreed] [A5 parties' management of HFCs],]
- [Appropriate financial mechanism for management of HFCs in A5 parties, should any HFC control measures be agreed]
- The elements in paragraph 1(a) of decision XXVI/9 including IPR issues in considering the feasibility and the ways of managing HFCs,
- Flexibility in implementation that enables countries to set their own strategies and set their own priorities in sectors and technologies,
- Exemption process and a mechanism for periodic review of alternatives including the consideration of availability or lack of availability of alternatives in all sectors in A5 countries and special needs for high ambient countries, based on all the elements listed in paragraph 1(a) of decision XXVI/9,
- Relationship with the HCFC phase out,
- Non-party trade provisions, and
- Legal aspects, synergies and other issues related to the UNFCCC in the context of HFC management under the MP.

[[Then,]Parties will discuss in the contact group the ways of managing HFCs including [the proposed amendments] [amending the MP to phase down HFCs [at an appropriate time]] and other options suggested/proposed by Parties.]

[Then, the parties will discuss in the contact group the pending matters related to the management of HFCs] [including amending the MP to phase down HFCs].

[Then, the parties will discuss the pending matters related to the management of HFCs].

[Then, the parties will discuss in the contact group the ways of managing HFCs including the proposals submitted by the parties.]