行政院所屬各機關因公出國人員出國報告書
（出國類別：出席國際會議）

出席「蒙特婁議定書第二十八次締約國會議」報告

出國人服務機關、職稱及姓名：
行政院環境保護署環境技術師 謝議輝

出國地點：盧安達 吉佳利
(Rwanda, Kigali)

出國期間：105 年 10 月 10 日至 10 月 14 日

報告日期：105 年 12 月 26 日

摘要

本次蒙特婁議定書第 28 次締約方會議（以下簡稱 MOP-28），由聯合國環境規劃署臭氧秘書處（Ozone Secretariat, UNEP）於 2016 年 10 月 10 日至 14 日在盧安達 吉佳利（Rwanda,Kigali）舉行，計有來自全球超過 250 多個國家及民間單位，共計 500 多位代表參與，共同協商研擬更具有執行效力之管制規範，以達成削減臭氧層破壞物質（ODS）及保護生態環境與人類健康免受額外紫外線危害的目標。

本署為密切掌握國際公約管制發展趨勢，並建立我國與其他國家管制與替代技術資訊分享管道。我國由工業技術研究院（UNEP 認可之 NGO，以下簡稱工研院）以觀察員身分參加此會議。主要目的在蒐集分析會議討論之議題內容、各國替代技術與管制趨勢資訊，俾作為未來研擬我國因應管理策略與方案時之參考，並提出對我國後續管理方案有效之建議。

本次會議中各締約方仍主要針對 HFCs 議題協商討論，並訂定 HFCs 管制時程，分為已開發國家（A2）：自 2019 年需削減 10%，2024 年削減 40%，2029 年削減 70%。俄羅斯聯邦國家則自 2020 年需削減 5%，2025 年削減 35%，2029 年削減 70%；開發中國家（A5）第一群組國家：自 2024 年凍結，自 2029 年削減 10%；開發中國家（A5）第二群組國家：自 2028 年凍結，自 2032 年削減 10%。HFCs 物質列出 17+1 種，其中 17 種管制生產與消費量，1 種是管控 HCFCs 與 HFCs 之製程排放，要求應有 HFC-23 銷毀設施。

本次會議共有 17 項決議文，包括 DecisionXXVIII/1 中的吉佳利修正案「Kigali Amendment」、能源效率與安全議題、ODS 豁免申請結果、HCFCs 即將廢除之生產需求、各國未遵約之追蹤要求、TEAP 與其他相關委員會之委員提名、基金報告、MOP29 舉辦地點等。

目　　錄

壹、 前言

一、 西元（下同）1930 年美國 DuPont 開發氟氯碳化物（Chlorofluorocarbons， CFCs）後，由於具有穩定、安全、便宜、不可燃、低毒性，廣泛應用在塑膠發泡、噴霧推進、冷凍空調系統、電子金屬零組件清洗溶劑、氣喘醫療、海龍滅火器等用途，便以 Freon 為商品名，並大量製造取代當時普遍使用的二氧化硫與氨等具毒性溶劑。

二、 1970 年代隨著 CFCs 大量在消費市場使用，在大氣環境中亦不斷排放累積，經科學家研究發現 CFCs 對全球環境的改變及潛在衝擊，於對流層中幾乎不會與任何物質反應，惟擴散至平流層後，受到紫外線照射而釋出高活性氯原子與溴原子，再與臭氧反應，致使臭氧層的濃度變稀薄，而含有氫的 HCFCs 及 HBFCs 對臭氧層破壞力相對較小。

三、 1980 年代南北極臭氧層厚度極據變化，由其在春季時南極上空的大氣臭氧含量約減少 40%以上，臭氧層破洞首度被觀察，而其實臭氣洞並不是真正有個「洞」，而只是表示臭氧含量反常稀少的區域。如果厚度低至 220 Dobson Unit 以下，即稱為臭氧層破洞。所謂 Dobson Unit (DU)是指標準狀態下(0℃,1 大氣壓)，氣體厚度為 0.01mm 之氣體量單位。

四、 1985 年聯合國環境規劃署（United Nations Environment Programme, 簡稱 UNEP）召集與協調各國共同攜手研商對策，在奧地利維也納連署 28 個國家通過惟也納保護臭氧層公約（Vienna Convention for the Protection of the Ozone Layer）」，以保護臭氧層持續遭受到破壞，並研擬具體管制措施管制臭氧層破洞，至今維也納公約已受到 197 個國家批准。

五、 1987 年 9 月 16 日聯合國環境規劃署於在加拿大蒙特婁市進一步通過具有實質管制規範及約束力的「蒙特婁議定書（Montreal Protocol on Substances that Deplete the Ozone Layer）」，簽屬國家包括，當時的 24 個國家及歐洲經濟體，管制納入氟氯碳化物（CFCs）及海龍 Halons-1301、1211、2402 等 8 種列管物質，致力減少產生及使用破壞臭氧層物質（Ozone Depleting Substances，ODS），以促進國家間合作研究臭氧機制、檢視排放現況及相關資訊交流的架構協議。

六、 1989 年 1 月 1 日蒙特婁議定書生效後，包括已開發國家（non-Article 5 國家）及開

發中國家（Article 5），分別自 1989 年及 1996 年起分階段削減 CFCs 與 Halons 之生產與消費量，至今「蒙特婁議定書」已成為聯合國 197 個國家皆已承諾遵循之國際環保公約。

七、公約、議定書及各修正案通過情形，包括 1990 年的倫敦修正案、1992 年的哥本哈根修正案、1997 年的蒙特婁修正案及 1999 年的北京修正案，如表一：

(一) 倫敦修正案：1990 年 6 月於英國倫敦召開第 2 次締約國大會（MOP2），修訂議定書之管制措施，擴大管制物質範圍，新增 10 種 CFCs、四氯化碳(Carbon Tetrachloride)、三氯乙烷（methyl chloroform）、1,1,1-三氯乙烷(1,1,1-trichloroethane)於 ODS 管制清單中，並決議五種 CFCs 及三種海龍(Halons)於 2000 年之前停止生產。此外，設立多邊基金（Multilateral Fund）促進議定書的推廣執行，資助開發中國家執行議定書減量方案時可能需承擔的部分與支持資訊流通活動，包括：技術援助、教育訓練及秘書處行政工作等。基金每三年重新審議編列。已於 1992 年 10 月正式生效，至今有 197 個締約國批准此修正案。

(二) 哥本哈根修正案：1992 年 11 月於丹麥哥本哈根召開第 4 次締約國大會（MOP4），再度擴大管制物質範圍，包括新增溴化甲烷(Methyl Bromide)、氟溴烴（Hydrobromofluorocarbons，HBFCs）及氟氯烴（HCFCs）管制，另決議將現有管制物質之削減時程大幅提前，自 1994 年 1 月 1 日起除必要用途外禁止生產海龍，自 1996 年 1 月 1 日起將 CFCs、四氯化碳、1,1,1-三氯乙烷、HBFC 等物質的消費量削減至零，並啟動「未遵約程序」（non-compliance procedure），成立推展委員會（Implementation Committee），來審查締約國未遵守約定之案例與相關後續處置。已於 1994 年 6 月正式生效，截至 2012 年 1 月 12 日止，共計有 197 個締約國批准此修正案。

(三) 蒙特婁修正案：1997 年第 9 次締約國大會（MOP9）於加拿大蒙特婁舉行，並通過各國應採用 ODS 的進出口許可制度（licensing system），決議對未批准哥本哈根修正案的締約國進行溴化甲烷貿易禁止。已於 1999 年 11 月正式生效，共計有 197 個締約國批准此修正案。

(四) 北京修正案：1999 年 11 月於中國大陸北京召開之第 11 次締約國會議通過北

京宣言，同意納入管制 HCFCs 生產管制，並訂定期削減期程，此外，要求締約國提報使用於檢疫與裝運前處理的溴化甲烷用量。已於 2002 年 2 月正式生效，共計有 197 個締約國批准此修正案。

表 1、蒙特婁議定書及其修正案之批准情形

公約/修正案	通過年	批准之締約國總數
維也納公約	1985	197
蒙特婁議定書	1987	197
倫敦修正案	1990	197
哥本哈根修正案	1992	197
蒙特婁修正案	1997	197
北京修正案	1999	197

資料來源：http://ozone.unep.org/en/about-secretariat

(五) MOP19 調整案：2007 年 9 月第 19 次締約國會議，因「聯合國技術與經濟評估委員會 2006 年評估報告」指出，多數 HCFCs 用途已具有經濟有效之環境友善替代品或技術，於 MOP19 決議加速 HCFCs 廢除時程，已開發國家（Article 2 所列國家）HCFCs 消費量與生產量削減時程由 2010 年達成基準量 65%的削減率，提高為削減 75%，至 2015 年達成 90%的削減率，在 2020 至 2030 年間得保留基準量 0.5%供既有設備維護需求，2030 年後完全消減 HCFCs，該項決議文業於 97 年 5 月 14 日正式生效。

(六) 吉佳利修正案：2016 年 10 月 15 日第 28 次締約國會議，在盧安達吉佳利增加溫室氣體氫氟碳化合物（HFCs）列入受控物質清單要逐步淘汰的協議。

八、 聯合國環境規劃署（UNEP）臭氧秘書處於 2016 年 10 月 10-14 日在盧安達吉佳利(Rwanda, Kigali)舉行蒙特婁議定書第 28 次締約國會議（MOP28），約計超過 500 人與會，包括各締約國政府機關代表、聯合國周邊組織、政府間組織、非政府組織（Non-Governmental Organization, NGO）及相關產業團體共襄盛舉，圖 1、2。

圖 1、會議地點：盧安達吉佳利 Convention Centre

圖 2、大會會場

貳、 我國代表團

本署為掌握蒙特婁議定書管制趨勢，並向國際宣揚臺灣的遵循成果，以財團法人工業技術研究院名義，用非政府組織(NGO)身分參加，由本署空保處謝議輝環境技術師及財團法人工業技術研究院等參加，共計 3 人與會，表 2、3。

表 2、成員任務分工表簡要說明

單位	職稱	姓名	任務分工
行政院環境保護署空氣品質保護及噪音管制處	環境技術師	謝議輝	資訊蒐集／會議紀錄
工業技術研究院	副組長	沈克鵬	技術資訊／對外交流
能源與環境研究所	資深工程師	楊斐喬	技術資訊／庶務行政

參、出國行程

表 3、行程簡要說明

2016 年 10 月 8 日至 10 月 9 日	啟程
2016 年 10 月 10 日至 10 月 14 日	報到、出席會議／活動
2016 年 10 月 15 日至 10 月 16 日	返程

肆、 與會目的

為密切掌握國際公約管制發展趨勢，並建立我國與其他國家管制與替代技術資訊分享管道，主要目的在蒐集分析本次會議討論之議題內容、各國替代技術與管制趨勢資訊，與各國保持聯繫及交流，並迅速掌握臭氧層保護國際管制最新資訊，使我國得以妥為因應，將衝擊減至最低，對於國際環保業務之推動，極有助益，並提出對我國後續管理方案有效之參考，俾作為未來研擬我國因應管理策略與方案。大會中討論重要之議題包括：

伍、 會議議程

本年度蒙特婁議定書締約國會議於盧安達-吉佳利召開，2016 年 10 月 10-14 日為期 5 天的會議，分為 2016 年 10 月 10-12 日 3 天的預備會議及 10 月 13-14 日 2 天的高層會

議。會議議程，如表 4：

表 4、蒙特婁議定書第二十八次締約國會議議程

日期	議程
10/10	1. 預備會議開幕。 2. 盧安達政府代表、UNEP 代表致歡迎詞。 3. 會議架構：確認預備會議討論議題項目、會議工作程序與架構。 4. 行政事項：2017 年 TEAP 成員名單、財務報告與多邊基金預算。 5. TEAP 依據 XXVII/4 決議報告 ODS 替代品資訊。 6. TEAP 依據 ExIII/1 決議報告展開 HFCs 削減之氣候效益評估與對多邊基金財務之影響。
10/11	7. HFCs 削減議題。 8. 蒙特婁議定書第二條豁免相關議題。 9. 2017 年必要用途豁免提名。 10. 2017 年與 2018 年關鍵用途豁免提名。 11. 2018-2020 年多邊基金增資議題。 12. TEAP 與 SAP 依據 XXVII/7 決議報告大氣中四氯化碳的觀測濃度與其數據提報之差異分析。
10/12	13. 遵約與資料提報事項。 14. TEAP 成員組成。 15. 與逐步淘汰氟氯烴有關的議題。 16. 海龍回收、回用與再精製議題。 17. 其他事項。
10/13	1. 高階會議開幕。 2. 開幕典禮：盧安達政府代表、UNEP 代表及 MOP27 主席致詞。 3. 會議架構：MOP-28 主席選舉、確認高階會議議程、會議工作程序與架構、代表之到任文件（Credentials of representatives）。 4. 各評估委員會報告各議題進展。 5. 多邊基金執行委員會主席簡報基金執行內容與進展。
10/14	6. 各國代表致詞。 7. MOP-28 會議記錄與決議討論結果說明。 8. MOP-29 會議地點與時間。 9. MOP-28 會議決議確認通過。 10. 本次會議紀錄確認通過。 11. 其他事項。 12. 會議閉幕。

陸、 會議過程及重要決議

MOP 從早期傳真報名表、email 報名表至 2014 年起改為使用網路填單報名，我國本次仍比照過去方式進行網路填單報名。在報名表單中的國籍部分，採下拉式選單，我國選擇以觀察員（Observer）的選項進行報名，順利完成報名，並收到 email 通知報名完成，而現場報到時，也能順利領取會議名牌並順利入場參與會議。

一、 會議重點內容

本次會議共計產出 17 個決議文，包括 DecisionXXVIII/1 中的吉佳利修正案「Kigali Amendment」、能源效率與安全議題、ODS 豁免申請結果、HCFCs 即將廢除之生產需求、各國未遵約之追蹤要求、TEAP 與其他相關委員會之委員提名、基金報告、MOP29 舉辦地點等，說明如下：

(一) 吉佳利修正案「Kigali Amendment」

各國從今（2016）年 4 月在日內瓦舉辦 37th OEWG 工作小組會議與 7 月在維也納舉辦 38th OEWG 工作小組會議，即不斷進行 HFCs 管制內容的協商討論，於 10 月在盧安達吉佳利時，更是不斷協商討論 6 天，至 10 月 14 日晚上 18:55 分才終於產出 HFCs 管制方案的版本，同時進行協商的尚有法律條文小組，也先初擬出除了時程以外的法律條文，在管制方案出爐後，才儘速納入條文，再正式產出吉佳利修正案「Kigali Amendment」條文版本。吉佳利修正案「Kigali Amendment」共有 5 個章節條文（Article），包括：

1. 第一條（Article 1）修正案：內容為蒙特婁議定書需增修的條文內容，現有蒙特婁議定書中共計有 9 個條文需增修，另有附件 A 和 C 有修訂並增加一個附件 F。此次增修的內容，是將新增管制物質 HFCs 納入，包括削減時程與管制物質種類。

(1)新增的管制物質列於 Annex F，分為 Group I 和 II，其中 Group I 共有 17 種 HFCs，表 5，管制削減的方式如同 CFCs 與 HCFCs，限制各國每年的生產與消費量，而 Group II 目前僅列出 1 種，即 HFC-23，管制生產 HCFCs 與 HFCs 時，其製程排放之 HFC-23 需以通過的銷毀方式進行銷毀。此條款剛擬出時，是要求不得排放超過 0.1%，但印度有意見，因此最後

協商討論後刪除 0.1%的數量限制。

表 5、吉佳利修正案管制物質

Group		100-year Global Warming Potential
Group I		
CHF_2CHF_2	HFC-134	1,100
CH_2FCF_3	HFC-134a	1,430
CH_2FCHF_2	HFC-143	353
$CHF_2CH_2CF_3$	HFC-245fa	1,030
$CF_3CH_2CF_2CH_3$	HFC-365mfc	794
CF_3CHFCF_3	HFC-227ea	3,220
$CH_2FCF_2CF_3$	HFC-236cb	1,340
CHF_2CHFCF_3	HFC-236ea	1,370
$CF_3CH_2CF_3$	HFC-236fa	9,810
$CH_2FCF_2CHF_2$	HFC-245ca	693
$CF_3CHFCHFCF_2CF_3$	HFC-43-10mee	1,640
CH_2F_2	HFC-32	675
CHF_2CF_3	HFC-125	3,500
CH_3CF_3	HFC-143a	4,470
CH_3F	HFC-41	92
CH_2FCH_2F	HFC-152	53
CH_3CHF_2	HFC-152a	124
Group II		
[CHF3	HFC-23	14,800]”

(2)削減的時程：蒙特婁議定書第 5 條（Aritcle 5）定義國家於 1989 年~1999 年之間的 CFCs 年消費量低於每人 0.3 公斤者，方適用第五條國家較晚的管制時程。A2 國家之消費量與生產量管制時程相同，A5 國家謹訂有消費量管制，生產量尚未訂定。但因全球許多新興國家皆不斷進步，且在蒙特婁議定書協助機制下，已逐漸建立其因應能力。因各國狀況不同，經過多次的協商，針對無法符合 A2 管制時程者，這次會議決議 Decision XXVIII/2 明確載明白俄羅斯、俄羅斯聯邦、哈薩克斯坦、塔吉克斯坦及烏茲別克斯坦等國家的管制時程適用於 A2*稍晚的管制時程，而巴林、印度、伊朗伊斯蘭共和國、伊拉克、科威特、阿曼、巴基斯坦、卡塔爾、沙特阿拉伯及阿拉伯聯合酋長國等國則適用於 A5 GII

管制時程。4 種不同管制時程，如圖 3 及表 6：

表 6、吉佳利修正案管制時程

	A2	A2 Russia	A5 GI	A5 GII
特定國家	已開發國家	俄羅斯聯邦、哈薩克、塔吉克斯坦、烏茲別克	開發中國家	印度、高週溫國家（伊朗、伊拉克、巴基斯坦、沙烏地阿拉伯國家）
單位	CO_2 equivalents			
基準量 = HFCs 年平均消費量(X)＋特定比例 HCFCs 基準量(Y)				
X	2011-2013	2011-2013	2020-2022	2024-2026
Y	15%	25%	65%	65%
	1989 HCFCs 消費量 + 2.8%之 1989 CFC s 消費量		Average 2009-10	
年度	階段削減			
2019	10%			
2020~2023		5%		
2024	40%		消費量凍結	
2025~2027		35%	0%	
2028				消費量凍結
2029~2031	70%		10%	0%
2032~2033				10%
2034	80%			
2035			30%	
2036	85%			
2037~2039				20%
2040~2041			50%	
2042~2044				30%
2045~2046			80%	
2047				85%

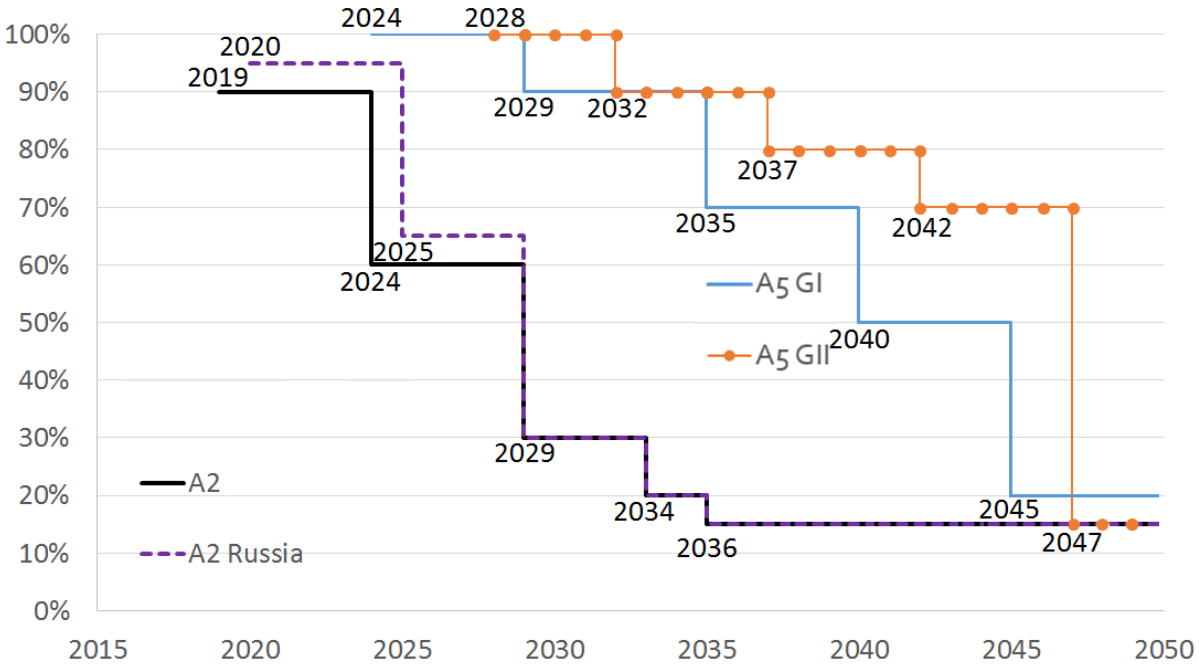

圖 3、吉佳利修正案削減時程圖

(3)高溫國家豁免準則：這次會議決議 Decision XXVIII/2 明確定義 A5 國家中的高溫國家豁免準則：有連續 10 年中每年有兩個月之月平均氣溫最高峰超過 35 度 C 者，符合規範的 A5 國家可以在開始管制前向締約方會議申請。通過豁免的設備包括分離式與箱型空調：

i. 一對多變頻空調機(商業和住宅)

ii. 空調機(商業和住宅)

iii. 商業用(自足式)空調機

(4)另通過可豁免的國家包括：阿爾及利亞、巴林、貝寧、布基納法索、中非共和國、乍得、科特迪瓦、吉布提、埃及、厄立特里亞、岡比亞、加納、幾內亞、幾內亞比紹、伊朗伊斯蘭共和國、約旦、科威特、馬里、毛里塔尼亞、尼日爾、尼日利亞、阿曼、巴基斯坦、卡塔爾、沙特阿拉伯、塞內加爾、蘇丹、阿拉伯敘利亞共和國、多哥、突尼斯、土庫曼斯坦及阿拉伯聯合酋長國。

2. 第二條（Article 2）：說明吉佳利修正案與蒙特婁議定書之前 4 個修正案（倫敦修正案、哥本哈根修正案、蒙特婁修正案、北京修正案）的關係，主要是

要求各締約方在完成這個吉佳利修正案前需先完成前一個修正案，即北京修正案的核准程序，方能進行本修正案的核准程序。

3. 第三條（Article 3）：說明與氣候變化綱要公約（UNFCCC）和其京都議定書的關係，指出此修正案不會影響氣候變化綱要公約針對 HFCs 以外的承諾與提供資訊規範（A4 & 12），也不會影響京都議定書中有關國家因應政策、排放量計算、年度清冊、CDM 機制等規範（A2,5,7,10）

4. 第四條（Article 4）：說明此修正案的正式生效日，包括修正案需在 2019 年 1 月 1 日且至少 20 個締約方提交核准文件之後 90 天正式生效，否則需達到 20 個締約方提交後 90 天才正式生效。這次修正案還新增了一個針對蒙特婁議定書第 4 條有關限制與非締約方進行 HFCs 貿易條款的正式生效日，要求 2033 年 1 月 1 日且至少 70 個締約方提交核准文件中最先符合條件 90 天後即可正式生效，顯然此條款乃是保障約一半的聯合國會員國（197 個）皆同意此貿易條款後才會開始實施。

5. 第五條（Article 5）：任何締約方皆可公開聲明其願意在修正案正式生效日以前即開始遵循先進國家的削減時程（2J）和報告消費量的義務。

(二) 本次會議產出的 17 個決議，除了前面兩個是與管制 HFCs 有關的吉佳利修正案相關決議外，其他尚有相關的包括能源效率、替代品安全溝通議題、多邊基金、實驗檢驗 ODS 豁免、溴化甲烷豁免、HCFCs 廢除後之 A5 國家需求、各國定期申報消費量、2 個有關未遵約國家決議、4 個有關相關委員會委員之決議，以及 2017 年 MOP 會議將於加拿大蒙特婁召開之決議等。

1. 有關能源效率之決議（Decision XXVIII/3: Energy efficiency）乃基於期望藉由更換替代品的機會，可同時獲得改善冷凍空調設備能源效率的機會，因此決議請各締約方能提供創新的資訊，供 TEAP 進行評估分析，於 2017 年締約方會議前產出評估報告，以提供各締約方參考討論。

2. 有關替代品安全溝通議題的決議（Decision XXVIII/4: Establishment of regular consultations on safety standards）乃是有鑑於近年來 HFCs 的替代品，多數具有低可燃性（A2L 或 A2）甚至可燃性（A3），對安全有高風險，而全球冷凍空調設備相關的安全標準也在討論與訂定標準，為能讓相關資訊更一致，且讓

各國能即時討論，中國這次特別提出討論，最後決議要求 TEAP 要求外部專家共同成立工作委員會，且能與國際標準 IEC 等共同合作，以訂定公平且有科學基礎的標準。決議中也提到臭氧秘書處能協助辦理相關研討會議，讓各國能互相分享資訊與技術。

3. 本次會議通過的 ODS 審查豁免決議共有兩個，包括中國大陸申請的實驗檢測用途豁免和幾個國家的溴化甲烷豁免（Decision XXVIII/6: Essential-use exemption for laboratory and analytical uses for 2017 in China、Decision XXVIII/7: Critical-use exemptions for methyl bromide for 2017 and 2018），其中決議同意中國大陸用於水中檢測油脂、總石油碳氫化合物時之必要用途豁免四氯化碳，於 2017 年共計 65 公噸 ，另外鼓勵中國大陸能儘速評估修訂其國家法律，以早日停止於該檢測用途使用四氯化碳。另外，溴化甲烷的關鍵用途豁免，決議通過的數量，如表 7：

表 7、MOP28 通過之溴化甲烷關鍵用途豁免結果

國家（2017 年）	用途	數量（公噸）
阿根廷	草莓果實	38.84
	番茄	64.10
加拿大 （愛德華王子島）	草莓走莖（匍莖） Strawberry runners	5.26
中國	薑（開放式農場）	74.617
	薑（保護式農場）	18.36
南非	碾磨（Mills）	4.1
	農場（structures）	55.0
國家（2018 年）	用途	數量
澳洲	草莓走莖（匍莖） Strawberry runners	29.730

4. 有關 HCFCs 廢除後之 A5 國家需求議題，主要是有鑑於非附件五國家（先進國家）之 HCFCs 管制時程中，2004 年允許額外增加管制上限的 15%供 A5 國家的當地需求（satisfy the basic domestic needs），2010 年與 2015 年則分別允許 10%，但 2020 年以後先進國家僅允許 0.5%消費與生產量作為維修用途，但並未訂定為滿足 A5 國家當地需求的允許值，因此本次討論決議要求 TEAP 評估下列幾項議題（Decision XXVIII/8: Phase-out of hydrochlorofluorocarbons）：

(1)持續評估先進國家於 2020 年以後的必要用途與需求量。

(2)持續評估先進國家於 2020-2030 年間之冷凍空調維修或其他可能用途之需求量。

(3)持續評估與檢視歷年來為滿足 A5 國家當地需求之生產量，並評估未來需求量。

(4)希望締約方於 2017 年 3 月 15 日以前提供相關資訊供 TEAP 評估。

(5)請 TEAP 於 2017 年第 39 次工作小組會議前提出評估報告。

(三) SAP、SPARC 及 TEAP 報告

1. 科學評估委員會評估報告 SAP

(1)科學評估委員會（Scientific Assessment Panel）說明其 2018 年版之評估報告的 2016 年工作進展，包括 7 月已召開討論會議，另希望有意參與此報告工作者於 2016 年 11 月 30 日以前提交名單，而 SAP 預計於 2017 年完成第一次草案報告，2018 年再陸續完成 2 次草案報告後進行專家審查，再提交締約方會議討論。

(2)SAP 另外說明臭氧層的相關科學證據：包括 2016 年的臭氧層之臭氧洞面積平均是 23 百萬公里，最小濃度為 118 Dobson Units，但相對於 1979 年尚未有臭氧洞時，當時的濃度為 221 Dobson Units，推估 2070 年臭氧濃度才會恢復到 1979 年的水準。

2. SPARC 研究報告

(1)世界氣候組織與幾個科學組織共同邀集專家組成進行的是世界氣候研究計畫（World Climate Research Programme）所進行的平流層-對流層過程及其在氣候上的作用（Stratosphere-Troposphere Processes And their Role in Climate, SPARC）研究，針對大氣中的四氯化碳濃度進行監測與評估。報告指出 CCl_4 產生的來源如下：

i. 路徑 A：由焚化、原料用途、製程助劑及實驗室等用途造成 CCl_4 排放，其排放量估算方式是 UNEP 依締約方申報的資料進行統計，依統計結果得 2007 至 2013 年間每年 CCl_4 排放量約 3 千

噸。而另一種工業部門 CCl_4 排放量估算路徑 A 的結果為每年排放約 2 千噸，符合 UNEP 的評估結果。

ii. 路徑 B：甲烷氯化物（chloromethanes ,CMs）與四氯乙烯（perchloroethylene , PCE）製程過程中的副產物。相關報告指出，2014 年全球 CCl_4 生產量為 203 千噸，與 2013 年 UNEP 報告的數據（200 千噸）一致。估計 CMs 與 PCE 生產過程中之洩漏或非原料用途造成 CCl_4 排放量約每年 13 千噸。

iii. 路徑 C：由國內工業部門和其他部門使用氯、或氯鹼工業製造氯及其衍生產品的過程中而造成 CCl_4 排放，儘管已被許多報告指出是 CCl_4 排放的來源，但該路徑無法量化 CCl_4 排放量。

iv. 路徑 D：由土染污染和有毒廢棄物處理設施之過程而造成，此路徑不確定性更大。

(2)SPARC 計畫 2016 年研究報告指出，由上述四種 bottom-up 路徑估算年 CCl_4 排放量高達 25 千噸，但其不確定性極高（路徑 C 無法量化與路徑 D 不確定性高，僅能大概估算年排放量約 10 千噸）。而 TEAP 報告中估算的 CCl_4 排放量僅以路徑 A 來估算，因此不足以代表全球 CCl_4 總排放量。

(3)SAP 與 TEAP 將持續研究以 top-down 和 bottom-up 估算 CCl_4 排放量造成的差異問題，以作為四年期報告之評估內容，並指出下列問題仍存在：

i. CCl_4 用於原料用途、製程助劑及實驗室之製程利用率是多少？且如何改善上述過程中 CCl_4 排放，以及是否能估算出其排放因子（路徑 A）。

ii. 如何改善 CMs 與 PCE 生產過程中之 CCl_4 排放？使否可以改善其排放的不確定性？（路徑 B）。

iii. 何謂氯鹼工業與國內相關部門使用氯而產生的 CCl_4？（路徑 C）

iv. 何謂垃圾掩埋場和污染場址而產生的 CCl_4？是否能量化所造成的排放量？（路徑 D）

(4)SAP 與 TEAP 建議締約方：

i.要求臭氧秘書處將此議題轉交維也納公約之臭氧研究部門進行研究。

ii.為解決上述問題，由臭氧秘書處協調舉辦 workshop，以進一步釐清 2016 年 SPARC 報告中提出的四種排放路徑。

iii.建立聯合 SAP 和 TEAP 的工作小組，以評估 CCl_4 排放量。

3. TEAP 報告

(1)發泡用途：目前全球每年約生產 25 百萬公噸非 CFCs 發泡產品，每年也以 3%速率成長。而在 A5 國家中 2016 年約有 45%的 HCFCs 發泡產品已被替換，且有 80%轉換成低 GWP 產品，包括碳氫化合物、HFO/HCFO、甲酸甲脂（Methyl formate/ Methylal）或以上化學品之混合物等，發泡隔熱產品影響產品的能源效率，因此對推動節能減碳工作而言也相當重要。

(2)ICAO 再次審核討論海龍的停用時程，確認 2024 年以後停止新型飛機之設計，應停止使用海龍的必要性。不過，許多海龍替代品的 GWP 值也很高，近期研發市場出現 2 個低 GWP 值的替代品，各用途可評估可行性。

(3)俄羅斯航太用途已於 2016 年全面廢除使用 CFCs，全球的製程試劑已減少使用 ODS，但原料用途卻仍持續增加。

(4)大氣中的溴化甲烷濃度監測顯示每年仍有約 3 萬公噸溴化甲烷排放大氣中，其中 1.1 萬公噸是用於 QPS 用途，但其中有 40%應已有替代技術/替代品，而另外約有 1.5 萬公噸（大氣排放量的 50%）的來源是是未知的。

(5)溴化甲烷評估委員指出以色列申報 2015 年因博物館防疫緊急用途而例外使用 0.5 公噸溴化甲烷，但委員會提醒以色列應妥善管理博物館之環境以避免此類緊急用途。另牙買加也申報 2016 年緊急用途使用 1.5 公噸溴化甲烷於麵粉倉庫之燻蒸，委員會也提醒牙買加該類用途皆已有

合適的替代品，應避免緊急使用溴化甲烷。

4. 周邊會議

(1)冷凍空調能源效率

i. 印度 2016 年的 GDP 成長率是 7.6%，可見印度購買冷凍空調的數量也將增加，而推測 4.75 kW 的分離式空調將是主要成長用途。印度的空調中能源效率屬 3 級的的為最大宗占 57%，其次是 5 級占 25%，但 1 級才占 2%。但 2015 年印度空調使用的冷媒種類中仍以 R22 占 69% 為最大宗，其次是 R410A 占 24%，而 HFC-32 占 6%。

ii. 普遍發現在開發中國家（A5）販售的空調設備效率皆差，但同一家公司，其在其原國家販售的效率是較佳的，因此若能將能源效率資訊更普及推廣，甚至訂定統一標準，要求各國提高對空調設備能源效率之要求，可藉由此次冷媒管制替代的機會，同步提升能源效率，有效降低總溫室氣體排放量。

(2)國際 HFCs 調查與印度 HFCs 基線

i. 聯合國蒙特婁議定書的多邊基金（MLF）協助 26 個發展中國家調查 HFCs 使用現況，另氣候與潔淨大氣組織（Climate & Clean Air Coalition，簡稱 CCAC）取得聯合國環境規劃署（UNEP）與聯合國工業發展組織（United Nations Industrial Development Organization，簡稱 UNIDO）的基金，協助發展中國家（包括約旦、南非）調查其 HFCs 使用現況與趨勢，調查的方式包括：

- Top-Down：包括進口核配量、海關、貿易統計資料等
- Bottom-Up：包括經銷商、零售商、使用廠商等的使用交易情形
- 文獻資料：過去的調查與查證報告
- 模型：未來趨勢推估模型

- HFCs 與 ODS 替代調查

ii.調查的重要關鍵包括，既有海關的進出口調查系統是獲得進口交易、經銷商、貨品消費量的品質資料之重要系統，一般相關廠商不願提供資料，較大型的廠商則較開放，召開相關研討會議有助於取得相關資料， 與廠商個別訪視討論，有助於取得較精準的資料。

iii.2010-2015 年各種 HFCs 的平均消費量比例，如圖 2，顯示 HFC-134a 為最大宗占 48.3%，其次是 R507A 占 37.3%，再其次是 R410A 占 7.8%、R407C 占 2.9%、R404A 占 2.6%，如圖 4

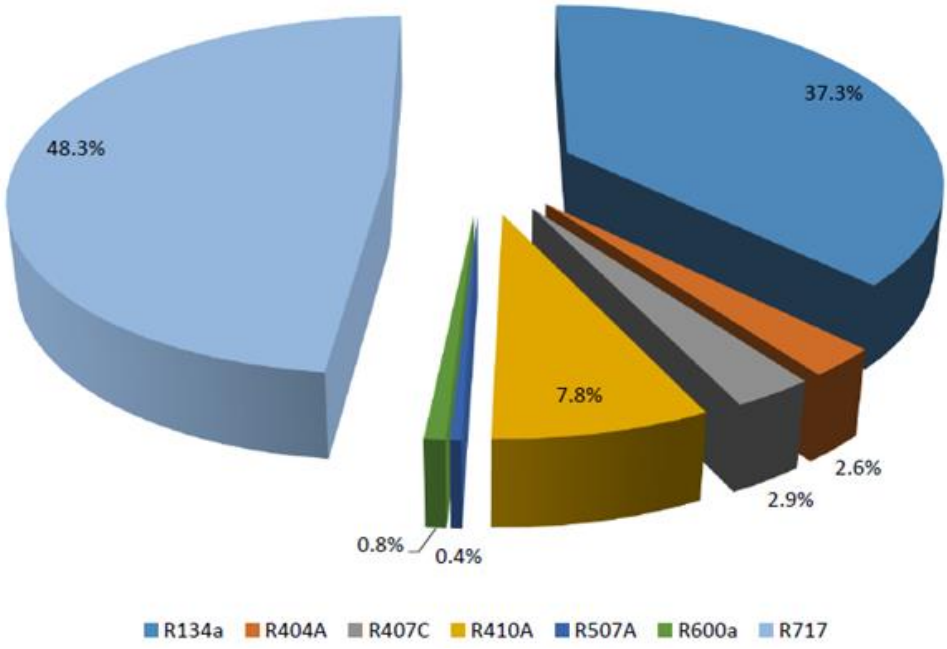

圖 4、2010-2015 年各種 HFCs 的平均消費量比例

iv.2010-2015 年平均各類用途使用 HFCs 的比例，工業冷凍冷藏用途最大宗占 51%，其次是汽車空調占 10%，家用冰箱占 8%，冰水機占 8%，商用冷凍冷藏占 7%，熱泵占 6%，商用空調占 4%，家用空調占 4%，冷凍冷藏運輸占 2%等，如圖 5。

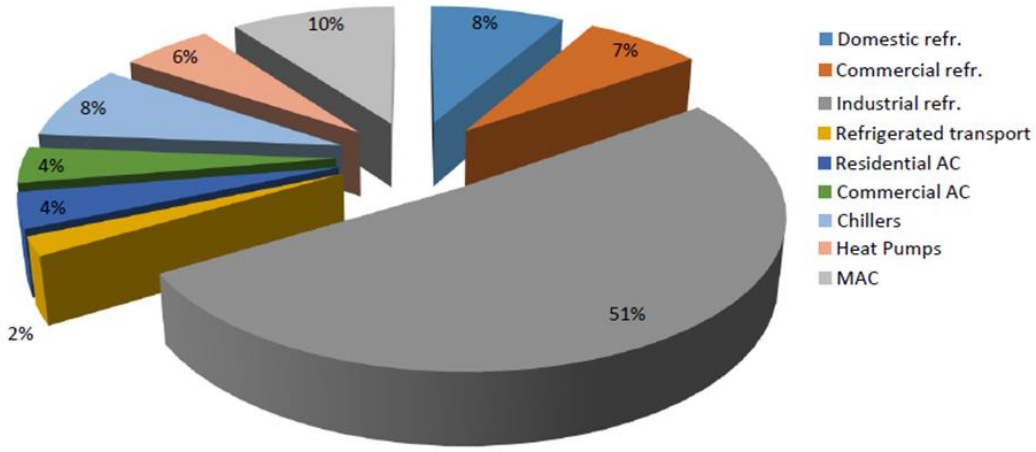

圖 5、2010-2015 年平均各類用途使用 HFCs 的比例

v.2010 年至 2015 年的 HFCs 種類從 HFC-134a 占 93%，下降至 55%，但 R410A 從 1%增加至 31%，R407C 也總 3%增加至 8%，如圖 6 及 7，另相關國家 HFCs 數據觀察結果，預測未來皆是以超過 10%的比例增加，如表 8。

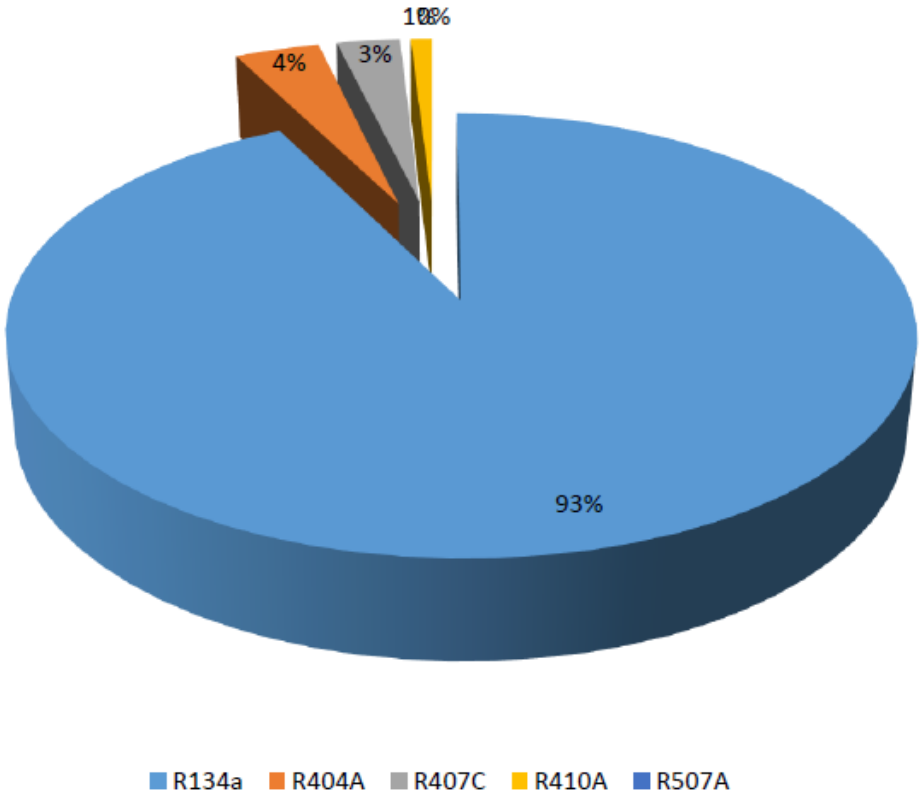

圖 6、2010 年 HFCs 種類占比

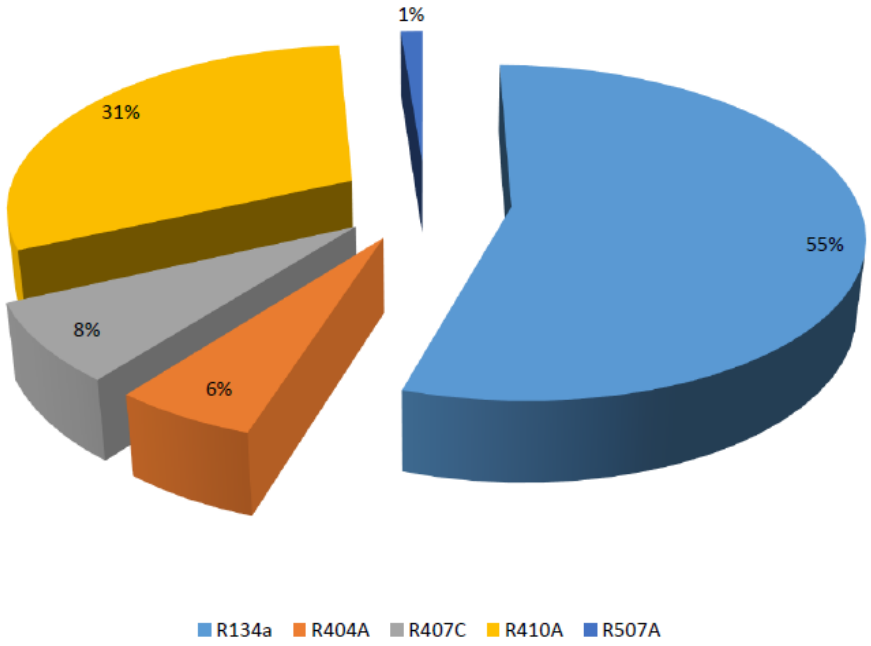

圖 7、2015 年 HFCs 種類占比

表 8、相關國家未來 HFCs 增加比例

國家	期間	每年增加比例	期間	未來每年增加比例
孟加拉國	2011-2013	23%	2014-18	14%
智利	2008-12	16%	2013-20	14%
哥倫比亞	2008-12	15%	2013-20	16%
加納			2014-20	18%
印尼			2009-20	12%
奈及利亞			2014-17	50%

vi.印度的 HFCs 未來推估方法中，先預估未來各用途別使用的冷媒種類變化情形，如表 9，以家用空調為例，2020 年以 40%使用 R410A 與 35%使用 HFC-32 為主，約 20%使用 R22，但 2025 年之後約有 10%使用 R290，但 R22 已完全停用，R410A 與 HFC-32 仍為大宗，並提出幾個停用管制情境來推估該國未來 HFCs 排放減量情形，如表 10。

表 9、印度推估各用途別使用的冷媒種類比例

	2020 年	2025 年	2030 年後
家用空調	HFC-32：35% R-410A：40% R-290：5% HCFC-22：20%	HFC-32：45% R-410A：45% R-290：10% HCFC-22：0%	HFC-32：45% R-410A：45% R-290：10% HCFC-22：0%
商業空調	HFC-134a：40% R-410A：50% HFC-32：10%	HFC-134a：40% R-410A：50% HFC-32：10%	HFC-134a：40% R-410A：50% HFC-32：10%
商業冰箱	HFC-134a：65% R-404A：35%	HFC-134a：60% R-404A：40%	HFC-134a：55% R-404A：45%
移動式空調	HFC-134a：100%	HFC-134a：100%	HFC-134a：100%

表 10、印度 HFCs 管制情境與結果

基線	凍結年	推估結果
2017-2019	2021	2023 年會超過基線量，因此需禁止商用空調使用 HFCs，但 2027 年需再禁止汽車空調用途，2032 年仍需再禁止其他用途使用 HFCs
2020-2022	2025	2025 年會超過基線量，因此需禁止商用空調使用 HFCs，但 2029 年需再禁止汽車空調用途，2034 年仍需再禁止其他用途使用 HFCs
2024-2026	2028	2028 年會超過基線量，因此需禁止商用空調使用 HFCs，但 2033 年需再禁止汽車空調用途，2038 年仍需再禁止其他用途使用 HFCs
2028-2030	2031	2031 年會超過基線量，因此需禁止商用空調使用 HFCs，但 2036 年需再禁止汽車空調用途，2041 年仍需再禁止其他用途使用 HFCs

(3)替代品成本資料

i. HFO-1234yf 為目前汽車空調冷媒使用的 HFC-134a 的替代品，因為 HFC-134a 的 GWP 值為 1430，歐盟為減少 HFCs 的使用，公告的法規已明訂要求 2017 年起新生產的汽車空調不得使用 GWP 超過 150 的冷媒，而目前主要會朝向使用 HFO-1234yf。

ii. HFO 的費用因量產與市場需求而變動，而市場需求會因法規管制而增加，目前推估一公斤約 75-80 公斤（美金），未來應可因市場需求增加而逐步降價，影響價格的因素，如表 11：

表 11、影響 HFO 價格的因素

目前市場情形	長期市場情形
●生產量少 ●生產設施規模小 ●生產製程與應用用途專利制 ●供應量與價格被專利擁有者控制	●專利於 2023 年到期 ●生產者增加的競爭 ●生產設施規模增大 ●經驗增加，提升效率

5. 宣傳交流事項

(1)本團參與本次會議之另一重要任務是與各國代表及國際專家交流，因此本次會議期間，主動與各國代表討論 ODS 管制議題，針對列管化學物質混合物之最低含量議題交換意見。

(2)這次分別與美國、歐盟、新加坡、日本等國，以及臭氧秘書處的法律負責人與資料申報負責人討論有關 HFCs 中含有 CFCs 之最低比例議題，各國代表表示他們並未在法規中訂定 CFCs 限制比例，而臭氧秘書處法律負責人表示，蒙特婁議定書本身未訂相關比例，由各國自行訂定決定。但臭氧秘書處資料申報負責人表示：

i.蒙特婁議定書第四次締約方會議決議中曾澄清列管化學物質的定義，認為生產過程中非故意產生的微量雜質，可不被列入管制物質。

ii.蒙特婁議定書控管各國消費量，在檢視各國申報的資料時，會以小數點下一位為準，所以如果該國申報的 CFCs 消費量低於 0.05 公噸，即

會顯示為 0.0，意謂消費量為零。因此，可依此推算各國進口含 CFCs 最低限制量。

(3)不過，若依其計算消費量之方式推算合理最低限制量，各種 CFCs 之數量是 5~500 公斤間(以 0.5%含量推算)，但這未考量如果有很多種 CFCs 的狀況，因此在實際執行面上應不可行。因此，建議以蒙特婁議定書曾有的決議，即微量雜質不列入管制，至於多少算是微量，臭氧秘書處人員也建議各國可參考國際間可能有的標準，例如 ASHARE 標準。詳細交流紀錄，如表 12。

表 12、與國際專家交流之會議紀錄

單位	與談人	討論內容摘要
日本環境部 全球環境局氟氣體控制政策與低碳推動政策辦公室 副室長	Mr. Hiroshi Fujita Email: HIROSHI_FUJITA@env.gov.jp	日本法規中並未設定混合物中最低 CFCs 含量
歐盟氣候基金、蒙特婁議定書政策官員	Mr. Cornelius Rhein Email: cornelius.rhein@ec.europa.eu	歐盟法規中並未設定混合物中最低 CFCs 含量，但有個共識約以 1%為基準，但此非法規規定，後續可再 email 聯繫，再協助詢問其他國家是否有特殊規定
新加坡國家環境局	Ms. Mary-Anne Pan Email: Maryanne_pan@nea.gov.sg	新加坡法規中並未設定混合物中最低 CFCs 含量 針對 HFCs 管制，新加坡也尚未進行其國內調查評估工作，但本次會議後會展開相關研究
蒙特婁議定書臭氧秘書處 資深法律專員	Mr. Gilbert M. Bankobeza	蒙特婁議定書中並未針對混合物訂定最低含量，但各國可以自行訂定相關規範
蒙特婁議定書臭氧秘書處 資料申報負責專員	Mr. Gerald Mutisya	蒙特婁議定書第四次締約方會議決議曾提到微不足道雜質不列入管制 另資料申報係以小數點下一位為準，0.5 以下係以 0.0 計算
印度 CEEW 能源、環境、水資源委員會	Dr. Vaibhav Chaturvedi	印度推估其未來 HFCs 排放量係以 GDP 每年 7%增長率推估，詢問是否有考慮飽和情形，回覆因印度的 GDP 仍很低，因此

自然資源保護委員會 NRDC	Mr. Bhaskar Deol	即使每年 7%成長至 2030 年仍不及世界水準
肯亞聯合國專員	Ms. Ann Wanjohi Email:annthuita@gmail.com	詢問肯亞是否有針對二手衣物要求一定要使用溴化甲烷燻蒸，回覆並未有如此規定
世界銀行 蒙特婁議定書合作組	Ms. Mary-Ellen Foley Email:Mfoley1@worldbank.org	各國推估 HFCs 消費量，由於混合冷媒尚未有專屬 CCC code，因此還是需要採用 bottom-up 方式進行推估

柒、 心得與建議

一、 我國冷凍空調產業因蒙特婁議定書對破壞臭氧層物質（ODS）的管制而轉為使用 HFCs，但面對國際公約對 HFCs 的管制，尚未進行低 GWP 值的應用可行性研究，勢必無法開始進行削減工作。過去我國遵循蒙特婁議定書管制規範，是依循已開發國家的管制時程，但新的修訂案要求 2019 年即需達成削減 10%目標，我國冷凍空調產業勢必無法即刻停用目前使用的 HFCs 冷媒。因此，我國產官學研各界應再次合作，展開基線調查、替代品研發應用可行性研究、國際貿易障礙分析等工作，以因應蒙特婁議定書修正案的 HFCs 削減規範。

二、 冷凍空調設備效率也影響間接溫室氣體排放，因此本次會議也同時產生一份與能源效率相關的決議：「吉佳利能源效率決議」，邀請各締約方於 2017 年 5 月以前提交該國在冷凍冷藏與熱泵設備之能源效率相關自願或創新資訊，並要求 TEAP 進行評估工作，以提供各國討論與參考。我國也可以蒐集相關資訊，未來參與國際會議時也可適時提出分享，展現我國積極與充分的技術能力。

三、 因應新替代品多數具可燃性，中國代表於本次會議中也提出一份與安全標準相關的決議，包括要求 TEAP 成立專門評估安全標準相關之工作小組，並邀請外部專家（如 IEC），並於 2017 年的工作小組會議中提出評估報告，且要求秘書處舉辦一場研討會討論此議題。我國冷凍空調產業界與政府應持續關注與追蹤國際安全標準之發展趨勢，以因應未來替代品的安全問題。

四、 蒙特婁議定書對 ODS 的管制雖已進入後段，但仍有特殊用途豁免需求、溴化甲烷管制、銷毀 ODS、走私等議題需持續於締約方會議中協議討論。我國對 HCFCs 的管制也將於 2020 年再次削減至僅於 0.5%消費量，因此需開始研擬如何有效分配予仍無法淘汰而有維修需求的冷凍空調設備，推動既有設備淘汰或直接轉為使用其他替代品等因應工作。

五、 我國應持續關注蒙特婁議定書的管制進展，以確實達到 ODS 管制與促進冷凍空調設備朝向使用低 GWP 值替代品且兼顧安全與能源效率的永續地球環境目標。

捌、 附錄

附錄一、會議議程

附錄二、MOP-28 會議記錄報告

附錄三、ENB 會議記錄

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Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Kigali, 10–14 October 2016

Annotations to the provisional agenda

I. Preparatory segment (10–12 October 2016)

Item 1
Opening of the preparatory segment

1.The preparatory segment of the meeting is scheduled to be opened at 10 a.m. on Monday, 10 October 2016, at the Radisson Blu Hotel and Convention Centre, Kigali. Information on pre-registration and on-site registration can be found in the information note for participants, posted on the meeting portal (http://conf.montreal-protocol.org/meeting/mop/mop-28/SitePages/Home.aspx) and in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP/OzL.Pro.28/2, para. 3). As the meeting will be virtually paperless, participants are urged to bring their own laptops and handheld devices to access the meeting documents.

(a) Statement(s) by representative(s) of the Government of Rwanda

(b) Statement(s) by representative(s) of the United Nations Environment Programme

2.Welcoming statements will be delivered by Mr. Vincent Biruta, Minister of Natural Resources of Rwanda, and Ms. Tina Birmpili, the Executive Secretary of the Ozone Secretariat representing the United Nations Environment Programme.

Item 2
Organizational matters

(a) Adoption of the agenda of the preparatory segment

3. The provisional agenda for the preparatory segment is contained in section I of document UNEP/OzL.Pro.28/1 for consideration and adoption. Details of the issues on the agenda for the preparatory segment are set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2) and its addendum (UNEP/OzL.Pro.28/2/Add.1).

(b) Organization of work

4.As is the custom, the preparatory segment will be co-chaired by the co-chairs of the Open-ended Working Group (currently Mr. Paul Krajnik (Austria) and Mr. Leslie Smith (Grenada)). As is mentioned in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 8), the co-chairs will present a proposal to the Twenty-Eighth Meeting of the Parties on how its work may be organized.

Item 3
Administrative matters

(a) Consideration of membership of Montreal Protocol bodies for 2017

Members of the Implementation Committee

5.Participants in the preparatory segment are expected to discuss the membership of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol and the selection process for 2017. Details regarding membership and the selection process are set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 9–12);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, draft decision XXVIII/[BB]).

Members of the Executive Committee of the Multilateral Fund

6.Participants in the preparatory segment are expected to discuss the membership of the Executive Committee and the selection process for 2017. Details regarding membership and the selection process are set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 13–16);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, draft decision XXVIII/[CC]).

Co-chairs of the Open-ended Working Group

7.Participants in the preparatory segment are expected to select the co-chairs of the Open-ended Working Group for 2017. Details about the selection process are set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 17 and 18);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, draft decision XXVIII/[DD]).

(b) Financial report of the trust fund and budgets for the Montreal Protocol

8.Participants in the preparatory segment are expected to consider information provided on the financial reports and budgets for the Trust Fund for the Montreal Protocol. The information is set out in the following documents:

(a)Note by the Secretariat on the proposed revision to the approved budget for 2016 and proposed budgets for 2017 and 2018 for the Trust Fund for the Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP/OzL.Pro.28/4 and UNEP/OzL.Pro.28/4/Corr.1);

(b) Note by the Secretariat on financial reports of the trust funds for the Vienna Convention for the Protection of the Ozone layer and the Montreal Protocol on Substances that Deplete the Ozone Layer for the fiscal year 2015 (UNEP/OzL.Pro.28/4/Add.1);

(c)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 19);

(d) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, draft decision XXVIII/[AA]).

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

9.Participants in the preparatory segment are expected to consider the final report by the task force of the Technology and Economic Assessment Panel on alternatives to ozone-depleting substances, which takes into account the comments and suggestions made by the parties and any additional information made available to the task force. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 20–24) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 7–10 and annex I);

(b) Report of the Technology and Economic Assessment Panel, September 2016, volume I: Decision XXVII/4 task force update report: further information on alternatives to ozone-depleting substances.

Item 5
Report by the Technology and Economic Assessment Panel on assessment of the climate benefits and the financial implications for the Multilateral Fund of the hydrofluorocarbon phasedown schedules in the amendment proposals (decision Ex.III/1)

10.Participants in the preparatory segment are expected to consider the report by the Technology and Economic Assessment Panel on assessment of the climate benefits and the financial implications for the Multilateral Fund of the hydrofluorocarbon (HFC) phasedown schedules in the amendment proposals based on decision Ex.III/1 of the Third Extraordinary Meeting of the Parties. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 25 and 26) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 11–17 and annex II);

(b) Report of the Technology and Economic Assessment Panel, September 2016, volume II: Decision Ex.III/1 working group report: climate benefits and costs of reducing hydrofluorocarbons under the Dubai Pathway.

Item 6
Dubai pathway on hydrofluorocarbons (decision XXVII/1)

11.Under this agenda item, participants in the preparatory segment are expected to hear about the progress made at the resumed thirty-eighth meeting of the Open-ended Working Group, to be held on 8 October 2016. The agenda for that meeting represents the continuation of discussions under item 4 of the agenda of the thirty-eighth meeting of the Open-ended Working Group, which was suspended in July 2016. Taking into account the progress made and the outcome of the meeting, it is expected that the parties will decide on the way forward. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Open-ended Working Group of the Parties to the Montreal Protocol at its resumed thirty-eighth meeting (UNEP/OzL.Pro.WG.1/resumed.38/2);

(b) Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 27–30) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 4–6);

(c)Updated consolidation of the amendment proposals submitted by parties to the Montreal Protocol (UNEP/OzL.Pro.WG.1/resumed.38/INF/1–UNEP/OzL.Pro.28/INF/1 and UNEP/OzL.Pro.WG.1/resumed.37/INF/1–UNEP/OzL.Pro.WG.1/38/INF/1–UNEP/OzL.Pro.ExMOP/3/INF/1);

(d) Briefing note entitled “Baselines: past practices and current challenges”;

(e) Submission by New Zealand entitled "Spreadsheet to calculate proposed A5 and Non-A5 HFC consumption baselines";

(f) Updated summary of the information submitted by parties on their implementation of paragraph 9 of decision XIX/6 to promote a transition from ozone-depleting substances that minimizes environmental impact (decision XXV/5, para. 3): report by the Secretariat (UNEP/OzL.Pro. 28/11);

(g) Submissions by parties on their implementation of decision XXVI/9 (UNEP/OzL.Pro.28/INF/3);

(h) Technology and Economic Assessment Panel, September 2016 report, volume I, decision XXVII/4 task force update report: further information on alternatives to ozone-depleting substances;

(i) Technology and Economic Assessment Panel, September 2016 report, volume II, decision Ex.III/1 working group report: climate benefits and costs of reducing hydrofluorocarbons under the Dubai Pathway.

Item 7
Issues related to exemptions under Articles 2A–2I of the Montreal Protocol

(a) Nominations for essential-use exemptions for 2017

12. Participants in the preparatory segment are expected to consider the nomination of China for an essential-use exemption to use carbon tetrachloride for testing of oil in water in 2017. The following documents are available to assist participants in their consideration of the issue:

(a) Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 31–33);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, sect. II, draft decision XXVIII/[A]).

(b) Nominations for critical-use exemptions for 2017 and 2018

13. Participants in the preparatory segment are expected to consider the critical-use nominations for methyl bromide for 2017 and 2018. The following documents are available to assist participants in their consideration of the issue:

(a) Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 34–36) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 18–20);

(b) Interim report of the Technology and Economic Assessment Panel, June 2016, vol. 2;

(c) Technology and Economic Assessment Panel, September 2016 report, volume III, evaluation of 2016 critical-use nominations for methyl bromide and related matters.

Item 8
Terms of reference for the study on the 2018-2020 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol

14. Participants in the preparatory segment are expected to consider the terms of reference for a study to estimate the funds required for the replenishment of the Multilateral Fund for the period 2018–2020 to enable parties operating under paragraph 1 of Article 5 of the Protocol to achieve compliance with the Montreal Protocol. The following document is available to assist participants in their consideration of the issue: note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 37 and 38 and annex).

Item 9
Report by the Technology and Economic Assessment Panel and the Scientific Assessment Panel on analysis of the discrepancies between observed atmospheric concentrations of and reported data on carbon tetrachloride (decision XXVII/7)

15.Participants in the preparatory segment are expected to consider a report by the Technology and Economic Assessment Panel and the Scientific Assessment Panel on the findings of an analysis of the discrepancies between observed atmospheric concentrations of and reported data on carbon tetrachloride. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 39–41) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 23–26);

(b) Report of the Technology and Economic Assessment Panel and the Scientific Assessment Panel, September 2016, volume IV: decision XXVII/7 report: investigation of carbon tetrachloride discrepancies.

Item 10
Proposal to establish an ad hoc standards coordination group (UNEP/OzL.Pro.WG.1/38/8, para. 92)

16.Participants in the preparatory segment are expected to consider further the draft decision submitted by China on issues related to the establishment of an ad hoc standards coordination group on international safety standards pertaining to the use of alternative substances, including flammable refrigerants in refrigeration and air-conditioning products and equipment. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 42–44);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty–Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3, sect. II, draft decision XXVIII/[B]).

Item 11
Compliance and data reporting issues: presentation on and consideration of the work and recommended decisions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol

17.Participants in the preparatory segment are expected to consider the report by the President of the Implementation Committee on compliance issues considered during the Committee's fifty-sixth and fifty-seventh meetings in 2016, including draft decisions to be submitted for possible adoption during the high-level segment. The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 45 and 46);

(b) Report by the Secretariat on information provided by parties in accordance with Articles 7 and 9 of the Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP/OzL.Pro.28/9–UNEP/OzL.Pro/ImpCom/57/2);

(c)Report of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol on the work of its fifty-sixth meeting (UNEP/OzL.Pro/ImpCom/56/4).

Item 12
Membership of the Technology and Economic Assessment Panel

18.Participants in the preparatory segment are expected to consider any proposals submitted by parties for appointments to the Panel and its technical options committees, taking into account the

observations made by parties at the thirty-eighth meeting of the Open-ended Working Group, at which it was pointed out that needed expertise and regional and gender balance should be taken into consideration in nominating and appointing members.

19.The following documents are available to assist participants in their consideration of the issue:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 47–50) and its addendum (UNEP/OzL.Pro.28/2/Add.1, paras. 27–30);

(b) Report of the Technology and Economic Assessment Panel, June 2016, volume 1, progress report, annex 1 (TEAP and TOC membership and administration) and annex 2 (matrix of needed expertise);

(c)Report of the Technology and Economic Assessment Panel (TEAP), June 2016 Progress Report, volume 1, corrigendum.

Item 13
Issues related to the phase-out of hydrochlorofluorocarbons (decision XXVIII/5)

20.Participants in the preparatory segment may wish to consider further issues related to the continued use of hydrochlorofluorocarbons (HCFCs) after the final phase-out dates should any relevant proposals be submitted by parties for a decision. The following document is available to assist participants in their consideration of the issue: note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 51–54).

Item 14
Availability of recovered, recycled or reclaimed halons (decision XXVI/7)

21.Participants in the preparatory segment may wish to consider the issues of availability of recovered, recycled or reclaimed halons for the remaining fire safety uses, in particular in civil aviation and should there be any proposals submitted by parties for decision. The following document is available to assist participants in their consideration of the issue: note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 55–57).

Item 15
Other matters

22.The parties are expected to consider any additional substantive issues that will have been raised at the time of the adoption of the agenda (UNEP/OzL.Pro.28/2, para. 58).

II. High-level segment (13 and 14 October 2016)

Item 1
Opening of the high-level segment

23.The high-level segment of the meeting is scheduled to be opened at 10 a.m. on Thursday, 13 October 2016 (UNEP/OzL.Pro.28/2, para. 59).

(a) Statement(s) by representative(s) of the Government of the Rwanda

(b) Statement(s) by representative(s) of the United Nations Environment Programme

(c) Statement by the President of the Twenty-Seventh Meeting of the Parties to the Montreal Protocol

24.Opening statements will be delivered by the representative of the Government of Rwanda, the Executive Director of the United Nations Environment Programme, Mr. Erik Solheim, and the President of the Bureau of the Twenty-Seventh Meeting of the Parties, Ms. Lucie Desforges (Canada) (UNEP/OzL.Pro.28/2, para. 60).

Item 2
Organizational matters

(a) Election of officers for the Twenty-Eighth Meeting of the Parties to the Montreal Protocol

25.The Twenty-Eighth Meeting of the Parties is expected to elect a president, three vice-presidents and a rapporteur on the basis of regional rotation agreed by the parties. It is expected that the president will be elected from the African States and the rapporteur from Western European and other States. It is expected that three vice-presidents will be elected, one each from the Asia-Pacific States, Eastern European States and Latin American and the Caribbean States. Information on this issue is set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 61);

(b) Rule 21 of the rules of procedure for meetings of the parties to the Montreal Protocol.

(b) Adoption of the agenda of the high-level segment of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol

26.The Twenty-Eighth Meeting of the Parties will consider for adoption the agenda of the high-level segment. Information on this issue is set out in the following documents:

(a)Provisional agenda (UNEP/OzL.Pro.28/1, sect. II);

(b) Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 62).

(c) Organization of work

27.The organization of work will be proposed by the President for the consideration and agreement of the parties as set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 63).

(d) Credentials of representatives

28.Credentials of representatives, alternative representatives and advisers should be submitted to the Executive Secretary of the meeting if possible not later than 24 hours after the opening of the meeting. The officers of the meeting shall examine the credentials and submit their report to the meeting. Information on this issue is set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 64);

(b) Rules 18 and 19 of the rules of procedure for meetings of the parties to the Montreal Protocol.

Item 3
Presentations by the assessment panels on progress in their work and any emerging issues

29.Under item 3, the assessment panels will make a presentation on the progress achieved in their assessment work and any emerging issues. Information on this issue is set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 65).

Item 4
Presentation by the Chair of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol on the work of the Executive Committee, the Multilateral Fund secretariat and the Fund's implementing agencies

30.Under item 4, the Chair of the Executive Committee of the Multilateral Fund will present a report on the decisions taken during the Executive Committee meeting and the work undertaken by the Multilateral Fund secretariat and the Fund's implementing agencies since the Twenty-Seventh Meeting of the Parties in November 2015. Information on this issue is set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 66);

(b) Report of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol to the Twenty-Eighth Meeting of the Parties (UNEP/OzL.Pro.28/10).

Item 5
Statements by heads of delegation and discussion on key topics

31.Under item 5, the Secretariat is planning to organize two sessions of ministerial round-table discussions, one to be held on 13 October and the other on 14 October 2016. The discussions will focus on outstanding issues to be addressed in the context of negotiations and on ensuring benefits to all as the parties look towards an agreement on an HFC amendment to phase down the production and consumption of those substances under the Montreal Protocol.

32.The discussions will be followed by statements by heads of delegation who will be invited to speak. On the first day of the preparatory segment, the Secretariat will begin accepting requests to speak and will compile a list of speakers based on those requests. Additional information on item 5 is set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, paras. 67 and 68).

Item 6
Report by the co-chairs of the preparatory segment and consideration of the decisions recommended for adoption by the Twenty-Eighth Meeting of the Parties

33.Under item 6, the co-chairs of the preparatory segment will present the summary of discussion and recommended decisions to the high-level segment. Information on this issue is set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 69).

Item 7
Dates and venue for the Twenty-Ninth Meeting of the Parties to the Montreal Protocol

34.The Twenty-Ninth Meeting of the Parties to the Montreal Protocol will be held simultaneously (or in parallel) with the twelfth meeting of the Conference of the Parties to the Vienna Convention. The parties may wish to take a decision on the date and venue of the meeting.

35.Information on this issue is set out in the note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 70).

Item 8
Other matters

36.The parties are expected to discuss any additional issues that will have been agreed during the adoption of the agenda (UNEP/OzL.Pro.28/2, para. 71).

Item 9
Adoption of decisions by the Twenty-Eighth Meeting of the Parties to the Montreal Protocol

37.Parties are expected to adopt decisions under item 9. Information on this issue is set out in the following documents:

(a)Note by the Secretariat on issues for discussion by and information for the attention of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/2, para. 72);

(b) Note by the Secretariat on draft decisions for the consideration of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol (UNEP/OzL.Pro.28/3).

Item 10
Adoption of the report

38.The parties are expected to adopt the draft report of the meeting on Friday, 14 October 2016.

Item 11
Closure of the meeting

39.The Twenty-Eighth Meeting of the Parties is expected to close on Friday, 14 October 2016.

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

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

Introduction

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

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

I. Opening of the preparatory segment

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

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

A. Statement by the representative of the Government of Rwanda

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

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

wide variety of deleterious effects around the globe. He expressed confidence that the parties would apply thoughtful analysis and their collective wisdom to finding solutions to the few remaining outstanding issues in order to reach consensus on an amendment that would be agreeable to all the parties.

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

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

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

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

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

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

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

12.In closing she paid tribute, leading a round of applause, to Ms. Aminah Ali of Malaysia and Mr. Blaise Horisberger of Switzerland, both of whom were participating in a meeting of the parties for the last time, thanking them for their tireless efforts as representatives of their countries to further the objectives of the Montreal Protocol. She urged representatives to make the most of the current meeting,

uniting and investing in the social, economic and environmental well-being of global citizens through collective action. By turning good intentions into concrete action through the adoption of an amendment to the Protocol, the parties would take a profoundly important step towards a healthier planet and healthier people, balancing global and national goals on the basis of evolving and sometimes imperfect knowledge to deliver effective solutions that were agreeable to all parties.

II. Organizational matters

A. Attendance

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

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

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

B. Officers

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

C. Adoption of the agenda of the preparatory segment

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

1. Opening of the preparatory segment:

(a) Statements by representative(s) of the Government of Rwanda;

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

2. Organizational matters:

(a) Adoption of the agenda of the preparatory segment;

(b) Organization of work.

3. Administrative matters:

(a) Consideration of membership of Montreal Protocol bodies for 2017;

(b) Financial report of the trust fund and budgets for the Montreal Protocol.

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

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

6. Dubai pathway on hydrofluorocarbons (decision XXVII/1).

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

(a) Nominations for essential-use exemptions for 2017;

(b) Nominations for critical-use exemptions for 2017 and 2018.

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

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

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

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

12. Membership of the Technology and Economic Assessment Panel.

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

14. Availability of recovered, recycled or reclaimed halons (decision XXVI/7).

15. Other matters.

D. Organization of work

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

III. Administrative matters

A. Consideration of membership of Montreal Protocol bodies for 2017

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

20.Subsequently, the Secretariat reported that it had received the names of the nominees for the 2017 membership of the Implementation Committee and the Executive Committee, as well as for the 2017

co-chairs of the Open-ended Working Group, and that the relevant draft decisions were included in the compilation of decisions for the parties' consideration and adoption during the high-level segment.

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

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

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

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

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

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

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

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

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

the availability of alternatives in various regions; that information was in general not available, although he was aware that HFC surveys had been undertaken that others were under way in a number of developing countries. The report of the task force used the assumption that alternatives would be equally available in all countries, although the situation would be different in reality.

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

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

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

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

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

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

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

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

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

37.Following the question-and-answer period, one representative said that some alternatives to high-GWP HFCs did not function well in tropical conditions, and he expressed the hope that the Technology and Economic Assessment Panel would be able to help Parties choose suitable alternatives. Another representative said that, while the mitigation scenarios presented in the report were very helpful and gave parties a clear idea of the kind of actions that would need to be taken, the lack of information on the cost and availability of alternatives, particularly for specific sub-sectors and regions, was a concern.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

57.The parties took note of the information presented.

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

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

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

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

A. Nominations for essential-use exemptions for 2017

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

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

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

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

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

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

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

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

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

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

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

70.The representative of Canada said that during the thirty-eighth meeting of the Open-ended Working Group representatives of Canada had met with members of the Committee to clarify a number of issues regarding the country's research programme on alternatives to methyl bromide and, following

the meeting, had also provided additional information to the Committee regarding its nomination. Canada would continue to provide information to the Committee on its research programme, which was moving forward, and would continue its efforts to eliminate critical uses of methyl bromide.

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

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

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

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

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

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

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

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

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

79.Introducing the item, the Co-Chair said that in accordance with the three-year funding cycle of the Multilateral Fund the parties needed, during the current year, to develop and adopt terms of reference for a study designed to estimate the funds necessary to enable Article 5 parties to achieve compliance during the 2018–2020 replenishment period. He recalled that, at the thirty-eighth meeting of the Open-ended Working Group, a contact group, co-chaired by Mr. Philippe Chemouny (Canada) and Mr. Obed Baloyi (South Africa), had been established to develop those terms of reference. The current text of the terms of reference was set out in the annex to document UNEP/OzL.Pro.28/2.

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

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

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

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

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

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

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

86.The parties took note of the information presented.

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

87.Introducing the item, the Co-Chair recalled that at the thirty-eighth meeting of the Open-ended Working Group China had introduced a conference room paper containing a draft decision on the establishment of an ad hoc standards coordination group with the aim of improving coordination with relevant international and regional standards bodies on the revision and updating of international and regional safety standards relevant to the use of alternative substances. The Working Group had agreed to forward the revised draft decision for consideration by the Meeting of the Parties at the current meeting. The draft decision was set out in document UNEP/OzL.Pro.28/2 (draft decision XXVIII/[B].)

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

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

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

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

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

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

93.The second draft decision, on data and information provided by the parties in accordance with Article 7 of the Montreal Protocol, addressed the key obligation to report annual production and consumption data of ozone-depleting substances under article 7 of the Protocol. Of 197 parties, 8 had not reported such data for 2015 by the time the Committee had considered the issue at its fifty-seventh meeting. The Central African Republic, Hungary, Israel, Latvia, Romania and Uzbekistan, however, had subsequently submitted their data. Thus, 195 of 197 parties had by the time of the current meeting reported their production and consumption data for 2015, a figure comparable to the 193 parties that had reported their date for the previous year by the time of the Twenty-Seventh Meeting of the Parties. The draft decision urged the two parties that had not submitted their data – Iceland and Yemen – to report it and thereby return to compliance. He also reported that, in accordance with decision XV/15, 119 parties had reported their 2015 data by 30 June 2016, representing a significant improvement on the 84 that had done so by the same date for the previous year. The Committee had therefore been able to review the compliance status of those parties early, completing a significant portion of its work in the middle of the year at the fifty-sixth meeting. During the two meetings, the Committee had also reviewed the situation of non-compliance with data-reporting obligations by the Democratic Republic of the Congo, Dominica, Somalia and Yemen, which had not reported article 7 data for 2014 by the time of the Twenty-Seventh Meeting of the Parties. In accordance with decision XXVII/9, those

parties had since submitted their outstanding data, which confirmed that those Parties were in compliance with the control measures for 2014.

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

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

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

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

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

XII. Membership of the Technology and Economic Assessment Panel

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

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

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

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

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

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

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

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

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

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

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

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

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

XV. Other matters

Financial and technical assistance under the Multilateral Fund

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

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

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

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

I. Opening of the high-level segment

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

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

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

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

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

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

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

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

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

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

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

II. Organizational matters

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

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

President: Mr. Vincent Biruta (Rwanda) (African States)

Vice-Presidents: Mr. Andrei Pilipchuk (Belarus) (Eastern European States)

Mr. Elías Gómez Mesa (Dominican Republic) (Latin American and Caribbean States)

Mr. Abdulbasit S. Sairati (Saudi Arabia) (Asian-Pacific States)

Rapporteur: Mr. Mikkel Sorensen (Denmark) (Western European and other States)

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

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

1. Opening of the high-level segment:

Statements by representative(s) of the Government of Rwanda;

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

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

2. Organizational matters:

(a) Election of officers for the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;

(b) Adoption of the agenda of the high-level segment of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;

(c) Organization of work;

(d) Credentials of representatives.

3. Presentations by the assessment panels on progress in their work and any emerging issues.

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

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

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

7. Dates and venue for the Twenty-Ninth Meeting of the Parties to the Montreal Protocol.

8. Other matters.

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

10. Adoption of the report.

11. Closure of the meeting.

C. Organization of work

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

D. Credentials of representatives

123.The Bureau of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol approved the credentials of the representatives of 98 of the 146 parties represented at the meeting. The Bureau provisionally approved the participation of 48 parties on the understanding that they would forward their credentials to the Secretariat as soon as possible. The Bureau urged all parties attending future meetings of the parties to make their best efforts to submit credentials to the Secretariat as required under rule 18 of the rules of procedure. The Bureau also recalled that the rules of procedure required that credentials be issued either by a head of State or Government or by a minister for foreign affairs or, in the case of a regional economic integration organization, by the competent authority of that organization. The Bureau recalled that representatives of parties not presenting credentials in the correct form could be precluded from full participation in the meetings of the parties, including with regard to the right to vote.

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

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

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

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

127.The Meeting of the Parties took note of the information presented.

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

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

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

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

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

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

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

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

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

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

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

138.The parties took note of the information presented.

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

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

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

A. First round-table discussion

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

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

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

144.Responding to the questions, Mr. D'Alotto said all the parties, whether Article 5 or non-Article 5, had clearly made great efforts to understand one another's positions and to reach a compromise that was mutually beneficial. He said that within the framework of common but differentiated responsibilities an HFC amendment that was agreeable to all the parties was attainable at the current meeting. The level of ambition of an HFC phase-down would, however, be determined by the availability of mature technologies and suitable alternatives at a reasonable cost. In that regard, he emphasized the importance of allowing sufficient time to enable industry to make the transition away from HFCs, saying that developing countries in particular needed to protect their industries. An agreement on an HFC amendment that did not threaten the economic growth of any party, he said, would constitute an extremely successful outcome to the current meeting.

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

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

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

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

149.Ms. McCarthy, expressing gratitude to the Government of Rwanda for hosting the meeting and to the Ozone Secretariat and UNEP for their tremendous efforts to facilitate the work of the Twenty-Eighth Meeting of the Parties, highlighted the remarkable progress that had been made since the Twenty-Seventh Meeting of the Parties in November 2015. All parties understood the seriousness of the situation with regard to HFCs and the opportunity that the Protocol provided for addressing it, and she urged participants to take advantage of the momentum and the spirit of sincerity, productive discussions, respect and mutual support at the current meeting to finalize the details of an HFC amendment in a timely manner. An HFC phase-down represented a huge down payment on parties' obligations under the Paris Agreement, with the potential to avoid 0.5°C of global warming by the end of the century. Hitherto, negotiations under the Montreal Protocol had been successful because the parties had listened to one another and worked together to find mutually beneficial solutions to their problems with the support of a tried and trusted financial mechanism. She said that an HFC phase-down would undoubtedly benefit from ample financial support to those parties that needed it, noting that in the margins of the seventy-first session of the General Assembly, in September 2016, philanthropic organizations and other donors had pledged $80 million to help countries in need of assistance to implement an ambitious HFC amendment and improve energy efficiency. She emphasized the importance of an early freeze date and continuing to base practical and responsible commitments on the best available science. The adoption of an HFC amendment, she said, would represent a success for each of the parties and a collective leap forward for humankind.

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

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

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

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

154.Also addressing the topic of issues still to be resolved, one representative said that the technical viability and commercial availability of alternatives to HFCs was a concern in addressing key remaining issues and proposed that the amendment provide for a review of alternative technologies and equipment. Such a review should be done prior to a freeze, she said, and should take into consideration national circumstances and constraints such as the high ambient temperatures and high urban densities common to many cities in the tropics. Mr. Arias Cañete responded that although the

parties were looking at existing technologies when negotiating the amendment, the proposed schedules extended to 2045 or 2047; technologies would therefore change during the phase-down. Mr. Solheim expressed agreement, adding that technological change could occur very fast and that the private sector would find solutions as long as politicians provided appropriate guidance to the markets. Ms. McCarthy suggested that there was a wealth of technical information on available chemicals and technologies and how they could be combined to produce better products for consumers; in addition, research could be focused to address identified questions, and technical reviews and assessments were regularly done under the Montreal Protocol to address just such issues. Finally, she said, the high-ambient-temperature exemption was precisely the kind of tool used under the Montreal Protocol to respond to challenges posed by the availability and viability of alternatives. There were many ways, she concluded, that the issue could be addressed to enable parties to understand the consequences for their individual countries and potential business opportunities.

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

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

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

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

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

B. Second round-table discussion

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

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

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

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

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

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

166.In his remarks, Mr. Joshi noted that developing countries were strongly affected by climate change even though they produced very small quantities of greenhouse gases. For developing countries to make the transition from HFCs to low-GWP gases, they would have to make policy,

legislative and technological changes, for which financial and technical assistance would be required from the Multilateral Fund and international organizations. In addition, it would be important to ensure that new technologies were energy efficient, readily available, commercially viable and environmentally friendly in order to obviate the need for any further amendments.

167.Mr. Helgesen said that he was a child of the Arctic, a region of the world that was warming at a rate almost twice the global average. Drawing attention to various climate change effects in the region, including rising temperatures, melting glaciers and sea-level rise with significant and often unknown effects on ecosystems, the fishing industry and exports, he said that an HFC amendment would provide an opportunity to rapidly achieve concrete results in combating climate change by means of an early and fast phase-down. In addition, by putting more energy-efficient solutions in place, the parties could limit expected temperature increases by 1℃ rather than 0.5℃. The parties needed to work together to overcome the particular challenges of an HFC phase-down for certain countries, providing early funding and ensuring that such countries were sufficiently well equipped to honour their commitments under an HFC amendment. He echoed the words of previous speakers, saying that many environmental problems could be solved much more quickly than originally thought and that the Montreal Protocol had triggered innovation that had brought about much faster progress than had been imagined at the time of its adoption. Such success could be repeated if leaders adopted decisions that sent clear signals to markets, investors, businesses and technological innovators. Currently all 197 parties to the Protocol were in compliance with their Protocol obligations, which bore testimony to the instrument's eminence among the multilateral environmental agreements. A failure to adopt an HFC amendment at the current meeting could cause confusion and sow doubt in the markets by damaging the credibility of the Paris Agreement.

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

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

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

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

172.Ms. Garciarivas said that she firmly expected agreement to be reached on an HFC amendment at the current meeting after so many years of work by all the parties. Citing recent extreme weather events caused by climate change with devastating effect in countries like Mexico and Haiti, she said that all countries were vulnerable to the impact of climate change and would benefit from an HFC amendment. Saying that Mexico's president was firmly convinced of the need for action on the basis

of the Paris Agreement, she highlighted a number of initiatives being undertaken by Mexico in areas such as technology conversion, renewable energy and structural reform.

173.Ms. El Haite said that through commitment at a high political level, 2015 had seen the adoption of the Sustainable Development Goals, followed by the Sendai Framework for Disaster Risk Reduction 2015–2030, the Addis Ababa Action Agenda and, finally, the Paris Agreement. In Paris the parties had understood that failure to reach agreement would call the achievement of the Sustainable Development Goals into question. Consequently, for the first time in the history of climate negotiations, the discussions in Paris had involved not only the climate and environment agendas but all human agendas, including development and respect for human rights such as the right to health and the right to decent housing. Having for years negotiated in isolated spheres within the United Nations system, in Paris the parties had understood that they must instead break down barriers and build bridges. They had taken on a commitment to change production and development models and construct a civilization in which all gases that increased global temperatures would be eliminated. Failure to agree on an HFC amendment would damage the credibility of the Paris Agreement, which depended on action and implementation. In closing, she urged the parties not to waste the opportunity to celebrate an HFC amendment to the Montreal Protocol at the forthcoming climate change meetings in Marrakech.

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

C. Statements by ministers and other heads of delegation

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

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

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

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

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

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

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

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

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

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

while at the same time being implementable. Another representative said that it was important to balance ambition with practicality.

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

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

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

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

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

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

Remarks by Mr. John Kerry

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

192.The scientific evidence behind the devastating impacts of climate of change was growing every year. An ambitious amendment to phase down HFCs was the single most effective immediate step that could be taken, preventing 0.5 degrees of global warming. HFC use currently produced 1 gigatonne of carbon dioxide equivalent emissions a year, equivalent to the emissions of 300 coal-fired power plants. While the phase-down of HFCs posed serious challenges to many Parties, he recalled that under the Montreal Protocol no country was expected to undertake action alone. An HFC amendment would recognize the differences between the parties – through differentiated baselines and phase-down schedules – and provide financial support, just as the Protocol had always done. He also drew attention to the additional funding that had recently been pledged from Governments and foundations to support developing countries in implementing an ambitious HFC amendment and improving energy efficiency.

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

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

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

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

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

Comments made during the adoption of the amendment

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

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

199.The representative of the Russian Federation, speaking on behalf of his country and the representatives of Belarus, Kazakhstan, Tajikistan and Uzbekistan, said that not enough attention had

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

200.The representative of a non-Article 5 party, speaking on behalf of a group of parties, said in response that those parties could not accept such a proposal because it would undermine the assurances that non-Article 5 parties had given regarding their willingness to provide sufficient additional financial resources to finance an HFC phase-down, which for many Article 5 parties was a condition of their willingness to agree to an HFC phase down amendment. The proponents of the change to Article 10 agreed to withdraw their proposal but asked that the present report reflect their proposal, their stated reason for it and their position that in the implementation of an HFC phase-down amendment their countries would consider their own contributions to the Multilateral Fund for the financing of HFC phase-down to be voluntary. The statement delivered by the Russian Federation is set out in annex III to the present report.

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

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

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

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

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

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

Ozone Secretariat, for their tremendous hard work and their achievement in facilitating the negotiations leading to the adoption of the Amendment.

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

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

208.The representative of Canada conveyed an offer by her country to host the Twenty-Ninth Meeting of the Parties to the Montreal Protocol and the Eleventh meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer in Montreal in 2017, the thirtieth anniversary year of the Montreal Protocol. The Meeting of the Parties accordingly decided that those meetings would take place in Montreal on dates to be announced following consultations between the host country and the Secretariat.

VIII. Other matters

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

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

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

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

Decision XXVIII/1: Further Amendment of the Montreal Protocol

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

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

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

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

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

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

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

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

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

Relationship with the HCFC phase-out

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

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

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

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

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

Financial issues

Overarching principles and timelines

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

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

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

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

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

13. That parties operating under paragraph 1 of Article 5 will have flexibility to prioritize hydrofluorocarbons, define sectors, select technologies and alternatives and elaborate and implement

their strategies to meet agreed hydrofluorocarbon obligations, based on their specific needs and national circumstances, following a country-driven approach;

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

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

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

(a) For the consumption manufacturing sector:

(i) Incremental capital costs;

(ii) Incremental operating costs for a duration to be determined by the Executive Committee;

(iii) Technical assistance activities;

(iv) Research and development, when required to adapt and optimize low-GWP or zero-GWP alternatives to hydrofluorocarbons;

(v) Costs of patents and designs, and incremental costs of royalties, when necessary and cost-effective;

(vi) Costs of the safe introduction of flammable and toxic alternatives;

(b) For the production sector:

(i) Lost profit due to the shutdown/closure of production facilities as well as production reduction;

(ii) Compensation to displaced workers;

(iii) Dismantling of production facilities;

(iv) Technical assistance activities;

(v) Research and development related to the production of low-GWP or zero-GWP alternatives to hydrofluorocarbons with a view to lowering the costs of alternatives;

(vi) Costs of patents and designs or incremental costs of royalties;

(vii) Costs of converting facilities to produce low-GWP or zero-GWP alternatives to hydrofluorocarbons when technically feasible and cost-effective;

(viii) Costs of reducing emissions of HFC-23, a by-product from the production process of HCFC-22, by reducing its emission rate in the process, destroying it from the off-gas, or by collecting and converting it to other environmentally safe chemicals. Such costs should be funded by the Multilateral Fund to meet the obligations of Parties operating under paragraph 1 of Article 5 specified under the Amendment;

(c) For the servicing sector:

(i) Public-awareness activities;

(ii) Policy development and implementation;

(iii) Certification programmes and training of technicians on safe handling, good practice and safety in respect of alternatives, including training equipment;

(iv) Training of customs officers;

(v) Prevention of illegal trade of hydrofluorocarbons;

(vi) Servicing tools;

(vii) Refrigerant testing equipment for the refrigeration and air-conditioning sector;

(viii) Recycling and recovery of hydrofluorocarbons;

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

Cut-off date for eligible capacity

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

Second and third conversions

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

(a) First conversions, in the context of a phase-down of hydrofluorocarbons, are defined as conversions to low-GWP or zero-GWP alternatives of enterprises that have never received any direct or indirect support, in part or in full, from the Multilateral Fund, including enterprises that converted to hydrofluorocarbons with their own resources;

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

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

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

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

Sustained aggregate reductions

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

Enabling activities

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

(a) Capacity-building and training for the handling of hydrofluorocarbon alternatives in the servicing, manufacturing and production sectors;

(b) Institutional strengthening;

(c) Article 4B licensing;

(d) Reporting;

(e) Demonstration projects; and

(f) Development of national strategies;

Institutional strengthening

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

Energy efficiency

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

Capacity-building to address safety

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

Disposal

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

Other costs

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

Exemption for high-ambient-temperature parties

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

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

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

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

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

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

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

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

34. To review, no later than the year following receipt of the first report of the Technology and Economic Assessment Panel on the suitability of alternatives, the need for an extension of the

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

[2] As listed in Appendix II to the present decision.

high-ambient-temperature exemption for a further period of up to four years, and periodically thereafter, for specific sub-sectors in parties that meet the criteria set out in paragraph 29 above, and that parties will develop an expedited process for ensuring the renewal of the exemption in a timely manner where there are no feasible alternatives, taking into account the recommendation of the Panel and its subsidiary body;

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

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

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

Other exemptions

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

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

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

Appendix I: List of exempted equipment for high ambient temperatures

(a)Multi-split air conditioners (commercial and residential)

(b) Split ducted air conditioners (commercial and residential)

(c)Ducted commercial packaged (self-contained) air-conditioners

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

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

Decision XXVIII/3: Energy efficiency

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

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

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

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

consumers and Governments,

1. To request the Technology and Economic Assessment Panel to review energy efficiency opportunities in the refrigeration and air-conditioning and heat-pump sectors related to a transition to climate-friendly alternatives, including not-in-kind options;

2. To invite parties to submit to the Ozone Secretariat by May 2017, on a voluntary basis, relevant information on energy efficiency innovations in the refrigeration, air-conditioning and heat-pump sectors;

3. To request the Technology and Economic Assessment Panel to assess the information submitted by parties on energy efficiency opportunities in the refrigeration and air-conditioning sectors during the transition to low-global-warming-potential and zero-global-warming-potential alternatives and to report thereon to the Twenty-Ninth Meeting of the Parties, in 2017;

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

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

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

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

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

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

(i) Progress in the revision of international safety standards by the IEC, the International Organization for Standardization (ISO) and other international standards bodies;

(ii) Information concerning tests and/or risk assessments and their results relevant to safety standards;

(iii) Assessment of the implications of international standards for the implementation of the decisions of the Meeting of the Parties to the Montreal Protocol on the accelerated phase-out of HCFCs and HFC control measures, and recommendations to the parties;

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

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

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

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

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

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

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

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

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

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

1. To request the Technology and Economic Assessment Panel to prepare a report for submission to the Twenty-Ninth Meeting of the Parties, and to submit it through the Open-ended Working Group at its thirty-ninth meeting, to enable the Twenty-Ninth Meeting of the Parties to adopt a decision on the appropriate level of the 2018–2020 replenishment of the Multilateral Fund;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Noting that China has reported difficulty in implementing existing alternatives to the use of carbon tetrachloride for the testing of oil, grease and total petroleum hydrocarbons in water and has indicated that it needs more time for the revision and promotion of national standards, and noting also that the party is taking necessary measures to implement the alternatives and has expressed a willingness to continue doing so,

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

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

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

Annex to decision XXVIII/6

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

(Metric tonnes)

Party	*2017*
China	65

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

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

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

Recalling paragraph 10 of decision XVII/9,

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

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

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

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

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

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

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

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

Annex to decision XXVIII/7

Table A

Agreed critical-use categories

(Metric tonnes)

2018	
Australia	Strawberry runners 29.730
2017	
Argentina	Strawberry fruit 38.84, tomato 64.10

Canada	Strawberry runners (Prince Edward Island) 5.261
China	Ginger, open field 74.617; ginger, protected 18.36
South Africa	Mills 4.1, structures 55.0

Table B

Permitted levels of production and consumption[a]

(Metric tonnes)

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

[a] Minus available stocks.

Decision XXVIII/8: Phase-out of hydrochlorofluorocarbons

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

of the Protocol,

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Decision XXVIII/13: Membership of the Implementation Committee

1. To note with appreciation the work carried out by the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol in 2016;

2. To confirm the positions of Bangladesh, Canada, Haiti, Kenya and Romania as members of the Committee for one further year and to select Congo, Georgia, Jordan, Paraguay and the United

Kingdom of Great Britain and Northern Ireland as members of the Committee for a two-year period beginning on 1 January 2017;

3. To note the selection of Mr. Brian Ruddie (United Kingdom of Great Britain and Northern Ireland) to serve as President and of Mr. Leonard Marindany Kirui (Kenya) to serve as Vice-President and Rapporteur of the Committee for one year beginning on 1 January 2017;

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

1. To note with appreciation the work carried out by the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol with the assistance of the Fund secretariat in 2016;

2. To endorse the selection of Australia, Austria, Belgium, Germany, Japan, Slovakia and the United States of America as members of the Executive Committee representing parties not operating under paragraph 1 of Article 5 of the Protocol and the selection of Argentina, Bosnia and Herzegovina, Cameroon, China, Lebanon, Mexico and Nigeria as members representing parties operating under that paragraph, for one year beginning 1 January 2017;

3. To note the selection of Mr. Paul Krajnik (Austria) to serve as Chair and Mr. Mazen Hussein (Lebanon) to serve as Vice-Chair of the Executive Committee for one year beginning 1 January 2017;

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

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

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

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

Taking note of the financial report on the Trust Fund for the Montreal Protocol on Substances that Deplete the Ozone Layer for the year ended 31 December 2015,[3]

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

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

Noting the depletion of the funding balance in 2016,

1. To approve the revised 2016 budget in the amount of $6,772,162 and the 2017 budget of $5,355,004, as set out in annex IV to the report of the Twenty-Eighth Meeting of the Parties to the Montreal Protocol;[4]

2. To reaffirm that a working capital reserve shall be maintained at a level of 15 per cent of the annual budget to meet the final expenditures under the Trust Fund, to note that such reserve shall be in the amount of $803,251 for 2017 and to take note of the proposed reserve for 2018 in the amount of $824,779;

3. To approve, as a consequence of funding the working capital reserve referred to in paragraph 2 of the present decision, total contributions to be paid by the parties of $4,276,933 for 2016 and $5,756,630 for 2017 and to take note of the contributions of $5,910,915 for 2018 as set out in

[3] UNEP/OzL.Pro.28/4/Add.1.

[4] UNEP/OzL.Pro.28/12.

annex V to the report of the Twenty-Eighth Meeting of the Parties and in the summary table immediately below;

Summary of contributions

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

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

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

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

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

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

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

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

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

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

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

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

X. Adoption of the report

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

XI. Closure of the meeting

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

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

Annex I

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

Article I: Amendment

Article 1, paragraph 4

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

"Annex C or Annex E"

there shall be substituted:

"Annex C, Annex E or Annex F"

Article 2, paragraph 5

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

"and Article 2H"

there shall be substituted:

"Articles 2H and 2J"

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

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

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

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

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

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

"should be;"

there shall be deleted:

"and"

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

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

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

Article 2J

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

“Article 2J: Hydrofluorocarbons

1. Each Party shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO_2 equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO_2 equivalents:

   (a) 2019 to 2023: 90 per cent

   (b) 2024 to 2028: 60 per cent

   (c) 2029 to 2033: 30 per cent

   (d) 2034 to 2035: 20 per cent

   (e) 2036 and thereafter: 15 per cent

2. Notwithstanding paragraph 1 of this Article, the Parties may decide that a Party shall ensure that, for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO_2 equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its calculated level of consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO_2 equivalents:

   (a) 2020 to 2024: 95 per cent

   (b) 2025 to 2028: 65 per cent

   (c) 2029 to 2033: 30 per cent

   (d) 2034 to 2035: 20 per cent

   (e) 2036 and thereafter: 15 per cent

3. Each Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO_2 equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO_2 equivalents:

   (a) 2019 to 2023: 90 per cent

   (b) 2024 to 2028: 60 per cent

   (c) 2029 to 2033: 30 per cent

   (d) 2034 to 2035: 20 per cent

   (e) 2036 and thereafter: 15 per cent

4. Notwithstanding paragraph 3 of this Article, the Parties may decide that a Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO_2 equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its

calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO_2 equivalents:

(a) 2020 to 2024: 95 per cent

(b) 2025 to 2028: 65 per cent

(c) 2029 to 2033: 30 per cent

(d) 2034 to 2035: 20 per cent

(e) 2036 and thereafter: 15 per cent

5. Paragraphs 1 to 4 of this Article will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by the Parties to be exempted uses.

6. Each Party manufacturing Annex C, Group I, or Annex F substances shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its emissions of Annex F, Group II, substances generated in each production facility that manufactures Annex C, Group I, or Annex F substances are destroyed to the extent practicable using technology approved by the Parties in the same twelve-month period.

7. Each Party shall ensure that any destruction of Annex F, Group II, substances generated by facilities that produce Annex C, Group I, or Annex F substances shall occur only by technologies approved by the Parties.

Article 3

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

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

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

", except as otherwise specified in paragraph 2;"

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

"; and

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

2. When calculating levels, expressed in CO_2 equivalents, of production, consumption, imports, exports and emissions of Annex F and Annex C, Group I, substances for the purposes of Article 2J, paragraph 5 *bis* of Article 2 and paragraph 1 (d) of Article 3, each Party shall use the global warming potentials of those substances specified in Group I of Annex A, Annex C and Annex F."

Article 4, paragraph 1 sept

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

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

Article 4, paragraph 2 sept

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

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

Article 4, paragraphs 5, 6 and 7

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

"Annexes A, B, C and E"

there shall be substituted:

"Annexes A, B, C, E and F"

Article 4, paragraphs 8

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

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

Article 4B

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

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

Article 5

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

"2I"

there shall be substituted:

"2J"

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

"Article 2I"

there shall be substituted:

"Articles 2I and 2J"

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

"any control measures"

there shall be inserted:

"with"

The following paragraph shall be inserted after paragraph 8 *ter* of Article

5 of the Protocol:

"8 *qua*

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

(i)2024 to 2028: 100 per cent

(ii) 2029 to 2034: 90 per cent

(iii) 2035 to 2039: 70 per cent

(iv)2040 to 2044: 50 per cent

(v)2045 and thereafter: 20 per cent

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

(i)2028 to 2031: 100 per cent

(ii) 2032 to 2036: 90 per cent

(iii) 2037 to 2041: 80 per cent

(iv)2042 to 2046: 70 per cent

(v)2047 and thereafter: 15 per cent

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

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

(e) Each Party operating under paragraph 1 of this Article and producing the controlled substances in Annex F, for the purposes of calculating its production baseline under Article

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

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

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

Article 6

In Article 6 of the Protocol, for the words:

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

Article 7, paragraphs 2, 3 and 3 ter

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

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

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

"C and E"

there shall be substituted:

"C, E and F"

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

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

Article 7, paragraph 4

In paragraph 4 of Article 7, after the words:

"statistical data on" and "provides data on"

there shall be added:

"production,"

Article 10, paragraph 1

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

"and Article 2I"

There shall be substituted:

", Article 2I and Article 2J"

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

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

Article 17

In Article 17 of the Protocol, for the words:

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

Annex A

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

Group	**Substance**	**Ozone-Depleting Potential***	**100-Year Global Warming Potential**
Group I			
$CFCl_3$	(CFC-11)	1.0	4 750
CF_2Cl_2	(CFC-12)	1.0	10 900
$C_2F_3Cl_3$	(CFC-113)	0.8	6 130
$C_2F_4Cl_2$	(CFC-114)	1.0	10 000
C_2F_5Cl	(CFC-115)	0.6	7 370

Annex C and Annex F

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

Group	**Substance**	**Number of isomers**	**Ozone-Depleting Potential***	**100-Year Global Warming Potential*** **
Group I				
$CHFCl_2$	(HCFC-21)**	1	0.04	151
CHF_2Cl	(HCFC-22)**	1	0.055	1810
CH_2FCl	(HCFC-31)	1	0.02	
C_2HFCl_4	(HCFC-121)	2	0.01–0.04	
$C_2HF_2Cl_3$	(HCFC-122)	3	0.02–0.08	
$C_2HF_3Cl_2$	(HCFC-123)	3	0.02–0.06	77

$CHCl_2CF_3$	(HCFC-123)**	–	0.02	
C_2HF_4Cl	(HCFC-124)	2	0.02–0.04	609
$CHFClCF_3$	(HCFC-124)**	–	0.022	
$C_2H_2FCl_3$	(HCFC-131)	3	0.007–0.05	
$C_2H_2F_2Cl_2$	(HCFC-132)	4	0.008–0.05	
$C_2H_2F_3Cl$	(HCFC-133)	3	0.02–0.06	
$C_2H_3FCl_2$	(HCFC-141)	3	0.005–0.07	
CH_3CFCl_2	(HCFC-141b)**	–	0.11	725
$C_2H_3F_2Cl$	(HCFC-142)	3	0.008–0.07	
CH_3CF_2Cl	(HCFC-142b)**	–	0.065	2310
C_2H_4FCl	(HCFC-151)	2	0.003–0.005	
C_3HFCl_6	(HCFC-221)	5	0.015–0.07	
$C_3HF_2Cl_5$	(HCFC-222)	9	0.01–0.09	
$C_3HF_3Cl_4$	(HCFC-223)	12	0.01–0.08	
$C_3HF_4Cl_3$	(HCFC-224)	12	0.01–0.09	
$C_3HF_5Cl_2$	(HCFC-225)	9	0.02–0.07	
$CF_3CF_2CHCl_2$	(HCFC-225ca)**	–	0.025	122
CF_2ClCF_2CHClF	(HCFC-225cb)**	–	0.033	595
C_3HF_6Cl	(HCFC-226)	5	0.02–0.10	
$C_3H_2FCl_5$	(HCFC-231)	9	0.05–0.09	
$C_3H_2F_2Cl_4$	(HCFC-232)	16	0.008–0.10	
$C_3H_2F_3Cl_3$	(HCFC-233)	18	0.007–0.23	
$C_3H_2F_4Cl_2$	(HCFC-234)	16	0.01–0.28	
$C_3H_2F_5Cl$	(HCFC-235)	9	0.03–0.52	
$C_3H_3FCl_4$	(HCFC-241)	12	0.004–0.09	
$C_3H_3F_2Cl_3$	(HCFC-242)	18	0.005–0.13	
$C_3H_3F_3Cl_2$	(HCFC-243)	18	0.007–0.12	
$C_3H_3F_4Cl$	(HCFC-244)	12	0.009–0.14	
$C_3H_4FCl_3$	(HCFC-251)	12	0.001–0.01	
$C_3H_4F_2Cl_2$	(HCFC-252)	16	0.005–0.04	
$C_3H_4F_3Cl$	(HCFC-253)	12	0.003–0.03	

$C_3H_5FCl_2$	(HCFC-261)	9	0.002–0.02	
$C_3H_5F_2Cl$	(HCFC-262)	9	0.002–0.02	
C_3H_6FCl	(HCFC-271)	5	0.001–0.03	

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

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

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

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

"*Annex F: Controlled substances*

Group	**Substance**	**100-Year Global Warming Potential**
Group I		
CHF_2CHF_2	HFC-134	1 100
CH_2FCF_3	HFC-134a	1 430
CH_2FCHF_2	HFC-143	353
$CHF_2CH_2CF_3$	HFC-245fa	1 030
$CF_3CH_2CF_2CH_3$	HFC-365mfc	794
CF_3CHFCF_3	HFC-227ea	3 220
$CH_2FCF_2CF_3$	HFC-236cb	1 340
CHF_2CHFCF_3	HFC-236ea	1 370
$CF_3CH_2CF_3$	HFC-236fa	9 810
$CH_2FCF_2CHF_2$	HFC-245ca	693
$CF_3CHFCHFCF_2CF_3$	HFC-43-10mee	1 640
CH_2F_2	HFC-32	675
CHF_2CF_3	HFC-125	3 500
CH_3CF_3	HFC-143a	4 470
CH_3F	HFC-41	92
CH_2FCH_2F	HFC-152	53
CH_3CHF_2	HFC-152a	124
Group II		
CHF_3	HFC-23	14 800

Article II: Relationship to the 1999 Amendment

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

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

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

Article IV: Entry into force

1. Except as noted in paragraph 2, below, this Amendment shall enter into force on 1 January 2019, provided that at least twenty instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.

2. The changes to Article 4 of the Protocol, Control of trade with non-Parties, set out in Article I of this Amendment shall enter into force on 1 January 2033, provided that at least seventy instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.

3. For purposes of paragraphs 1 and 2, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.

4. After the entry into force of this Amendment, as provided under paragraphs 1 and 2, it shall enter into force for any other Party to the Protocol on the ninetieth day following the date of deposit of its instrument of ratification, acceptance or approval.

Article V: Provisional application

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

Annex II

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

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

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

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

commercial air-conditioning and heat pumps to allow for larger charges of flammable refrigerants; for A2L refrigerants, the evaluation had started in 2011 and a new standard was projected to be available by 2018 or 2019; for A3 refrigerants, the evaluation had started in 2015 and a new standard was expected to be ready by 2021.

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

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

Ms. Helen Tope presented information on a new chapter in the updated report on metered-dose inhalers and aerosols, which included non-metered-dose-inhaler medical, consumer and technical aerosols. Metered-dose inhalers for asthma and chronic obstructive pulmonary disease used approximately 10,000 tonnes per year of HFC-134a and HFC-227ea. A BAU scenario estimated total cumulative HFC demand of 990 Mt CO_2-eq (~30 Mt CO_2-eq./year). She noted that both HFC metered-dose inhaler and dry powder metered-dose inhaler and dry-powder inhaler alternatives were available for all key classes of drugs used in the treatment of asthma and chronic obstructive pulmonary disease. Completely avoiding HFC metered-dose inhalers was not yet feasible, however, because there were economic impediments to switching to multi-dose dry-powder inhalers for salbutamol and because a minority of patients could not use available alternatives. Regarding aerosols, she estimated global HFC demand for aerosols at 44 kilotonnes in 2015, with about 15 kilotonnes of HFC-134a and 29 kilotonnes of HFC-152a. A BAU scenario for global HFC demand (HFC-134a and HFC-152a) for aerosols for the period 2015–2050 estimated total cumulative HFC demand at 740 Mt CO-eq.
(~20 Mt CO_2-eq./year). She said that relatively low-GWP options and not-in-kind alternatives, where suited for the purpose, were available for HFC propellants and solvents, although their adoption might not always be feasible in some markets or for some products.

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

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

Mr. Kuijpers started the presentation with a review of decision Ex.III/1 decision, by which the Meeting of the Parties had requested the Panel to "prepare a report for consideration by the twenty-eighth Meeting of the Parties containing an assessment of the climate benefits, and the

financial implications for the Multilateral Fund, of the schedules for phasing down the use of hydrofluorocarbons (HFCs) contained in the amendment proposals as discussed by the Parties at the thirty-eighth meeting of the Open-ended Working Group and the Third Extraordinary Meeting of the Parties." To respond to the decision, the Panel formed a working group of eight panel members. The Panel's response to the decision was carefully considered, taking into account the need to define key terms, the challenge of understanding the context of the decision given that many of the sessions at which parties had discussed the proposed HFC amendments had been closed informal discussions and that the Panel had had only six weeks to complete its analysis and deliver a final report to facilitate discussions at the Twenty-Eighth Meeting of the Parties. The objectives of the report were to provide a clear definition of terms, to build on the accepted methodology used by the Panel for the business-as-usual (BAU) and mitigation scenarios and to provide an initial assessment of the potential benefits and costs of the amendment proposals.

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

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

On climate benefits, Mr. Kuijpers said that the Panel had considered "climate benefit" to be a reduction in HFC consumption below that of a BAU scenario over the period from the control

start year until 2050, which was consistent with the Panel's approach in previous reports. The year 2050 had been chosen because it was consistent with the end-year requested by the parties for the scenarios in the Panel's decision XXVII/4 task force report. A choice of different end years would lead to different climate benefits. He said that there were other methods of calculating "climate benefits" on the basis of estimated emissions, supported by atmospheric measurements (Velders, 2015), leading to direct global temperature impact via the radiative forcing in a given year. He showed an illustrative figure of how climate benefits for demand had been calculated.

Ms. Maranion continued the presentation with a description of how the Panel had calculated climate benefits. She listed a number of issues that had been taken into account, including historic HCFC consumption values and best estimates for the trend in future demand. HFC consumption to 2014 had been determined on the basis of available data, and consumption for 2015 had been checked against the best estimate of HFC 2015 production in order to ascertain the 2015 starting point for future BAU demand calculations. She then showed a figure which gave the BAU scenario with and without with regulations for non-Article 5 parties, together with the four control schedules for non-Article 5 parties set out in the four amendment proposals.

She noted again that the control schedules, based on certain baselines and subsequent reductions, had been compared against the BAU scenario with regulations to identify the climate benefit, i.e., the difference in demand between the two, expressed in CO_2-equivalent. Where it concerned the proposals for non-Article 5 parties, the North American proposal yielded a climate benefit of 10,690 Mt CO_2-eq., the European Union proposal a benefit of 11,500 Mt CO_2-eq., the Indian proposal a benefit of 10,000 Mt CO_2-eq., and the Island States proposal a benefit of 12,470 Mt CO_2-eq. She then showed a figure showing the BAU scenario for Article 5 parties, along with the control schedules as described in the amendment proposals. She noted that while the calculations for the European Union and Indian proposals had assumed that there would be no reduction steps after the freeze year until 2050, the proposals themselves indicated that possible reduction steps would be decided on in the future.

As to the cost calculations, she said that they encompassed manufacturing conversion costs (plus costs for production shutdown and servicing) and that costs for project preparation, institutional strengthening, capacity-building and other factors had not been included. Where available, the current Multilateral Fund cost guidelines for HCFC conversion had been used. She then showed a table with the cost effectiveness ranges for the various sectors subsectors, including for production shutdown and servicing, that had been used in the calculations. As to the Article 5 parties, she said that the North American proposal yielded a climate benefit of 75,850 Mt CO_2-eq. and costs in the range of
$3,440–5,250 million and that the European Union proposal yielded a climate benefit of 53,260 Mt CO_2-eq. and costs in the range of $5,580–8,540 million. She noted that the European Union proposal had a freeze in 2019 at the average HCFC-HFC consumption for 2015–2016 and no reduction steps, which would have to be negotiated; not taking any reductions into account until 2050 was the reason that the climate benefit was relatively low and the costs high for the European Union proposal. She said that the Indian proposal yielded a climate benefit of 26,130 Mt CO2-eq. and costs in the range of $9,300–14,220 million. Also, because no reduction steps were assumed after the freeze in 2031 until a final 85 per cent reduction in 2050, the climate benefit was relatively low and the costs high. The Island States proposal yielded a climate benefit of 74,890 Mt CO_2-eq. and costs in the range of $4,550–6,950 million. In closing she showed a slide with the cost ranges for the four amendment proposals for Article 5 parties and restated some key points about the report including that it provided an assessment of the potential climate benefits and costs of the four amendment proposals for the consideration of the parties and that it built on the accepted methodology used by the Panel for BAU and mitigation scenarios across the various sectors of use. She emphasized again that the cost calculations in the report consisted of manufacturing conversion costs plus the cost of production shutdown and servicing. Costs for project preparation, institutional strengthening, capacity-building and other factors had not been included and where available, current Multilateral Fund cost guidelines for HCFC conversion had been used.

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

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

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

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

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

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

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

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

For the Argentina strawberry fruit and tomato nominations a reduction was recommended based on a lower methyl bromide dosage rate (26 to 15 g/m2) for the uptake of barrier films and a change in adoption from two years to three years. After the Open-ended Working Group meeting the party had explained that more time was needed to adopt barrier films.

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

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

The co-chairs then pointed out some highlights, including China's indicated intent to seek no more methyl bromide critical-use exemptions after 2018; one party failing to provide an accounting framework as requested in paragraph 9 (f) of decision Ex.1/4; and only one Article

5 party providing a national management strategy as requested in paragraph 3 of decision Ex.1/4. She also stressed that there were concerns over the reporting of stocks.

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

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

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

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

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

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

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

(a) Fugitive: 2 Gg yr^{-1}, from UNEP Reports;

(b) Unreported non-feedstock: 13 Gg $yr^{-:1}$

(c) Unreported inadvertent emissions;

(d) Legacy: combined C. & D. ~10 Gg $yr^{-.1}$

The four pathways had a total emissions of 20±5 Gg yr^{-1}. Only pathway A could be estimated from Article 7 reports.

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

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

Ms. Tope discussed the joint of the Scientific Assessment Panel and the Technology and Economic Assessment Panel regarding the carbon tetrachloride discrepancy. Previous assessments had omitted some emissions sources from bottom-up emissions estimates Article 7 data reports were therefore not adequate on their own for deriving bottom-up global carbon tetrachloride emissions estimates. Further scientific research was needed to tighten observations-derived top-down emissions estimates. Finally, there was a continuing need to develop improved methodologies for estimating bottom-up carbon tetrachlorideCl_4 emissions.

Ms. Tope concluded the presentation by presenting the recommendations of the Scientific Assessment Panel and the Technology and Economic Assessment Panel for consideration by the Parties. First, a joint working group of the two panels could be established for estimating emissions of carbon tetrachloride in support of their quadrennial assessments. Second, to address remaining questions, a joint workshop of the two panels could be held in coordination with the Ozone Secretariat in order to further evaluate the emissions pathways outlined in the SPARC report. The workshop could also be tasked with developing improved methodologies for estimating bottom-up carbon tetrachloride emissions. Finally, the SPARC report included a "Research Direction Suggestions" section. Parties might wish to request the Ozone Secretariat to forward it to the Vienna Convention's Ozone Research Managers for consideration and evaluation for their next report.

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

1. Scientific Assessment Panel

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

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

(a)New evidence for recovery of the global ozone layer: new published research that suggested that the Antarctic ozone hole was improving due to the reduction of ozone-depleting substances;

(b) Global ozone projections in the twenty-first century: the evolution of global ozone in the second half of the century would depend largely on changes in the abundances of greenhouse gases. In some scenarios, atmospheric models showed that ozone would recover to 1980 levels by mid-century but might overshoot 1980 levels in later decades (i.e., super recovery) and reduce ultraviolet radiation exposure of humans and ecosystems. The Scientific Assessment Panel would work closely with the Environmental Effects Assessment Panel to evaluate the resulting effects, especially in the northern hemisphere;

(c)An update of the carbon tetrachloride budget, of which the 2016 report of the Technology and Economic Assessment Panel and the Scientific Assessment Panel provided a new evaluation;

(d) Evaluation of new atmospheric observations and their interpretation concerning principal ozone-depleting substance and hydrofluorocarbon (HFC) abundances and their budgets. Of special interest is a re-evaluation of the methyl bromide budget in cooperation with the Technology and Economic Assessment Panel;

(e) New projections of HFC emissions and the climate implications of HFC phase-down proposals. HFC emissions are undergoing change due to national regulations and technical changes in HFC use sectors;

(f) Changes in stratospheric circulation. Systematic changes in winds in the stratosphere have been observed that could influence ozone and other trace gas amounts in the stratosphere.

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

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

2. Environmental Effects Assessment Panel

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

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

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

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

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

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

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

3. Technology and Economic Assessment Panel

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

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

He informed parties about the historic agreement reached that week at the International Civil Aviation Organization (ICAO) to control CO_2 emissions from international aviation. He noted that at the same meeting a tremendous breakthrough for the Montreal Protocol with regard to halons had also occurred. ICAO had approved a requirement to replace halons in cargo bays in all new aircraft designs by 2024; from 2024, therefore, there would no longer be a need to use halons in any new designs in any fire protection application. The milestone had been achieved through more than a decade of engagement between ICAO and Montreal Protocol bodies, including especially Halon Technical Options Committee (HTOC) Co-chairs Mr. Dan Verdonik and Mr. David Catchpole. He pointed out, however, that halons would be needed for existing equipment and current aviation designs for the foreseeable future (excluding those covered by European Union retrofit requirements), which would require careful management. Many new designs continued to require high GWP HFCs, although two new low-GWP agents had been introduced recently that might be suitable for some applications.

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

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

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

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

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

The Technology and Economic Assessment Panel, he said, remained ready to respond to tasks, would continue to be aligned with the current and future needs of the parties and will continue

to identify emerging issues for the parties. He explained, however, that the Panel continued to be challenged by a limited pool of qualified experts from both Article 5 parties and non-Article 5 parties. He explained that the Panel experts primarily needed to have technical expertise and experience, but also the capacity to take on the workload, the ability to write and communicate in a comprehensible way, and the necessary support to take on the workload or be in a position to volunteer their time.

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

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

Annex III

Statement by the delegation of the Russian Federation

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

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

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

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

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

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

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

Annex IV

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

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

Cost category		*Revised 2016*	*2017*	*Proposed 2018*
1100	Professional and higher category	1 060 652	1 249 082	1 249 082
1300	Administrative support	232 542	233 990	241 000
	Component total: employee salaries, allowances and benefits	**1 293 194**	**1 483 072**	**1 490 082**
	Consultants			
1201	Assistance in data reporting, analysis and promotion of implementation of the Protocol	85 000	85 000	85 000
	Component total: non-employee compensation and allowances	**85 000**	**85 000**	**85 000**
	Expendable equipment			
4101	Miscellaneous expendables	18 000	18 000	18 000
	Subtotal	**18 000**	**18 000**	**18 000**
	Non-expendable equipment			
4201	Personal computers and accessories	5 000	5 000	5 000
4202	Portable computers	5 000	5 000	5 000
4203	Other office equipment (server, scanner, furniture, etc.,)	5 000	5 000	5 000
4204	Photocopiers	5 000	5 000	5 000
4205	Equipment and peripherals for paperless meetings	5 000	5 000	5 000
	Subtotal	**25 000**	**25 000**	**25 000**
	Rental of premises			
4301	Rental of office premises	41 870	41 870	41 870
	Subtotal	**41 870**	**41 870**	**41 870**
	Operation and maintenance of equipment			

Cost category			*Revised 2016*	*2017*	*Proposed 2018*
5101		Maintenance of equipment and others	20 000	20 000	20 000
	Subtotal		**20 000**	**20 000**	**20 000**
	Reporting costs				
5201		Reporting	65 000	65 000	50 000
5202		Reporting (assessment panels)	5 000	5 000	5 000
5203		Reporting (Protocol awareness)	5 000	5 000	5 000
	Subtotal		**75 000**	**75 000**	**60 000**
	Sundry				
5301		Communications	10 000	10 000	10 000
5302		Freight charges	10 000	10 000	10,000
5303		Training	10 000	10 000	10 000
5304		Others (International Ozone Day)	10 000	90 000	15 000
	Subtotal		**40 000**	**120 000**	**45 000**
	Component total: supplies and consumables		**219 870**	**299 870**	**209 870**
	Travel on official business				
1601		Staff travel on official business	210 000	210 000	210 000
1602		Conference Services staff travel on official business	15 000	15 000	15 000
	Component total: travel on official business		**225 000**	**225 000**	**225 000**
	Meeting costs				
1321		Conference services costs: Open-ended Working Group meetings	600 000	676 000[5]	631 000
1322		Conference services costs: preparatory meetings and meetings of the parties	625 000	460 000	645 000
1323		Communication costs of Article 5 party assessment panel members and organizational costs of meetings	70 000	70 000	90 000

[5] To include a workshop on safety standards in accordance with decision XXVIII/4.

Cost category		*Revised 2016*	*2017*	*Proposed 2018*
1324	Conference services costs: Bureau meetings	25 000	25 000	25 000
1325	Conference services costs: Implementation Committee meetings	125 000	125 000	125 000
1326	Conference services costs: Montreal Protocol informal consultation meetings	10 000	10 000	10 000
1332	Conference services costs: resumed thirty-seventh meeting of the Open-ended Working Group	80 000	–	–
1333	Conference services costs: Additional five-day meeting of the Open-ended Working Group and two-day back-to-back extraordinary Meeting of the Parties	870 000	–	–
	Subtotal	**2 405 000**	**1 366 000**	**1 526 000**
	Travel of Article 5 parties			
3301	Travel of Article 5 parties: assessment panel meetings	450 000	400 000	450 000
3302	Travel of Article 5 parties: preparatory meetings and meetings of the parties	375 000	375 000	375 000
3303	Travel of Article 5 parties: Open-ended Working Group meetings	325 000	325 000	325 000
3304	Travel of Article 5 parties: Bureau meetings	20 000	20 000	20 000
3305	Travel of Article5 parties: Implementation Committee meetings	125 000	125 000	125 000
3306	Travel of Article5 parties: consultations in an informal meeting	10 000	10 000	10 000
3312	Travel of Article5 parties: Additional five-day meeting of the Open-ended Working Group and two-day back-to-back extraordinary Meeting of the Parties	435 000	–	–
	Subtotal	**1 740 000**	**1 255 000**	**1 305 000**

Cost category		*Revised 2016*	*2017*	*Proposed 2018*
	Hospitality			
5401	Hospitality	25 000	25 000	25 000
	Subtotal	**25 000**	**25 000**	**25 000**
	Component total: operating expenses	**4 170 000**	**2 646 000**	**2 725 250**
	Total direct costs	**5 993 064**	**4 738 942**	**4 865 952**
	Programme support costs (13 per cent)	779 098	616 062	632 574
	Grand total	**6 772 162**	**5 355 004**	**5 498 526**

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

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

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

Annex V

Contributions by the parties

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

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

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016 Contributions by parties* *Current level*	*2017 Contributions by parties*	*2018 Proposed Contributions by parties*
1	Afghanistan	0	0	0	0
2	Albania	0	0	0	0
3	Algeria	0.16	5 840	9 211	9 457
4	Andorra	0	0	0	0
5	Angola	0	0	0	0
6	Antigua and Barbuda	0	0	0	0
7	Argentina	0.888	18 416	51 119	52 489
8	Armenia	0	0	0	0
9	Australia	2.327	88 412	133 957	137 547
10	Austria	0.717	34 018	41 275	42 381
11	Azerbaijan	0	0	0	0
12	Bahamas	0	0	0	0
13	Bahrain	0	0	0	0
14	Bangladesh	0	0	0	0
15	Barbados	0	0	0	0
16	Belarus	0	0	0	0
17	Belgium	0.881	42 543	50 716	52 075
18	Belize	0	0	0	0
19	Benin	0	0	0	0
20	Bhutan	0	0	0	0
21	Bolivia (Plurinational State of)	0	0	0	0
22	Bosnia and Herzegovina	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
23	Botswana	0	0	0	0
24	Brazil	3.807	125 072	219 155	225 029
25	Brunei Darussalam	0	0	0	0
26	Bulgaria	0	0	0	0
27	Burkina Faso	0	0	0	0
28	Burundi	0	0	0	0
29	Cabo Verde	0	0	0	0
30	Cambodia	0	0	0	0
31	Cameroon	0	0	0	0
32	Canada	2.908	127 204	167 403	171 889
33	Central African Republic	0	0	0	0
34	Chad	0	0	0	0
35	Chile	0.397	14 238	22 854	23 466
36	China	7.887	219 452	454 025	466 194
37	Colombia	0.321	11 041	18 479	18 974
38	Comoros	0	0	0	0
39	Congo	0	0	0	0
40	Cook Islands	0	0	0	0
41	Costa Rica	0	0	0	0
42	Côte d'Ivoire	0	0	0	0
43	Croatia	0	5 371	0	0
44	Cuba	0	0	0	0
45	Cyprus	0	0	0	0
46	Czech Republic	0.343	16 455	19 745	20 274
47	Democratic People's Republic of Korea	0	0	0	0
48	Democratic Republic of the Congo	0	0	0	0
49	Denmark	0.581	28 774	33 446	34 342
50	Djibouti	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
51	Dominica	0	0	0	0
52	Dominican Republic	0	0	0	0
53	Ecuador	0	0	0	0
54	Egypt	0.151	5 712	8 693	8 925
55	El Salvador	0	0	0	0
56	Equatorial Guinea	0	0	0	0
57	Eritrea	0	0	0	0
58	Estonia	0	0	0	0
59	Ethiopia	0	0	0	0
60	European Union	2.489	106 572	143 283	147 123
61	Fiji	0	0	0	0
62	Finland	0.454	22 124	26 135	26 836
63	France	4.838	238 422	278 506	285 970
64	Gabon	0	0	0	0
65	Gambia	0	0	0	0
66	Georgia	0	0	0	0
67	Germany	6.362	304 411	366 237	376 052
68	Ghana	0	0	0	0
69	Greece	0.469	27 197	26 999	27 722
70	Grenada	0	0	0	0
71	Guatemala	0	0	0	0
72	Guinea	0	0	0	0
73	Guinea-Bissau	0	0	0	0
74	Guyana	0	0	0	0
75	Haiti	0	0	0	0
76	Holy See	0	0	0	0
77	Honduras	0	0	0	0
78	Hungary	0.16	11 339	9 211	9 457
79	Iceland	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
80	India	0.734	28 391	42 254	43 386
81	Indonesia	0.502	14 750	28 898	29 673
82	Iran (Islamic Republic of)	0.469	15 176	26 999	27 722
83	Iraq	0.128	0	7 368	7 566
84	Ireland	0.334	17 819	19 227	19 742
85	Israel	0.428	16 881	24 638	25 299
86	Italy	3.732	189 612	214 837	220 595
87	Jamaica	0	0	0	0
88	Japan	9.639	461 796	554 882	569 753
89	Jordan	0	0	0	0
90	Kazakhstan	0.19	5 158	10 938	11 231
91	Kenya	0	0	0	0
92	Kiribati	0	0	0	0
93	Kuwait	0.284	11 638	16 349	16 787
94	Kyrgyzstan	0	0	0	0
95	Lao People's Democratic Republic	0	0	0	0
96	Latvia	0	0	0	0
97	Lebanon	0	0	0	0
98	Lesotho	0	0	0	0
99	Liberia	0	0	0	0
100	Libya	0.124	6 053	7 138	7 330
101	Liechtenstein	0	0	0	0
102	Lithuania	0	0	0	0
103	Luxembourg	0	0	0	0
104	Madagascar	0	0	0	0
105	Malawi	0	0	0	0
106	Malaysia	0.321	11 979	18 479	18 974
107	Maldives	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016 Contributions by parties* *Current level*	*2017 Contributions by parties*	*2018 Proposed Contributions by parties*
108	Mali	0	0	0	0
109	Malta	0	0	0	0
110	Marshall Islands	0	0	0	0
111	Mauritania	0	0	0	0
112	Mauritius	0	0	0	0
113	Mexico	1.429	78 522	82 262	84 467
114	Micronesia (Federated States of)	0	0	0	0
115	Monaco	0	0	0	0
116	Mongolia	0	0	0	0
117	Montenegro	0	0	0	0
118	Morocco	0	0	0	0
119	Mozambique	0	0	0	0
120	Myanmar	0	0	0	0
121	Namibia	0	0	0	0
122	Nauru	0	0	0	0
123	Nepal	0	0	0	0
124	Netherlands	1.476	70 508	84 968	87 245
125	New Zealand	0.267	10 785	15 370	15 782
126	Nicaragua	0	0	0	0
127	Niger	0	0	0	0
128	Nigeria	0.208	0	11 974	12 295
129	Niue	0	0	0	0
130	Norway	0.845	36 277	48 644	49 947
131	Oman	0.113	4 348	6 505	6 679
132	Pakistan	0	0	0	0
133	Palau	0	0	0	0
134	Panama	0	0	0	0
135	Papua New Guinea	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
136	Paraguay	0	0	0	0
137	Peru	0.135	4 988	7 771	7 980
138	Philippines	0.164	6 565	9 441	9 694
139	Poland	0.837	39 261	48 183	49 474
140	Portugal	0.39	20 206	22 451	23 053
141	Qatar	0.268	8 909	15 428	15 841
142	Republic of Korea	2.03	85 002	116 860	119 992
143	Republic of Moldova	0	0	0	0
144	Romania	0.183	9 634	10 535	10 817
145	Russian Federation	3.075	103 929	177 016	181 761
146	Rwanda	0	0	0	0
147	Saint Kitts and Nevis	0	0	0	0
148	Saint Lucia	0	0	0	0
149	Saint Vincent and the Grenadines	0	0	0	0
150	Samoa	0	0	0	0
151	San Marino	0	0	0	0
152	Sao Tome and Principe	0	0	0	0
153	Saudi Arabia	1.141	36 831	65 683	67 444
154	Senegal	0	0	0	0
155	Serbia	0	0	0	0
156	Seychelles	0	0	0	0
157	Sierra Leone	0	0	0	0
158	Singapore	0.445	16 369	25 617	26 304
159	Slovakia	0.159	7 290	9 153	9 398
160	Slovenia	0	0	0	0
161	Solomon Islands	0	0	0	0
162	Somalia	0	0	0	0
163	South Africa	0.362	15 858	20 839	21 398

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
164	South Sudan	0	0	0	0
165	Spain	2.433	126 735	140 059	143 813
166	Sri Lanka	0	0	0	0
167	Sudan	0	0	0	0
168	Suriname	0	0	0	0
169	Swaziland	0	0	0	0
170	Sweden	0.952	40 924	54 803	56 272
171	Switzerland	1.135	44 632	65 338	67 089
172	Syrian Arab Republic	0	0	0	0
173	Tajikistan	0	0	0	0
174	Thailand	0.29	10 188	16 694	17 142
175	The former Yugoslav Republic of Macedonia	0	0	0	0
176	Timor-Leste	0	0	0	0
177	Togo	0	0	0	0
178	Tonga	0	0	0	0
179	Trinidad and Tobago	0	0	0	0
180	Tunisia	0	0	0	0
181	Turkey	1.014	56 611	58 372	59 938
182	Turkmenistan	0	0	0	0
183	Tuvalu	0	0	0	0
184	Uganda	0	0	0	0
185	Ukraine	0.103	0	5 929	6 088
186	United Arab Emirates	0.601	25 364	34 597	35 525
187	United Kingdom of Great Britain and Northern Ireland	4.444	220 774	255 825	262 681
188	United Republic of Tanzania	0	0	0	0
189	United States of America	21.906	937 830	1 261 047	1 294 845
190	Uruguay	0	0	0	0
191	Uzbekistan	0	0	0	0

	Party	*Adjusted United Nations scale of assessments with 22% maximum assessment rate*	*2016* *Contributions by parties* *Current level*	*2017* *Contributions by parties*	*2018 Proposed Contributions by parties*
192	Vanuatu	0	0	0	0
193	Venezuela (Bolivarian Republic of)	0.569	26 728	32 813	33 691
194	Viet Nam	0	0	0	0
195	Yemen	0	0	0	0
196	Zambia	0	0	0	0
197	Zimbabwe	0	0	0	0
	Total	**100**	**4 276 933**	**5 756 630**	**5 910 915**

MOP28 - FINAL

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SUMMARY OF THE TWENTY-EIGHTH MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL: 10-14 OCTOBER 2016

The twenty-eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP 28) met from 10-14 October 2016, in Kigali, Rwanda. Over 500 participants from governments, UN agencies, intergovernmental and non-governmental organizations, academia, and industry attended the meeting.

MOP 28's primary decision was to adopt the Kigali Amendment, which amended the Protocol to include hydrofluorocarbons (HFCs) as part of its ambit. MOP 28 also adopted a number of substantive and procedural decisions. Substantive decisions included: essential-use exemptions (EUEs) and critical-use exemptions (CUEs); and the Terms of Reference (TOR) for the study on the 2018-2020 replenishment of the Multilateral Fund (MLF). Procedural decisions adopted include: budget; organizational issues related to the Technology and Economic Assessment Panel; and membership of Montreal Protocol bodies.

MOP 28 immediately followed a one-day resumed session of the 38th Open-ended Working Group (OEWG 38), where parties agreed to continue work in a contact group on the feasibility and ways of managing hydrofluorocarbons (HFC Management Contact Group) and established a Legal Drafting Group to formulate legal text on an amendment for the MOP's consideration.

During the week, the main agenda item was the Dubai pathway on HFCs, under which parties were mandated to continue negotiations with a view to agreeing on an amendment in 2016. Over the course of the week, many heated discussions took place and parties "went to the brink and back" before the Kigali Amendment was agreed to at 6:54 am on Saturday morning.

A BRIEF HISTORY OF THE OZONE REGIME

Concerns that the Earth's stratospheric ozone layer could be at risk from chlorofluorocarbons (CFCs) and other anthropogenic substances first arose in the early 1970s. At that time, scientists warned that releasing these substances into the atmosphere could deplete the ozone layer, hindering its ability to prevent harmful ultraviolet (UV) rays from reaching the Earth. This would adversely affect ocean ecosystems, agricultural productivity and animal populations, and harm humans through higher rates of skin cancers, cataracts and weakened immune systems. In response, a UN Environment Programme (UNEP) conference held in March 1977 adopted a World Plan of Action on the Ozone Layer and established a Coordinating Committee to guide future international action.

VIENNA CONVENTION: Negotiations on an international agreement to protect the ozone layer were launched in 1981 under the auspices of UNEP. In March 1985, the Vienna Convention for the Protection of the Ozone Layer was adopted. It called for cooperation on monitoring, research and data exchange, but it did not impose obligations to reduce ozone depleting substances (ODS) usage. The Convention now has 197 parties, which represents universal ratification.

MONTREAL PROTOCOL: In September 1987, efforts to negotiate binding obligations to reduce ODS usage led to the adoption of the Montreal Protocol, which entered into force in January 1989. The Montreal Protocol introduced control measures for some CFCs and halons for developed countries (non-Article 5 countries). Developing countries (Article 5 countries) were granted a grace period, allowing them to increase their ODS use before taking on commitments. The Protocol and all its amendments have been ratified by 197 parties, representing universal ratification.

Since 1987, several amendments and adjustments have been adopted, adding new obligations and additional ODS and adjusting existing control schedules. Amendments require ratification by a certain number of parties before they enter into force; adjustments enter into force automatically.

LONDON AMENDMENT AND ADJUSTMENTS: Delegates to the second Meeting of the Parties to the Montreal Protocol (MOP 2), held in London, UK, in 1990, tightened control schedules and added ten more CFCs to the list of ODS, as

IN THIS ISSUE

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well as carbon tetrachloride (CTC) and methyl chloroform. MOP 2 also established the Multilateral Fund (MLF), which meets the incremental costs incurred by Article 5 countries in implementing the Protocol's control measures and finances clearinghouse functions. The Fund is replenished every three years.

COPENHAGEN AMENDMENT AND ADJUSTMENTS: At MOP 4, held in Copenhagen, Denmark, in 1992, delegates tightened existing control schedules and added controls on methyl bromide, hydrobromofluorocarbons and hydrochlorofluorocarbons (HCFCs). MOP 4 also agreed to enact non-compliance procedures. It established an Implementation Committee (ImpCom) to examine possible non-compliance and make recommendations to the MOP aimed at securing full compliance.

MONTREAL AMENDMENT AND ADJUSTMENTS: At MOP 9, held in Montreal, Canada, in 1997, delegates agreed to: a new licensing system for importing and exporting ODS, in addition to tightening existing control schedules; and banning trade in methyl bromide with non-parties to the Copenhagen Amendment.

BEIJING AMENDMENT AND ADJUSTMENTS: At MOP 11, held in Beijing, China, in 1999, delegates agreed to controls on bromochloromethane, additional controls on HCFCs, and reporting on methyl bromide for quarantine and pre-shipment (QPS) applications.

MOP 21: MOP 21 took place in Port Ghalib, Egypt, in 2009, and adopted decisions on: alternatives to HCFCs; institutional strengthening; environmentally sound management of ODS banks; methyl bromide; and data and compliance issues. This meeting was the first at which delegates considered a proposal to amend the Protocol to include hydrofluorocarbons (HFCs) submitted by the Federated States of Micronesia (FSM) and Mauritius.

MOP 22: MOP 22 took place in Bangkok, Thailand, in 2010, and adopted decisions on, *inter alia*: the terms of reference (TOR) for the Technology and Economic Assessment Panel (TEAP) study on the MLF replenishment and the evaluation of the financial mechanism; and assessment of technologies for ODS destruction. Delegates also considered two amendments proposed to address HFCs under the Protocol, one submitted by the US, Mexico and Canada, and another submitted by FSM.

COP 9/MOP 23: The Ninth Conference of the Parties (COP 9) and MOP 23 took place in Bali, Indonesia, in 2011, and adopted decisions on, *inter alia*: a US$450 million replenishment of the MLF for the 2012-2014 period; updating the nomination process and recusal guidelines for the TEAP; the treatment of ODS in relation to servicing ships; and additional information on alternatives. Delegates also discussed the two proposed amendments to the Protocol to address HFCs.

MOP 24: MOP 24 took place in Geneva, Switzerland, in 2012, and adopted decisions on, *inter alia*, the review by the Scientific Assessment Panel (SAP) of RC-316c, a CFC not controlled by the Montreal Protocol; procedural issues related to the TEAP and its subsidiary bodies; and data and compliance issues. MOP 24 did not reach agreement on two draft decisions on: clean production of HCFC-22 through by-product emission control; and an HFC amendment to the Montreal Protocol.

MOP 25: MOP 25 was held in Bangkok, Thailand, in 2013. The MOP adopted 21 decisions, including on: TOR for the study of the 2015-2017 MLF replenishment; implementation of the Montreal Protocol with regard to small island developing states; and a TEAP report on ODS alternatives. MOP 25 did not reach agreement on: amendment proposals; additional funding for the MLF for implementing the Montreal Protocol to maximize the climate benefit of the accelerated phase-out of HCFCs; and the harmonization and validation of the climate impact fund.

COP 10/MOP 26: COP 10/MOP 26 was held in Paris, France, in 2014, and adopted decisions on, *inter alia*: a US$507.5 million replenishment of the MLF for the 2015-2017 period; availability of recovered, recycled or reclaimed halons; and a TEAP report on ODS alternatives. Delegates also discussed possible ways to move the HFC issue forward, deciding to convene a two-day workshop in 2015, back-to-back with an additional OEWG session, to continue discussions on HFC management, including a focus on high-ambient temperatures (HAT) and safety requirements, as well as energy efficiency.

MOP 27: Held immediately after the two-day resumed session of OEWG 36, MOP 27 met from 1-5 November 2015, in Dubai, United Arab Emirates. Delegates adopted a number of substantive and procedural decisions. These included: essential-use and critical-use exemptions (EUEs and CUEs); avoiding the unwanted import of products and equipment containing or relying on HCFCs; the budget; and membership of Montreal Protocol bodies for 2016.

The two-day resumed session of OEWG 36 agreed on a mandate for a contact group on the feasibility and ways of managing HFCs (HFC Management Contact Group). The Contact Group was established at MOP 27 and met throughout the week. Following protracted negotiations that concluded in the early hours of Friday morning, parties adopted the Dubai pathway on HFCs (Dubai pathway), a "roadmap" for negotiating an HFC amendment including provisions for an additional OEWG meeting and an extraordinary MOP (ExMOP) in 2016.

OEWG 37: OEWG 37 convened in Geneva, Switzerland, from 4-8 April 2016. Delegates heard an update from the TEAP on ODS alternatives. The remainder of the meeting focused on the work of the HFC Management Contact Group, under the mandate outlined in the Dubai pathway on HFCs. Parties concluded a first review of the challenges listed in the mandate, including discussing a conference room paper (CRP) on funding issues, reaching an "in principle" agreement on an exemption for countries with HAT conditions as part of an HFC amendment, which includes the definition of HAT. OEWG 37 was suspended with a view to generating solutions to challenges at a resumed session.

RESUMED OEWG 37, OEWG 38 AND EXMOP 3: OEWG 37, OEWG 38 and ExMOP 3 convened back-to-back in Vienna, Austria from 15-23 July 2016.

The resumed session of OEWG 37 continued its discussions on the feasibility and ways of managing HFCs. It concluded its work on generating solutions to the stated challenges contained in the Dubai pathway.

OEWG 38 considered, *inter alia*: the report by the TEAP on updated and new information on ODS alternatives; the TEAP 2016 report; issues related to exemptions under Article 2 of the Protocol; and the TOR for the study on the 2018-2020 MLF replenishment. Parties also continued work in the HFC Management Contact Group, starting consideration of the four amendment proposals from North America, the Island States, India and the European Union. As parties were unable to conclude their work, OEWG 38 was suspended, to be concluded immediately prior to MOP 28.

ExMOP 3 considered issues contained in the Dubai pathway. The meeting convened a ministerial roundtable entitled "Moving Forward to Deliver in 2016 on the Mandate of the Dubai Pathway on HFCs." Parties also heard national statements and updates

on the work of the HFC Management Contact Group. Delegates adopted a decision for the TEAP report to MOP 28 to assess the climate benefits and MLF financial implications of proposed HFC phase-down schedules.

MOP28 SUMMARY

PREPARATORY SEGMENT

OEWG 38 Co-Chair Paul Krajnik (Austria) opened the preparatory segment of MOP 28 on Monday, 10 October. Vincent Biruta, Minister of Natural Resources, Rwanda, reflected that the Protocol's long history of international cooperation and commitment had led to the phase-out of ODS. Biruta urged delegates to adopt an ambitious amendment on HFCs, saying such action could avoid up to half a degree of warming by the end of the century and up to a full degree of warming if accompanied by strong efforts to promote energy efficiency.

Tina Birmpili, Executive Secretary, Ozone Secretariat, thanked Amina Mohamed (Malaysia) and Blaise Horisberger (Switzerland) for their contributions to the process, noting their participation for the last time. She concluded by urging delegates to reach an amendment that will contribute to a healthier planet and people.

OEWG 38 Co-Chair Leslie Smith (Grenada) introduced the agenda (UNEP/OzL.Pro.28/1) and organization of work, which delegates adopted without amendment.

TEAP REPORT ON UPDATED AND NEW INFORMATION ON ODS ALTERNATIVES: OEWG 38 Co-Chair Smith introduced this item on Monday. TEAP Co-Chair Bella Maranion (US) noted that the updated report responds to comments on HAT criteria, and provides: further information on HFC production; updated tables for total, new manufacturing, and servicing demand; and new and updated information on the availability of alternatives for foam blowing agents, metered-dose inhalers (MDIs) and aerosols.

TEAP then highlighted, *inter alia*, that: the refrigerants and blends information remains unchanged compared to previous reports; the report provides a limited review of the OEWG 37 proposal to define HAT countries; and that completely avoiding HFC MDIs is not yet technically or economically feasible.

Responding to questions, TEAP explained difficulties in obtaining reliable data on: country-level HFC production; processing costs of HFCs vs. hydrofluoroolefins (HFOs); and regional availability and market penetration of alternatives. TEAP said projecting emissions from leaks will require further investigation. They underscored that parties have historically taken important decisions with incomplete information, stressing the Protocol's practice of regular reviews allows for updates.

Co-Chair Smith left the agenda item open and encouraged parties to engage in informal dialogue with the TEAP.

During Tuesday morning's plenary, Co-Chair Smith returned to this agenda item. The European Union (EU) thanked TEAP for the new segments on foam blowing agents, aerosol MDIs and the standards process, and expressed optimism that challenges on each will be overcome.

On Wednesday, Co-Chair Smith invited additional comments. Egypt stressed the need for the TEAP to research leakages in the refrigeration appliance manufacturing and maintenance industries and to investigate how to calculate and quantify these amounts. He also requested the TEAP to conduct additional research on the most appropriate refrigeration and air conditioning (RAC) alternatives, especially in situations where developing countries could expect to shoulder the economic burden. Noting no further interventions, Co-Chair Smith closed this agenda item.

TEAP REPORT ON ASSESSMENT OF THE CLIMATE BENEFITS AND FINANCIAL IMPLICATIONS OF THE HFC PHASE-DOWN SCHEDULES IN THE AMENDMENT PROPOSALS: Co-Chair Smith introduced this agenda item on Monday morning. TEAP Senior Expert Lambert Kuijpers outlined the definitions the TEAP had applied to the study, noting that some information in the report was based on closed informal discussions.

TEAP Co-Chair Maranion presented the following estimated climate benefits by 2050 for the four proposed non-Annex 5 phase-down schedules: 10,690 megatonnes (Mt) carbon dioxide equivalent (CO_2e) for the North American proposal; 11,500 Mt CO_2e for the EU proposal; 10,000 Mt CO_2e for the Indian proposal; and 12,470 Mt CO_2e for the Island States' proposal.

For the proposed Article 5 phase-down schedules, Maranion presented the following estimated climate benefits and costs to the MLF by 2050: 75,850 Mt CO_2e for the North American proposal, costing US$3,440-5,250 million; 53,260 Mt CO_2e for the EU proposal, costing US$5,580-8,540 million; 26,130 Mt CO_2e for the Indian proposal, costing US$9,300-14,220 million; and 74,890 Mt CO_2e for the Island States' proposal, costing US$4,550-6,950 million. She noted the report considers manufacturing conversion costs but not other costs such as those associated with project preparation, institutional strengthening, and capacity building.

Responding to questions, TEAP said it: used customary assumptions about leakage emissions; finds HFC consumption hard to forecast; did not calculate climate benefits for actions regarding HFC-23; did not calculate the climate impacts of the HAT proposal, which is not yet finalized; did not look at the impact of proposed late Article 5 baselines; and is aware of a recent report on the cumulative costs of an HFC phase-down, and is discussing internally whether this approach is an appropriate way to consider the amendment proposals.

TEAP also stated: it had not received guidance on taking equipment disposal costs into account in its calculations and would have to investigate if this calculation is possible; and that analyzing the climate benefits of the different proposals for individual regions and countries is "an enormous task."

Canada highlighted: more than 50 gigatonnes difference in cumulative CO_2e emissions between the different proposals; that considering interim targets would yield higher climate benefits; and cumulative environmental benefits need not imply cumulative costs. The EU stressed that a five-year phase-out delay implies a doubling of the annual HFC climate impact by 2030 and suggested that the EU proposal's climate benefits would have been higher, and costs lower, if the TEAP had adopted several different assumptions. Saudi Arabia underlined the need to consider the "bigger picture" and national circumstances.

During Tuesday morning's plenary, Co-Chair Smith recalled this agenda item had been left open to allow further reflection on the report. Saudi Arabia, supported by Argentina, Benin, Egypt, the Gambia, Jordan and Kuwait, called for all costs of conversion from HFCs to be estimated by the TEAP, and for disclosure of what factors are included in the calculations. Rwanda also requested additional financing information.

The US and Australia said that until parties define the scope of an amendment, it is difficult for the TEAP to provide exact figures. The US also underscored the TEAP's finding that early

reduction and freeze dates have the highest benefit and lowest cost. Mexico welcomed the report's estimates as a starting point, reflecting that the TEAP can refine its figures in the future.

OEWG 38 Co-Chair Krajnik closed this agenda item on Wednesday, as there were no further comments.

TEAP/SAP REPORT ON ANALYSIS OF THE DISCREPANCIES BETWEEN OBSERVED ATMOSPHERIC CONCENTRATIONS OF AND REPORTED DATA ON CTC: OEWG 38 Co-Chair Smith introduced this item on Monday. SAP Co-Chair Paul Newman (US) explained the recent Stratosphere-troposphere Processes and their Role in Climate (SPARC) report identifies four emission pathways that together account for 20 +/-5 gigagrams per year (Gg/yr) CTC, while observation-based estimates indicate 35 +/-15 Gg/yr, suggesting the CTC budget can be considered reconciled.

Newman said that SAP/TEAP recommendations include that parties: create a TEAP/SAP working group for estimating CTC emissions in support of their quadrennial assessments; hold a joint TEAP/SAP workshop to further evaluate emissions pathways and improve methodologies for estimating bottom-up CTC emissions; and request the Ozone Secretariat to forward the SPARC report's research suggestions to the Vienna Convention's Ozone Research Managers for consideration in their next report.

As there were no further comments, OEWG 38 Co-Chair Smith closed the agenda item.

OTHER MATTERS: On Tuesday morning, OEWG 38 Co-Chair Smith informed that the United Arab Emirates (UAE) had requested to make an intervention. The UAE said that his country has suspended its request to submit a CRP at MOP 28 but stated it will raise the UAE's eligibility for technical and financial support at MOP 29. He described the UAE's current and historic compliance with the Montreal Protocol, without any MLF assistance, despite its eligibility for such assistance. He underscored challenges related to the availability and feasibility of alternatives suitable for HAT countries, which he said will require additional and exceptional efforts that the UAE government cannot manage on its own. Saudi Arabia and Bahrain expressed support for the UAE's eligibility for financial and technical assistance.

Reminding delegates that this topic is not under discussion at this time, Co-Chair Smith proposed addressing it at the forthcoming OEWG and MOP. Delegates agreed.

HIGH-LEVEL SEGMENT

Acting MOP 27 President Lucie Desforges (Canada) opened the High-Level Segment (HLS), welcoming UNEP Executive Director, Erik Solheim, and President of Rwanda, Paul Kagame, to the "ozone family." She emphasized the time has come to deliver on the Dubai pathway and reach an agreement that works for all.

Solheim called on delegates to draw inspiration from the Montreal Protocol's history, reminding delegates the Protocol is the world's most successful environmental agreement and stressing that no one nation can address HFCs on its own. He urged delegates to be flexible but ambitious.

President Kagame urged delegates to be ambitious and not only seek to "get an amendment done," but to do it well. He noted that prior Protocol controls were imposed without sacrificing economic progress and posited that the same would prove true for HFCs. He urged including action toward significantly improving energy efficiency in appliances using coolants in the amendment.

Organizational Matters: The MOP 28 Bureau was elected by acclamation as follows: as President, Vincent Biruta (Rwanda); as Vice Presidents, Abdulbasit Sairafi (Saudi Arabia), Andrei Pilipchuk (Belarus), and Elias Gómez Mesa (Dominican Republic); and as rapporteur, Mikkel Sørensen (Denmark).

Delegates adopted the agenda (UNEP/OzL.Pro.28/1) without amendment. Plenary agreed to the organization of work as outlined by MOP 28 President Biruta.

Credentials of Representatives: On Thursday, MOP 28 President Biruta requested parties to submit credentials for inspection by the Bureau. On Friday afternoon, the Ozone Secretariat reported that the Bureau had approved the credentials of representatives from 95 out of a total of 142 countries represented at the meeting. He noted that the Bureau had agreed to provisionally approve the participation of 47 other parties who had not submitted credentials, on the understanding that these parties would provide their credentials as soon as possible. He urged parties attending future meetings to make best efforts to submit their credentials, noting that non-submission could lead to preclusion from full participation, including the right to vote.

PRESENTATIONS BY THE ASSESSMENT PANELS ON PROGRESS IN THEIR WORK AND ANY EMERGING ISSUES: This agenda item was addressed on Thursday afternoon. SAP Co-Chairs David Fahey (US) and Bonfils Safari (Rwanda) provided an overview of the ongoing 2018 assessment, which is currently in preparation, noting that it will address, *inter alia*, the reappearance of the Antarctic ozone hole in 2016 and the TEAP/SAP CTC budget analysis. Fahey noted topics previously addressed will be updated, and highlighted the expected recovery of global ozone to 1980 levels by mid-century, stressing future projections will depend on actions by parties on control of substances.

Environmental Effects Assessment Panel (EEAP) Co-Chair Janet Bornman (Australia) presented updates from the Panel that respond to party requests at MOP 27. She highlighted that ozone model simulations under different greenhouse gas (GHG) emission scenarios indicate different trends in UV radiation, with UV radiation increasing in some regions and producing a range of effects on human health, natural ecosystems and agriculture. EEAP Co-Chair Nigel Paul (UK) described additional effects from UV exposure, including on aquatic ecosystems and changes in plastics and wood materials.

TEAP Co-Chair Ashley Woodcock (UK) presented for TEAP, highlighting, *inter alia*: the International Civil Aviation Organization (ICAO) has approved a requirement to replace halons in cargo bays in all new aircraft designs by 2024; CFC phase-out in MDIs will be achieved in 2016; and the Russian Federation will phase out CFC solvents in aerospace applications in 2016, completing the global phase-out.

PRESENTATION BY THE MLF EXCOM CHAIR ON THE WORK OF THE MLF EXCOM, THE MLF SECRETARIAT AND THE FUND'S IMPLEMENTING AGENCIES: On Thursday, Agustin Sánchez Guevara (Mexico), Chair, MLF ExCom, presented the Report of the ExCom since MOP 27 (UNEP/OzL.Pro.28/10), highlighting the MLF's decisions, activities and achievements, and noting funding approval for 142 HCFC Phase-out Management Plans (HPMPs), 14 Stage II HPMPs, an HCFC production phase-out management plan for China, and 144 country surveys of ODS alternatives.

MINISTERIAL ROUNDTABLE: Towards an Agreement on an HFC Amendment under the Montreal Protocol Addressing the Remaining Issues: On Thursday, this ministerial

roundtable, moderated by Johnston Barkat, UN Assistant Secretary-General and UN Ombudsman, took place. The roundtable session featured statements and a panel discussion.

An in-depth summary of Thursday's Ministerial Roundtable is available at: http://www.iisd.ca/vol19/enb19130e.html

Ensuring benefits for all: On Friday, MOP 28 President Vincent Biruta opened the session, with delegates observing one minute of silence in memory of King Bhumibol Adulyadej of Thailand.

Moderator Johnston Barkat invited panelists to consider why an HFC amendment is important to them, and how such an amendment can benefit everyone.

Noting the environment knows no boundaries, Batio Bassière, Minister of Environment, Burkina Faso, stressed the need to consider future generations and vulnerable peoples. Andrew Yatilman, Director, Office of Environment and Emergency Management, FSM, highlighted GHG reduction, energy efficiency and Sustainable Development Goal benefits from an HFC phase-down.

Martha Garcíarivas, Under-Secretary for Environmental Protection, Mexico, outlined potential economic advantages from an HFC phase-down and highlighted the important role of the MLF. Hakima El Haite, Minister of the Environment, Morocco, highlighted benefits from preventing 0.5°C temperature rise including with regard to mitigating: sea level rise, forced migration and food insecurity.

Jayadev Joshi, Minister of Population and Environment, Nepal, stressed the need for: assurances the MLF would provide support to developing countries; and commercially-viable and environmentally-friendly alternative technologies. Vidar Helgesen, Minister of Climate and Environment, Norway, said challenges in negotiating the amendment "are imminently solvable," and stressed benefits to all if there is an early and fast HFC phase-down. Helgesen further stressed energy efficiency measures could help to prevent a full degree of global warming.

Norbert Kurilla, State Secretary, Slovakia, called for an agreement that: includes an early phase-down commencement; ensures inclusivity and ownership of all parties; and provides for flexibility that respects and addresses differences effectively.

Responding to moderator Barkat's question about the implications of a failure to agree on an HFC amendment in Kigali, panelists stated that signals on climate change need to be consistent, meaning a failure in Kigali could: pose a huge risk to the climate process; possibly damage the Paris Agreement's credibility; and create hesitancy among investors to make key investments to combat climate change. Panelists underscored that all parties win if there is an amendment, the momentum built up by recent decisions that address GHG emissions, such as those by the International Maritime Organization and ICAO, should be built upon, and "failure is not an option."

STATEMENTS BY HEADS OF DELEGATION: On Thursday and Friday, ministers and other heads of delegation addressed the plenary. John Kerry, US Secretary of State, described the adoption of an amendment on HFCs as the single biggest action to address climate change this year. He emphasized his country's commitment to an agreement on HFCs, and to invest in the outcomes, including through financial and technical assistance. He concluded by urging delegates to "bet on the future of the planet and human ingenuity" by adopting an ambitious HFC amendment in Kigali.

Malaysia said an amendment should recognize the need for financial assistance for Article 5 parties. Sri Lanka urged for an amendment to recognize the special needs of developing countries. Luxembourg announced that his country will provide additional resources to the MLF to assist developing countries in implementing any HFC commitments agreed.

Costa Rica said her country's membership in the High Ambition Coalition has motivated it to take every opportunity possible to limit global GHG emissions, including adopting an ambitious HFC amendment.

Ethiopia urged delegations not to leave Kigali without ensuring a better future. Indonesia encouraged parties to show further flexibility on baselines, formulas, phase-down schedules, and financial support.

Samoa stressed the need for capacity building in the RAC sector and noted concerns related to the fisheries industry. FSM noted issues remained to be resolved but expressed confidence that an HFC phase-down would be the Montreal Protocol's next success. Italy warned that, without an HFC amendment, past and ongoing climate efforts would be undone.

Mauritius expressed satisfaction with the openness that had characterized the previous days' deliberations, saying transparency and consensus have become trademarks of the ozone process.

Canada noted movement towards an ambitious but feasible amendment and announced her country's readiness to host MOP 29 in Montreal for the HFC amendment's first anniversary and thirtieth anniversary of the Protocol.

Japan said the amendment should allow parties to choose in which sectors they continue to use HFCs, alternatives should be chosen on the basis of energy efficiency and safety and not just global warming potential (GWP), and all financing for HFC amendment implementation should be as efficient and effective as possible.

Afghanistan expressed hoped for adoption of an amendment in 2016 that has a 2017 baseline, a 2024 freeze date and a "reasonable" phase-down schedule for Article 5 countries. Maldives requested assistance in adopting low-GWP alternatives to HCFCs, particularly in the fisheries sector.

The International Institute of Refrigeration urged coordinating efforts to phase down HFCs with other international energy initiatives, as RAC energy consumption and efficiency is key for any energy strategy.

An in-depth summary of Thursday's statements is available at: http://www.iisd.ca/vol19/enb19130e.html

CLOSING PLENARY: The final plenary session resumed as the Preparatory Segment plenary at 1:00 am on Saturday morning, after the HFC Management Contact Group ended its work on Friday evening and allowed time for parties to consult on the draft amendment text and address other outstanding agenda items. Parties initially addressed the draft amendment text, which continued until 6:54 am. The Preparatory Segment and HLS, respectively, then approved and adopted the "Kigali Amendment." The Preparatory Segment plenary then approved the other outstanding CRPs.

The HLS plenary then reconvened and considered the draft report and compilation of decisions of MOP 28 (UNEP/OzL.Pro.28/L.1, UNEP/OzL.Pro.28/L.1/Add.1 and UNEP/OzL.Pro.28/L.2). On Friday afternoon, it had approved and adopted sections of the MOP 28 report, where possible.

After going through the remainder of the documents section-by-section, delegates adopted the documents with minor corrections.

EU thanked Lambert Kuijpers, retiring member of the Refrigeration, Air-Conditioning and Heat Pumps TOC and TEAP, for his important contribution over many years.

MOP 28 President Biruta, noting the adoption of the reports and decisions, as well as the achievement of adopting the Kigali Amendment, closed the HLS at 8:05 am, exclaiming "we have done it!"

MOP 28 OUTCOMES

Unless otherwise stated, all draft decisions submitted for MOP 28's consideration are contained in document UNEP/OzL.Pro.28/3 and were adopted on Saturday morning. The final decisions can be found in document UNEP/OzL.Pro.28/L.2.

ADMINISTRATIVE MATTERS: Consideration of Membership of Montreal Protocol Bodies for 2017: On Monday, OEWG 38 Co-Chair Krajnik requested parties to submit their nominations for membership of the 2017 ImpCom and MLF ExCom, as well as for the OEWG 39 Co-Chairs, referring delegates to document UNEP/OzL.Pro.28/2. OEWG 38 Co-Chair Smith reminded delegations on Wednesday to submit their nominations so that these could be forwarded to the HLS.

The HLS adopted the nominations on Saturday morning.

Members of the Implementation Committee: In its decision (XXVIII/[BB]), the MOP confirms the positions of Bangladesh, Canada, Haiti, Kenya, and Romania as members of the ImpCom for one further year. The MOP also selects Republic of Congo, Georgia, Jordan, Paraguay, and UK as members of the Committee for a two-year period beginning on 1 January 2017.

The MOP also notes the selection of Brian Ruddie (UK) to serve as President and Marindany Kirui (Kenya) to serve as Vice President and Rapporteur of the Committee for one year beginning on 1 January 2017.

Members of the MLF ExCom: In its decision (XXVIII/[CC]), the MOP decides to endorse Australia, Austria, Belgium, Germany, Japan, Slovakia, and US as members of the MLF ExCom representing non-Article 5 parties. It also endorses the selection of Argentina, Bosnia and Herzegovina, Cameroon, China, Lebanon, Mexico, and Nigeria as members representing Article 5 parties.

It also notes the selection of Paul Krajnik (Austria) to serve as Chair and Mazen Hussein (Lebanon) to serve as Vice Chair for one year beginning 1 January 2017

Co-Chairs of the OEWG: In its decision (XXVIII/[DD]), the MOP endorses the selection of Cindy Newberg (US) and Cheikh Ndiaye Sylla (Senegal) as Co-Chairs of OEWG 39.

Financial report of the Trust Fund and Budgets for the Montreal Protocol: On Monday, OEWG 38 Co-Chair Krajnik invited parties to indicate their interest in participating in a committee to review proposed budgets (UNEP/OzL.Pro.28/4, UNEP/OzL.Pro.28/4/Corr.1 and UNEP/OzL.Pro.28/4/Add.1) and prepare a draft decision. The Budget Committee met throughout the week, chaired by Ives Enrique Gómez Salas (Mexico) and Jean Clarke (Ireland).

On Saturday morning, Budget Committee Co-Chair Clarke introduced the draft decision, noting that the Committee had approved Option 2 in the Secretariat's paper and recommended the CRP for adoption and approval by the MOP. The HLS adopted the decision.

Final Outcome: In its decision (UNEP/OzL.Pro.28/CRP.8), the MOP decides to, *inter alia*:

- approve the revised 2016 budget in the amount of US$6,772,162 and the 2017 budget of US$5,355,004;
- reaffirm that a working capital reserve shall be maintained at 15% of the annual budget to meet the final expenditures under the Trust Fund, noting such a reserve shall be in the amount of US$803,251 for 2017 and a proposed reserve for 2018 of US$824,779;
- approve total contributions to be paid by the parties of US$4,276,933 for 2016 and US$5,756,630 for 2017;
- take note of the contributions of US$5,910,915 for 2018 as set out in the annex to the MOP 28 report, noting that the contributions of individual parties for 2017 and indicative contributions for 2018 are also listed in this annex;
- note with concern that a number of parties have not paid their contributions for 2016 and prior years and urge those parties to pay both their outstanding contributions and their future contributions promptly and in full, particularly as the Fund balance has been significantly depleted;
- request the Executive Secretary and invite the MOP President to enter into discussions with any party whose contributions are outstanding for two or more years with a view to finding a way forward, requesting that the Executive Secretary report to MOP 29 on the outcome of these discussions;
- further consider how to address outstanding contributions to the Trust Fund at its next meeting and request the Executive Secretary to continue to publish and regularly update information on the status of contributions to the Protocol's Trust Funds;
- invite parties to provide additional voluntary contributions to the Trust Fund "Support of the Activities of the Ozone Secretariat" for any unbudgeted meetings;
- encourage parties to contribute to the Trust Fund "Support of the Activities of the Ozone Secretariat" with a view to ensuring the full and effective participation of Article 5 parties in the MOP and the OEWG;
- encourage parties and other stakeholders to contribute financially and by other means to assist the members of the assessment panels and their subsidiary bodies to ensure their continued participation in the assessment activities under the Protocol; and
- request the Secretariat to indicate in future financial reports of the Trust Fund the amounts of cash on hand in the section entitled "Total reserves and fund balances" in addition to contributions that have not yet been received.

ISSUES RELATED TO EXEMPTIONS UNDER ARTICLES 2A–2I OF THE MONTREAL PROTOCOL: Nominations for EUEs for 2017: On Monday, OEWG 38 Co-Chair Smith introduced the single EUE nomination for 2017 (UNEP/OzL.Pro.28/3, draft decision XXVIII/[A]) from China for 65 metric tonnes of CTC, reminding delegates that it was discussed at OEWG 38. Delegates agreed to forward the draft decision to the HLS, where it was adopted Friday afternoon without amendment.

Final Outcome: In its decision (XXVIII/[A]), the MOP authorizes the proposed 65 metric tonnes of CTC and:

- encourages China to complete revision of its relevant national standard on testing of oil, grease and total petroleum hydrocarbons in water and to ensure that a revised national standard is brought into force as soon as possible; and
- requests China, prior to submitting any further requests for EUEs for use of ODS in the testing of oil, grease and total petroleum hydrocarbons in water, to provide information on: its evaluation of the use of other international analytical methods for such testing; the national circumstances that make using them difficult; progress in developing its own method and in revising the relevant national standard; and a timeline for phasing out CTC for laboratory and analytical uses.

Nominations for CUEs for 2017 and 2018: On Monday, OEWG 38 Co-Chair Smith introduced nominations for CUEs (UNEP/OzL.Pro.28/2/Add.1), noting five parties had submitted seven nominations for methyl bromide CUEs.

The Methyl Bromide Technical Options Committee (MBTOC) presented its recommendations for the five parties plus two emergency use nominations, one from Israel for museum artifacts and one from Jamaica for a flour mill. The MBTOC expressed concern that Article 5 parties may not be reporting all stocks and that only one party had provided a national management plan. South Africa, Canada and Australia described their efforts to reduce methyl bromide use, and indicated interest in working in a small group on the draft decision on CUEs.

On Wednesday, Argentina, Australia, Canada, China, and South Africa submitted UNEP/OzL.Pro.28/CRP.4 on this agenda item. Australia explained that the CRP followed the format of past MOP decisions on CUEs and reflected MBTOC recommendations. After the EU requested more time to reflect on the CRP, Co-Chair Smith encouraged interested parties to consult informally. On Friday the HLS approved a revised CRP (UNEP/OzL.Pro.28/CRP.4/Rev.1) resulting from the consultations.

Final Outcome: In its decision (UNEP/OzL.Pro.28/CRP.4/Rev.1), the MOP permits, for the agreed critical use categories for 2017 and 2018 for each party and subject to relevant conditions, the levels of production and consumption for 2017 and 2018 that are necessary to satisfy critical uses.

It further decides that:

- parties shall endeavor to license, permit, authorize, or allocate quantities of methyl bromide for critical uses as listed in Table A of the annex;
- each party that has an agreed CUE shall renew its commitment to ensuring that the relevant criteria are applied in licensing, permitting or authorizing critical uses of methyl bromide; and
- each party shall report on the implementation of the decision to the Ozone Secretariat by 1 February for the years that the decision applies.

The annex decision contains two tables. Table A lists agreed critical use categories for Australia (strawberry runners) for 2018, and Argentina (strawberry fruit and tomatoes), Canada (strawberry runners), China (ginger) and South Africa (mills and structures) for 2017. Table B sets out corresponding permitted levels of production and consumption.

TOR FOR THE STUDY ON THE MLF 2018–2020 REPLENISHMENT: OEWG 38 Co-Chair Smith introduced this item (UNEP/OzL.Pro.28/2, Annex) on Monday, announcing that the relevant contact group would meet before plenary returned to this item.

The Contact Group convened on Tuesday, co-chaired by Obed Baloyi (South Africa) and Philippe Chemouny (Canada). Co-Chair Baloyi recalled that parties had completed two readings of the TOR at OEWG 38 in July 2016, and invited "creative views" on how to resolve the remaining outstanding issues.

Delegates disagreed as to whether to refer to the special needs of small and medium-sized enterprises (SMEs) in the context of agreed control measures, with one country highlighting that Article 5 parties have many such enterprises whose needs should be considered. Several others noted this issue is addressed in the ExCom's guidelines. Parties were also unable to agree on whether to refer to Article 5 parties' meeting their 2020 "and 2025" compliance obligations with respect to Article 2F (HCFCs) of the Protocol, with some suggesting the relevant sub-paragraph be deleted. The question of whether reference should be made to "full" support for low-GWP alternatives remained unresolved. One Article 5 party supported referencing low "or zero" GWP alternatives.

During a report to plenary on Wednesday, Co-Chair Baloyi requested additional time to allow the Contact Group to continue its work and further requested that the group's meetings not be held in parallel with meetings of the Budget Committee. OEWG 38 Co-Chair Krajnik indicated these requests would be accommodated.

Parties continued their reading of the draft TOR on Wednesday afternoon. They continued to disagree on whether to delete a sub-paragraph on allocating resources to enable Article 5 parties to meet their 2020 and 2025 compliance obligations with respect to Article 2F, with one party supporting its retention given significant challenges faced by Article 5 countries. Delegates were also unable to agree on whether to retain a paragraph on the need to allocate sufficient resources for activities in the servicing sector in HPMPs. Some noted a decision by the ExCom renders this paragraph obsolete while others stressed the importance of this issue for certain Article 5 countries.

Co-Chair Chemouny encouraged delegates to ensure the TOR are not used "as an opportunity to make new policy recommendations." He said the Co-Chairs would consult Article 5 countries not present to enable a decision on whether to delete references to the years 2020 and 2025. Co-Chair Baloyi noted that more time would be requested to finalize the decision and encouraged delegates to meet bilaterally to resolve outstanding issues.

The Contact Group reconvened Friday morning. Delegates supported deleting a sub-paragraph on the need to allocate sufficient resources to activities in the servicing sector of HPMPs given the recent ExCom decision. After some deliberation, delegates agreed to a new sub-paragraph on provision by the TEAP of indicative figures of the resources required for phasing out HCFCs that could enable Article 5 parties to encourage the use of low or zero GWP alternatives, to replace bracketed text on this topic. Co-Chair Chemouny proposed introducing a placeholder paragraph on HFCs, pending agreement on an amendment, to which delegates also agreed.

The Contact Group met to finalize the decision on Friday evening. Following agreement of the HFC Management Contact Group, delegates were able to agree to inclusion of a paragraph on enabling Article 5 countries to carry out initial activities related to the phase-down of HFCs. They also agreed to retain a reference to SMEs and on other outstanding issues. Co-Chair Baloyi thanked delegates for their commitment and work in Vienna and Kigali.

Reporting on the Contact Group's work during the closing plenary on Saturday morning, Co-Chair Chemouny said the draft decision's guidance to the TEAP is roughly in line with past decisions for similar studies. He noted the draft requests a comprehensive estimate of the 2018-2020 MLF replenishment, taking into account key party considerations, and addresses control measures related to HFC phase-down. He introduced a minor oral amendment. Parties then agreed to forward the draft decision to the HLS.

Final Outcome: In the final decision (UNEP/OzL.Pro.28/CRP.9), the MOP decides, *inter alia*:

- to request the TEAP to prepare a report for submission to MOP 29, and to submit it through OEWG 39, to enable MOP 29 to take a decision on the appropriate level of the 2018-2020 MLF replenishment;

- that, in preparing the report, the TEAP should take into account, *inter alia*: all control measures and relevant decisions agreed upon by parties, in particular those pertaining to the special needs of low volume- and very-low-volume-consuming countries, in addition to SMEs; the need to allocate resources to enable all Article 5 parties to meet and/or maintain compliance with Articles 2A–2E (CFCs, halons, other fully integrated CFCs, CTC, and methyl chloroform), 2G (hydrobromofluorocarbons), 2H (methyl bromide), 2I (bromochloromethane) and 2J (HFCs) of the Protocol; as well as the need to allocate resources to enable all Article 5 parties to meet compliance obligations relevant in the 2018-2020 replenishment period with respect to Article 2F of the Protocol;
- that the TEAP should provide indicative figures of the resources within the estimated funding required for phasing out HFCs that could be associated with enabling Article 5 parties to encourage the use of low- or zero-GWP alternatives, and indicative figures for any additional resources that would be needed to further encourage the use of low- or zero-GWP alternatives;
- the need for additional resources to enable parties operating under paragraph 1 of Article 5 to carry out initial activities related to the phase-down of HCFCs listed under Annex F and controlled under Article 2J; and
- that the TEAP should provide indicative figures for the periods 2021-2023 and 2024-2026 to support a stable and sufficient level of funding, on the understanding that those figures will be updated in subsequent replenishment studies.

PROPOSAL TO ESTABLISH AN *AD HOC* STANDARDS COORDINATION GROUP: OEWG 38 Co-Chair Krajnik introduced this agenda item (UNEP/OzL.Pro.28/3, draft decision XXVIII/[B]) on Monday. Delegates agreed to a request from China that a further exchange of views be held before the draft decision was forwarded to the HLS. Informal consultations were held on Tuesday.

Krajnik invited a report-back on Tuesday's discussions during Wednesday morning's plenary. China said many delegates had proposed amendments, noting numerous issues remained to be resolved. She requested more time for additional deliberations.

During Saturday morning's closing plenary, President Biruta invited China to report on progress. China said the CRP had been through several rounds of discussion and had been finalized. He expressed hope that the joint efforts of governments, industry, standard bodies, and other stakeholders would allow standards barriers to be removed as soon as possible. Delegates agreed to forward the decision to the HLS for adoption.

Final Outcome: In the final decision (UNEP/OzL.Pro.28/CRP.7), the MOP aims to support the timely revision of standards for flammable, low-GWP refrigerants and zero-GWP and low-GWP refrigerants that are alternatives to HCFCs and HFCs, and decides to, *inter alia*:

- request the TEAP to: establish a task force to: liaise with standards organizations to support the timely revision of the IEC 60335-2-40 standard and ensure that the requirements for categories are revised synchronously; submit a report on safety standards relevant for low-GWP alternatives to OEWG 39; and provide relevant findings to the standards bodies;
- request the Ozone Secretariat to organize a workshop on the safety standards relevant to the safe use of low-GWP alternatives back-to-back with OEWG 39 within existing resources;
- urge parties to consult and work with their industries and standards bodies to support the timely completion of the processes of developing new standards, harmonizing existing standards and revising current standards with a goal of completing these efforts by the end of 2018;
- invite parties to submit information on their domestic safety standards relevant to the use of low-GWP flammable refrigerants to the Ozone Secretariat by the end of 2016; and
- request the MLF's ExCom to consider maintaining or increasing the Fund's technical and capacity-building assistance with a view to improving cooperation between national authorities in charge of Protocol implementation and national and regional standards committees.

COMPLIANCE AND DATA REPORTING ISSUES: On Monday, ImpCom President Iftikhar-ul-Hassan Gilani (Pakistan) reported on the 56th and 57th ImpCom meetings (UNEP/OzL.Pro.28/9/Add.1-UNEP/OzL.Pro/ImpCom/57/2/Add.1), highlighting the ImpCom's "light agenda" due to widespread compliance. He presented three draft decisions (UNEP/OzL.Pro.28/CRP.1/Rev.3) on: non-compliance with its data and information reporting obligations by Israel; data and information provided by the parties in accordance with Article 7 of the Protocol; and non-compliance by Guatemala in 2014 with Montreal Protocol provisions governing consumption of HCFCs. Delegates agreed to forward the draft decisions to the HLS, where they were adopted on Saturday morning without amendment.

Final Outcome: All three final decisions are contained in UNEP/OzL.Pro.28/CRP.1/Rev.3. In its decision on **the non-compliance of Israel**, the MOP notes with concern that Israel has not:

- reported on its use of controlled substances as process agents in 2014 and 2015; and
- provided the information required under paragraph 3 of decision XXII/20 (Treatment of stockpiled ODS) on the measures in place to avoid the diversion to unauthorized uses of 17.3 ODP-tonnes of excess production of bromochloromethane stockpiled in 2014.

The MOP also:

- expresses its concern about Israel's repeated failure to respond to the requests for information recorded in ImpCom recommendations 55/4, 56/5 and 56/7;
- requests Israel to submit this information to the Secretariat no later than 31 March 2017; and
- requests the ImpCom to review Israel's situation at its 58th meeting.

In its decision on **data and information** provided by the parties in accordance with Article 7 of the Montreal Protocol, the MOP:

- notes with concern that Iceland, Israel and Yemen have not reported their 2015 data as required under Article 7 of the Montreal Protocol;
- urges the three countries to report the required data as quickly as possible, and urges Yemen, where appropriate, to work closely with the implementing agencies in reporting the required data; and
- requests the ImpCom to review the situation of the three parties at its 58th session.

In its decision on **non-compliance in 2014 by Guatemala** with Montreal Protocol provisions governing HCFC consumption, the MOP:

- notes that despite Guatemala's revision of its 2013 data, it remains in non-compliance for 2013;

- notes that Guatemala's data corrections for 2013 and 2014 will not change any of the benchmarks already agreed in decision XXVI/16;
- notes that Guatemala's 2015 data indicates the country has already returned to compliance with Protocol control measures;
- urges Guatemala to work with the relevant implementing agencies to implement the remainder of the plan of action in decision XXVI/6; and
- requests the ImpCom to continue monitoring Guatemala's progress in implementing the plan of action, and, to the extent that it works towards meeting the specific Protocol control measures, treat Guatemala in the same manner as a party in good standing, including by allowing Guatemala to continue to receive international assistance to meet commitments.

TEAP MEMBERSHIP: On Monday, OEWG 38 Co-Chair Smith said Brazil and India had submitted TEAP membership nominations and recommended these countries take the lead in preparing a CRP for parties' consideration. Delegates agreed. During plenary on Wednesday morning, Smith informed delegates that a CRP has been submitted and said plenary would return to the issue once parties had had time to review the CRP.

During Saturday morning's closing plenary, MOP 28 President Biruta noted that Brazil had coordinated with the US, India and other countries on TEAP membership, and that nominations for Brazil, Georgia, India, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, and the US could be found in UNEP/OzL.Pro.28/CRP.6. The UK noted his country's nomination of Adam Chattaway to Co-Chair the Halons Technical Options Committee (HTOC), replacing David Catchpole. Delegates agreed to forward the draft decision as amended by the UK for adoption.

Final Outcome: In the final decision (UNEP/OzL.Pro.28/CRP.6), the MOP decides to thank the TEAP for its outstanding reports and the individual members of the Panel for their outstanding service and dedication. The MOP further decides to endorse the following four-year appointments: Rajendra Shende (India) as TEAP Senior Expert; Paulo Altoé (Brazil) as Co-Chair of the Flexible and Rigid Foams TOC; and Daniel Verdonik (US) as Co-Chair of the HTOC. Bella Maranion (US) is appointed TEAP Co-Chair for an additional four-year term. Adam Chattaway is appointed HTOC Co-Chair.

ISSUES RELATED TO THE HCFC PHASE-OUT: On Monday, OEWG 38 Co-Chair Krajnik introduced this issue. Canada informed that a small group of parties will submit a CRP. The UAE said his country may submit a CRP and requested time for consultation.

Recalling that the agenda item is in relation to a decision on issues faced by non-Article 5 countries, the US requested clarification from Saudi Arabia and the UAE. Saudi Arabia responded that the HFC Management Contact Group is considering baselines calculated using both HCFC and HFC components.

Co-Chair Krajnik suggested postponing discussion until the CRPs are available.

On Tuesday, Co-Chair Krajnik said that Australia, Canada, Japan, and the US had submitted a CRP (UNEP/OzL.Pro.28/CRP.3).

On Saturday morning, Canada informed her country had met informally with several parties to discuss the document and had submitted UNEP/OzL.Pro.28/CRP.3/Rev.1. Co-Chair Krajnik proposed forwarding the CRP to the HLS for adoption, to which delegates agreed.

Final Outcome: In its decision (UNEP/OzL.Pro.28/CRP.3/Rev.1) the MOP decides to, *inter alia*: request the TEAP, in relation to Annex C, Group I, substances:

- to continue to assess sectors, including subsectors, if any, where essential uses for non-Article 5 parties may be needed after 1 January 2020, including estimations of the volumes of HCFCs that may be needed;
- to continue to assess the servicing requirements for RAC equipment and any other possible needs in other sectors between 2020 and 2030 for non-Article 5 parties; and
- to continue to review recent volumes of production of each of the HCFCs to satisfy basic domestic needs, and to make projected estimates of such future production and estimated needs of Article 5 parties to satisfy basic domestic needs beyond 1 January 2020.

The MOP also requests the TEAP to invite parties to provide relevant information to the Ozone Secretariat by 15 March 2017 for inclusion in the TEAP's assessment; and requests the TEAP to submit its report to OEWG 39 in 2017.

AVAILABILITY OF RECOVERED, RECYCLED OR RECLAIMED HALONS: On Monday, OEWG 38 Co-Chair Smith introduced this issue, noting there had been no submissions. He suggested closing the agenda item. Delegates agreed.

DATES AND VENUE FOR MOP 29: On Friday morning, Canada offered to host MOP 29 in Montreal, the birthplace of the Protocol and home of the MLF. She reminded delegates that Canada hosted the MOP during the Protocol's 10th and 20th anniversaries and that 2017 would be the Protocol's 30th anniversary.

MOP 28 President Biruta said the Secretariat would consult with Canada about dates and insert them into the draft decision (UNEP/OzL.Pro.28/3, Draft decision XXVIII/[EE]) before conveying it to the HLS for adoption.

Delegates did not revisit the decision during the closing plenary.

DUBAI PATHWAY ON HYDROFLUOROCARBONS

Negotiations on the Kigali Amendment took place under this agenda item. The majority of discussions took place in the HFC Management Contact Group, co-chaired by Patrick McInerney (Australia) and Xia Yinxian (China), which met throughout the week. A number of small group and informal discussions, as well as Article 5 and non-Article 5 party consultation sessions also took place. The Contact Group established a Legal Drafting Group (LDG), facilitated by Brian Ruddie (UK), to draft legal text in parallel to the Contact Group discussions to allow legal text to be reviewed and approved as negotiations progressed.

Discussions began on Monday morning, with a report from the Co-Chairs on progress. The MOP then asked the Contact Group to continue its deliberations. During the week, the MOP also referred a number of CRPs for consideration by the Contact Group, including on energy efficiency, ExCom guidelines related to an HFC amendment, and consideration of HFCs not listed as controlled substances.

The HFC Management Contact Group ended its work on Friday evening, after which parties were afforded the time to review the draft amendment text before the final plenary session. During the final plenary session, participants reviewed the amendment text article-by-article. The Contact Group concluded its work in the early hours of Saturday morning, forwarding the proposed amendment to the MOP 28 HLS for adoption.

This section summarizes the discussions that took place during MOP 28 and the principal elements of the Kigali Amendment. Discussion is organized by topic, in order of amended articles.

PREAMBLE: The US proposed a text addition on recognizing the adoption of an amendment to address adverse climate effects from the transition to ODS, similar to the preamble reference in the Dubai pathway. Following questions, the US withdrew its proposal and requested it be noted in the meeting report.

ARTICLE 1 (DEFINITIONS): MOP 28 updated this article to reflect the inclusion of HFCs as listed in Annex F.

ARTICLE 2J (HFCS): The Kigali Amendment amends Article 2 (Control Measures) to include reference to HFCs, as well as to include a new sub-article, Article 2J on HFCs. Within this sub-article, a number of issues are addressed, including baselines and freeze dates. These aspects are further discussed below.

Baselines: On Monday evening, the Contact Group discussed the non-Article 5 proposal for baselines. Some Article 5 parties questioned why there was not scope for more ambition. In response, several non-Article 5 parties explained what they felt the proposal went as far as possible. The Russian Federation said a 2018 baseline year for non-Article 5 parties is not reasonable for countries like his and Belarus because entry into force and adoption of implementing regulations would require three years.

In the Tuesday contact group session, Kuwait, for Article 5 parties, proposed a two-track baseline set for Article 5 parties, one averaging consumption for the years 2020, 2021 and 2022, the other averaging consumption for the years 2024, 2025 and 2026.

The US and Switzerland sought clarity on certain aspects of the Article 5 proposal. China explained that Article 5 parties have very diverse positions and that having two baselines would allow each country to make a choice appropriate to its national circumstances. She said China considers 2020-2025 to be a reasonable timeframe, and that Argentina and Brazil have agreed to reach the baseline earlier than 2023. With regard to the HCFC component in baselines, she noted the same principles cannot be applied to Article 5 and non-Article 5 parties.

The EU said non-Article 5 parties are willing to consider a two-track approach for Article 5 parties but need more information before they can embrace the concept.

Brazil, supported by South Africa, said Article 5 countries had made progress in narrowing baseline years to two options, and other details, such as baseline components and freeze years, have not been disclosed because Article 5 parties are still negotiating them.

Canada expressed concern about the two-track baseline year proposal, saying it is difficult to negotiate without knowing which countries would opt for which baseline year. He added such clarity would help in understanding potential climate benefits.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL. Pro.28/CRP/11 and CRP/10), the MOP decides most non-Article 5 parties will use a baseline averaging their calculated levels of HFC consumption for the years 2011, 2012, and 2013, plus 15% of their baseline consumption of HCFCs.

The decision and its annex state that Belarus, the Russian Federation, Kazakhstan, Tajikistan, and Uzbekistan will use a baseline averaging their calculated levels of HFC consumption for the years 2011, 2012 and 2013, plus 25% of their baseline consumption of HCFCs.

The decision and its annex state that most Annex 5 parties will use a baseline averaging their calculated levels of HFC consumption for the years 2020, 2021, and 2022, plus 65% of their baseline consumption of HCFCs.

The decision and its annex state that Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the UAE will use a baseline averaging their calculated levels of HFC consumption for the years 2024, 2025, and 2026, plus 65% of their baseline consumption of HCFCs.

Freeze Date: During Tuesday's contact group deliberations, China said there should be at least two years between freeze and baseline dates. The EU said that non-Article 5 parties are willing to explore a two-year delay between a baseline year and freeze date. The Russian Federation said a freeze would not be possible for his country and Belarus until 2021.

During Friday's contact group deliberations, Indonesia said his country had a mandate, achieved through a national stakeholder consultation, including with industry, to agree on a freeze date for 2025. He emphasized that he would not block consensus but requested the Contact Group reflect his country's position in the meeting report.

Thailand supported a freeze date of 2025, expressing concern that its industry would not be ready by 2024. The EU thanked Indonesia and Thailand for their flexibility in reaching consensus, observing that the 65% baseline component aims to help countries to be able to comply. Cambodia preferred retaining 2025 as a freeze date.

In response to a question from the US, Co-Chair McInerney noted that a number of the amendment proposals address HFC-23 emissions and requested a single proposal. China, supported by the US, suggested controlling HFC-23 by 1 January 2020. The US requested the LDG to apply the control measures on a facility basis. India and Argentina expressed interest in working with the LDG to develop appropriate language.

During Saturday morning's plenary discussion, Indonesia reiterated its position on freeze dates, stressing it prefers 2025 and requesting its position be reflected in the MOP 28 report. Co-Chair McInerney confirmed this statement, and similar statements by Thailand and Cambodia, would be reflected in the report.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL. Pro.28/CRP/11 and CRP/10), the MOP decides on a freeze year of 2024 for most Article 5 parties, and a freeze year of 2028 for Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and UAE. No freeze is set for non-Article 5 countries.

Phase-down schedules: The phase-down schedules were discussed as a "package deal" with baselines and freeze dates, which were accepted by all parties.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL. Pro.28/CRP/11 and CRP/10), the MOP decides to have two baselines each for non-Article 5 and Article 5 parties. The majority of non-Article 5 parties will have the following phase-down schedule:

- 2019 to 2023: 90%
- 2024 to 2028: 60%
- 2029 to 2033: 30%
- 2034 to 2035: 20%
- 2036 and thereafter: 15%

The decision and its annex provide that the second group of non-Article 5 parties, which includes Belarus, the Russian Federation, Kazakhstan, Tajikistan, and Uzbekistan, will have the following phase-down schedule:

- 2020 to 2024: 95%
- 2025 to 2028: 65%
- 2029 to 2033: 30%
- 2034 to 2035: 20%
- 2036 and thereafter: 15%

The decision and its annex provide that the majority of Article 5 parties will have the following phase-down schedule:

- 2024 to 2028: 100%
- 2029 to 2034: 90%
- 2035 to 2039: 70%
- 2040 to 2044: 50%
- 2045 and thereafter: 20%

The decision and its annex provide that the second group of Article 5 parties, i.e., Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and UAE, will have the following phase-down schedule:

- 2028 to 2031: 100%
- 2032 to 2036: 90%
- 2037 to 2041: 80%
- 2042 to 2046: 70%
- 2047 and thereafter: 15%

Basic Domestic Needs: During Friday's contact group deliberations, the US proposed the LDG include Basic Domestic Needs provisions in the agreement, to which delegates agreed.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP decides that in order to satisfy the basic domestic needs of Article 5 parties, these countries' calculated levels of production may exceed that limit by up to 10% of calculated production levels of controlled substances in Annex F.

Emissions of substances generated as a byproduct: On Saturday morning, the US suggested adding "through leakage" after emissions. Following consultations, Switzerland proposed adding "process vent does not exceed zero" after the "period thereafter." The US requested clarification on how a process has emissions of zero. Switzerland responded the process vents themselves have zero emissions. Saudi Arabia expressed concern that zero emissions would be costly for manufacturers.

Final Outcome: In its decision on the Further Amendment of the Montreal Protocol and its annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP decides that each party manufacturing Annex C Group I or Annex F substances shall ensure that for the twelve-month period commencing 1 January 2020, and in each twelve-month period thereafter, its calculated level of emissions of Annex F, Group II substances generated as a byproduct in each production line that manufactures Annex C, Group I or Annex F substances does not exceed 0.1% of the mass of Annex C, Group I or Annex F substances manufactured in that production line during the same twelve-month period.

HFC-23: On HFC 23 as a by-product, Switzerland proposed adding: "Each party manufacturing Annex C Group 1 or Annex F substances shall ensure that for the 12-month period commencing on 1 January 2020 and each 12-month period thereafter its emissions of Annex F Group II substances generated as a byproduct in each production line that manufactures Annex F Group II substances are destroyed with the technology approved by the parties in the same 12-month period." The EU asked to delete "as a byproduct." The US proposed adding at the end of the paragraph: "should be destroyed to the extent practicable using approved technology."

Final Outcome: Delegates agreed to the proposed changes.

ARTICLE 3 (CALCULATION OF CONTROL LEVELS): During Saturday morning's plenary, Belarus questioned the feasibility of measuring an emission level as precisely as 0.1% and suggested further discussions were necessary on the relevant paragraph. LDG Facilitator Ruddie suggested replacing the world "baseline" with the phrase "calculated level of." Belarus proposed "consumption level" as alternative wording.

Final Outcome: In its decision on the Further Amendment of the Montreal Protocol and its annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP updates the preambular text to include references to HFCs. It also includes text stating that emissions from Annex F, Group II substances generated in each facility that generates HCFCs or HFCs by including, among other things, amounts emitted from equipment leaks, process vents and destruction devices, but excluding amounts captured for use, destruction or storage, are also included.

The MOP further states that when calculating levels, expressed in CO2e, of production, consumption, imports, exports, and emissions of substances as listed in Annex F and HCFCs for the purposes of Article 2J, paragraph 5*ter* of Article 2, and paragraph 1(d) of Article 3, each party shall use the GWPs of these substances as specified in Annexes C and F.

ARTICLE 4A (CONTROL OF TRADE WITH NON-PARTIES): During Saturday morning's discussions, China requested further explanation on an article on trade with non-parties, noting her country's understanding that the date of entry into force regarding trade with such parties should be five years after the relevant article enters into force for Article 5 parties. India supported this reading.

The US also confirmed this understanding, noting that this paragraph additionally allows Article 5 parties an extra year to put regulations in place. India said this extra year is not required given the freeze dates for Article 5 parties of 2024 and 2028.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP updates Article 4 to include reference to HFCs.

ARTICLE 4B (LICENSING): During Friday's contact group deliberations, Co-Chair McInerney asked the group to decide on the date on which licensing systems would come into play. Belarus noted a difference in the wording on licensing systems and requested discussing the topic in plenary. The US affiliated itself with the EU dates of 2019 and 2021, to which other delegates also agreed.

Final Outcome: In the decision on Further Amending the Montreal Protocol and its accompanying annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP decides to include a paragraph, inserted after paragraph 2 of Article 4B (Licensing) of the Protocol, stating that each party shall, by 1 January 2019 or within three months of the date of entry into force of the paragraph, whichever is later, establish and implement a system for licensing the import and export of new, used, recycled and reclaimed controlled substances in Annex F.

The paragraph also states that non-Article 5 parties not in a position to establish and implement such a system by 1 January 2019 may delay taking those actions until 1 January 2021.

ARTICLE 5 (SPECIAL SITUATION OF DEVELOPING COUNTRIES): In this article, the MOP included text stating that, in order to meet basic domestic needs and subject to any adjustments made to the control measures in Article 2J, the majority of Article 5 parties shall be entitled to delay its compliance with the control measures as follows:

- 2024 to 2028: 100%
- 2029 to 2034: 90%
- 2035 to 2039: 70%
- 2040 to 2044: 50%
- 2045 and thereafter: 20%

The remainder, namely Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the UAE, may modify those measures as follows:

- 2028 to 2031: 100%
- 2032 to 2036: 90%
- 2037 to 2041: 80%
- 2042 to 2046: 70%
- 2047 and thereafter: 15%

Parties may also, for the purposes of calculating their consumption baseline, be entitled to use the average of its calculated levels of consumption and production of Annex F controlled substances for the years 2020, 2021, and 2022, plus 65% of its baseline consumption of Annex C, Group I controlled substances

Parties may decide that an Article 5 party may, for the purposes of calculating its consumption baseline, be entitled to use the average of its calculated levels of consumption and production of Annex F controlled substances for the years 2024, 2025, and 2026, plus 65% of its baseline consumption of Annex C, Group I controlled substances.

These paragraphs will apply to calculated levels of production and consumption save to the extent that a high ambient temperature exemption applies based on criteria decided by the parties.

Exemption for HAT Countries: In its Friday deliberations, the Contact Group tasked the LDG with converting the agreed HAT exemption from the Vienna solutions into legal text.

Final Outcome: In its decision on Further Amendment of the Montreal Protocol (UNEP/OzL.Pro.28/CRP/11), the MOP decides:

- to make an exemption for parties with HAT conditions available, where no suitable alternatives exist for the specific sub-sector of use, as described below;
- to distinguish and separate this exemption from the EUEs and CUEs under the Montreal Protocol;
- to make this exemption effective and available as of the HFC freeze date or other initial control obligation, with an initial duration of four years;
- to apply this exemption for sub-sectors contained in Annex I for parties with an average of at least two months per year over 10 consecutive years with a peak monthly average temperature above 35°C, where the party has formally notified the Secretariat of its intent to use this exemption no later than one year before the HFC freeze date or other initial control obligation, and every four years thereafter should it wish to extend the exemption;
- that any party operating under this HAT exemption will report separately its production and consumption data for the sub-sectors to which a HAT exemption applies;
- that any transfer of production and consumption allowances for this HAT exemption will be reported to the Secretariat under Article 7 of the Protocol by each of the parties concerned;
- the TEAP and a TEAP subsidiary body that includes outside expertise on HAT will assess the suitability of HFC alternatives for use where suitable alternatives do not exist based on criteria agreed by the parties and can recommend to add or remove sub-sectors to Annex I, that will include, but not be limited to, the criteria listed in paragraph 1(a) of Decision XXVI/9, and report this information to the MOP;
- that this assessment will take place periodically starting four years from the HFC freeze date or other initial control obligation and every four years thereafter;
- to review, no later than the year following receipt of the first TEAP report on suitability of alternatives, the need for an extension of this exemption for a further period of up to four years, and periodically thereafter, for specific sub-sectors in parties that meet the criteria set out in paragraph 4 above, and that parties will develop an expedited process to ensure the renewal of the exemption in a timely manner where there are no feasible alternatives, taking into account the recommendation of the TEAP and its subsidiary body;
- that amounts of Annex F substances that are subject to the HAT exemption are not eligible for funding under the MLF while they are exempted for that party;
- that the ImpCom and MOP should, for 2025 and 2026, defer the consideration of the HCFC compliance status of any party operating under a HAT exemption in cases where it has exceeded its allowable consumption or production levels due to its HCFC-22 consumption or production for the sub-sectors listed in Annex I, on the condition that the party concerned is following the phase-out schedule for consumption and production of HCFCs for other sectors and has formally requested a deferral through the Secretariat; and
- to consider, no later than 2026, whether to extend the compliance deferral in paragraph 11 for an additional period of two years, and, if appropriate, to consider further deferrals thereafter, for parties operating under the HAT exemption.

ARTICLE 6 (ASSESSMENT AND REVIEW OF CONTROL MEASURES): This article was updated to include reference to those substances included under Annex F.

ARTICLE 7 (REPORTING OF DATA): In its annex to the decision on Further Amendment of the Montreal Protocol (UNEP/OzL.Pro.28/CRP/10), the MOP decides to insert text stating that non-Article 5 parties shall provide data for the years 2011 to 2013. The majority of Article 5 parties shall provide such data for 2020 to 2022. Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the UAE shall provide such data for 2024 to 2026. Each party shall also provide to the Secretariat statistical data of its annual emissions of Annex F, Group II controlled substances per facility in accordance with Article 3(d) of the Protocol.

ARTICLE 10 (FINANCIAL MECHANISM): In Friday's Contact Group deliberations, Co-Chair McInerney noted that the Russian Federation had requested this issue be dealt with in plenary to allow for translation. The US suggested language be simplified to state that a financial mechanism will be enabled to address those chemicals listed in Article 2J (HFCs). Co-Chair McInerney suggested tasking the LDG with the minimum amount of text needed for negotiation.

FSM said that his country favors simplified text such as that proposed by the US and suggested further discussion take place. India cautioned against discriminating between the two Article 5 country groups and requested clarity on what is defined as a financial mechanism, including whether this mechanism includes domestic funding. Co-Chair McInerney suggested, and delegates agreed, that the US, EU, FSM, Colombia, and India discuss and resolve this issue to enable further negotiation, in addition

to tasking the LDG to partially complete its work so that the minimum text needed to facilitate funding could be included to enable further negotiation.

During Saturday morning's plenary, the Russian Federation expressed concern about the lack of discussion on the scale of necessary finance to address HFCs and the consequences of such funding on the MLF and for countries. He proposed adding the following text to the first paragraph of Article 10 (Financial Mechanism): "Contributions to the MLF funding assigned for HFC-related activities shall be voluntary."

The EU said this proposal would undermine a very important part of the agreement. She stressed that non-Article 5 parties are willing to provide additional, sufficient financial resources, underscoring these resources were a condition for agreement on an amendment for many parties.

Co-Chair McInerney said both interventions would be reflected in the meeting report.

The Russian Federation, also on behalf of Belarus, Kazakhstan, Tajikistan and Uzbekistan, said this group would not insist on the inclusion of the text in Article 10 under the condition that the Russian Federation could explain the group's position before the beginning of the procedure of the examination of the amendment, and under the condition that the statement would be reflected in the meeting report.

Co-Chair McInerney agreed the Russian Federation could make his statement.

The Russian Federation, also on behalf of Belarus, Kazakhstan, Tajikistan and Uzbekistan, described the group's concern that the financial consequences of an adoption of an amendment had been insufficiently worked on. He highlighted that: HFCs do not have a destructive effect on the ozone layer and do not fall under the Protocol's mandate; discussion of an amendment became possible based on compromise consensus; and the regulation of HFCs by the Protocol will be based exclusively on voluntary contributions by parties. He further described the intention of the London Amendment on the establishment of the MLF, stressing its focus on ozone. Belarus underscored his country's support for the statement.

Final Outcome: In its decision on Further Amendment of the Montreal Protocol (UNEP/OzL.Pro.28/CRP/11), the MOP decides to recognize that the amendment maintains the MLF as the financial mechanism and that sufficient additional financial resources will be provided by non-Article 5 parties to offset costs arising out of HCFC obligations for Article 5 parties under this amendment;

The MOP also includes text under Article 10 stating that where an Article 5 party chooses to use funding from any other financial mechanism that could assist in meeting any part of its agreed incremental costs, that part shall not be met by the financial mechanism under Article 10 of the Protocol.

ARTICLES 17 (PARTIES JOINING AFTER ENTRY INTO FORCE): This article was updated to include reference to those substances included under Annex F.

ANNEX F (CONTROLLED SUBSTANCES): This annex has been added after Annex E of the Protocol.

List of Controlled Substances: On Wednesday, Co-Chair McInerney proposed opening discussion on the list of substances, noting some informal discussion had previously taken place. The US suggested, supported by FSM, informal discussions on the amendment's substances list to decide whether it should contain 19 or 22 substances. Belarus asked whether HFC-23 would be included in the list of controlled substances and in the calculation of baselines.

Australia, with Canada, expressed support for the North American and EU proposals to list HFCs in one annex with two groups, one of which would list HFC-23. She said her country does not consider listing hydrofluoroolefins (HFOs) as the right way forward since these function as alternatives to high- and very high-GWP HFCs. She noted openness to discussing the list with China.

FSM clarified his country's proposal to have two groups of substances. He noted that, under the proposal, the phase-down would apply to one group, while substances listed in the second group would require reporting, but would not be part of the HFC baseline and control measures.

Canada explained the rationale behind HFC-23 having its own group, as this substance would be subject to different control measures as part of an amendment.

Summarizing the discussions, Co-Chair McInerney noted there are a total of 22 HFCs across the four amendment proposals. He said there has been some suggestion that three HFOs should not be included and noted additional discussion on whether or not to include a number of other relatively low-GWP substances.

During Friday's afternoon contact group deliberations, China requested deleting HFC-161 from the list of controlled substances, noting its very low GWP. Co-Chair McInerney noted China's request and proposed bracketing the list of controlled substances.

On Saturday morning, during the final plenary session, China proposed deleting HFC-161 from the list. India stressed the text should state that HFOs will not be controlled. The EU asked if brackets on the list could be lifted. Co-Chair McInerney suggested bilateral discussions, following which China noted agreement that HFC-161 be deleted from the list. Parties agreed to retain HFC-23 as listed in Group II of Annex F.

Final Outcome: In the annex to its decision on Further Amending the Montreal Protocol (UNEP/OzL.Pro.28/CRP/10), the MOP decides to place 18 HFCs in Annex F, Group II of the table of controlled substances in Annex F, along with their respective 100-year GWP figures. HFC-23 is listed in Group II of Annex F.

GWP Values: On language on GWP values, the EU, following consultation with the Russian Federation, proposed adding the following text to the end of Annex C: "until a GWP value is included by means of the procedure in Article 2 (Control Measures)."

Final Outcome: Delegates agreed to include this amendment in Annex C.

Consideration of HFCs Not Listed as Controlled Substances in Annex F of the Protocol: During Tuesday's Contact Group, Switzerland introduced a CRP on the topic (UNEP/OzL.Pro.28/CRP.2), prepared with Norway. He said the CRP, *inter alia*: urges individual parties to discourage, at the national level, the development and promotion of HFCs with significant GWP that are not listed as controlled substances in Annex F; encourages parties to report on the existence of these HFCs, including on the likelihood of these substances' production and consumption; and requests the Secretariat to forward this information to the SAP and the TEAP, and request these panels to report to the MOP on such HFCs.

India suggested it was premature to discuss the CRP before an amendment is agreed. The US noted the type of reporting proposed in the CRP mirrors existing practice for unlisted ODS. The EU added that the draft decision would send an important signal to industry that non-listed HFCs will be monitored.

China requested Switzerland to consider postponing work on the CRP until after the amendment was agreed. Switzerland agreed that consideration of the CRP could be deferred to OEWG 39, requesting the evening's brief discussion be reflected in the MOP 28 report.

Final Outcome: The MOP agreed to defer this decision to OEWG 39.

OTHER MATTERS ADDRESSED UNDER THE DUBAI PATHWAY: Relationship with the UNFCCC: In Friday's Contact Group deliberations, Saudi Arabia urged specific reference to the relationship with the United Nations Framework Convention on Climate Change (UNFCCC) in the amendment text. India said the text should note that an amendment will not impose additional obligations under the Kyoto Protocol. The US, with FSM, suggested similar text to that advocated by India be included. Australia cautioned on nuances, suggesting that the LDG bear responsibility for drafting text. Delegates agreed.

Final Outcome: During the final plenary session, delegates agreed to Article III in the consolidated amendment text from the LDG stating that the Kigali Amendment is not intended to have the effect of excepting HFCs from the scope of the commitments contained in relevant articles of the UNFCCC or those of its Kyoto Protocol.

Entry-into-Force: In Friday's Contact Group deliberations, Co-Chair McInerney noted that the entry into force will be the same as the first control measure: January 2019. Belarus requested that this date be further discussed with translation and cautioned on a potential contradiction with previous articles. McInerney noted that the LDG will address the potential contradiction and report to plenary.

Final Outcome: In its decision on the Further Amendment of the Montreal Protocol and its annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP decides to include text under Article IV (entry into force) stating that Kigali Amendment shall enter into force on 1 January 2019, provided that at least 20 instruments of ratification, acceptance or approval of the Amendment have been deposited by states or regional economic integration organizations that are parties to the Montreal Protocol. It further states that if this condition has not been fulfilled by that date, the Amendment shall enter into force on the 90th day following the date on which the condition has been fulfilled.

The changes to Article 4 of the Protocol (control of trade with non-parties) set out in Article I of this Amendment shall enter into force on 1 January 2029, provided that at least 70 instruments of ratification, acceptance or approval of the Amendment have been deposited by states or regional economic integration organizations that are parties to the Montreal Protocol. In the event that this condition has not been fulfilled by that date, the control of trade with non-parties provisions of the Amendment shall enter into force on the 90th day following the date on which the condition has been fulfilled.

It further states that for purposes of the foregoing paragraphs, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by Member States of such an organization.

It also states that after the entry into force of this Amendment, the Amendment shall enter into force for any other party to the Protocol on the 90th day following the date of deposit of its instrument of ratification, acceptance or approval.

ExCom Guidelines: During Contact Group deliberations on Friday, India provided an overview of its CRP that it had introduced at the meetings held in Vienna in July (UNEP/OzL.Pro.WG.1/38/CRP.2), explaining that the paper tasks the ExCom with developing guidelines for the solutions. He noted that the intention is for the MOP to approve the guidelines within one to two years after the CRP's adoption. Canada suggested flexibility with timing, given that it is an important issue that may take some time. Australia noted that timing of approval is crucial. Co-Chair McInerney suggested interested parties discuss the CRP prior to the recommencement of plenary.

Final Outcome: In its decision on the Further Amendment of the Montreal Protocol and its annex (UNEP/OzL.Pro.28/CRP/11 and CRP/10), the MOP decides to request:

- the MLF ExCom to develop, within one year of the Kigali Amendment's adoption, guidelines for financing the phase-down of HFCs' consumption and production, including cost-effectiveness thresholds;
- the MLF ExCom Chair to report back to the MOP on the progress made in accordance with this decision, including on cases where ExCom deliberations have resulted in a change in the national strategy or the national technology choice submitted to the ExCom; and
- the MLF ExCom to revise the rules of procedure of the ExCom with a view to building in more flexibility for Article 5 parties.

The MOP also requests the MLF ExCom, in developing new guidelines on methodologies and cost calculations, to make the following categories of costs eligible and to include them in the cost calculation:

- for the consumption manufacturing sector: incremental capital costs; incremental operating costs; technical assistance activities; research and development, when required to adapt and optimize low-GWP or zero-GWP alternatives to HFCs; costs of patents and designs, and incremental costs of royalties, when necessary and cost-effective; and costs of safe introduction of flammable and toxic alternatives.
- for the production sector: lost profit due to shutdown/closure of the production facilities as well as production reduction; compensation to displaced workers; dismantling of production facilities; technical assistance activities; research and development related to the production of low-GWP or zero-GWP alternatives to HFCs with a view to lowering the costs of alternatives; costs of patents and designs or incremental costs of royalties; costs of converting facilities to produce low-GWP or zero-GWP alternatives to HFCs when technically feasible and cost-effective; costs of reducing emissions of HFC-23, a by-product from the production process of HCFC-22, by reducing its emission rate in the process, destroying it from the off-gas, or by collecting and converting to other environmentally-safe chemicals. Such costs should be funded by the MLF to meet the obligations of Article 5 parties.
- for the servicing sector: public awareness activities; policy development and implementation; certification programmes and training of technicians on the safe handling, good practice and safety of alternatives, including training equipment; training of customs officers; preventing illegal trade of hydrofluorocarbons; servicing tools; refrigerant testing equipment for the RAC sector; recycling and recovery of HFCs; additional import costs; and incremental cost of refrigerants for MVAC servicing/recharging.

Energy Efficiency: On Wednesday, during plenary, Co-Chair Smith noted that Rwanda and Morocco had submitted UNEP/OzL.Pro.28/CRP.5 on energy efficiency, which was referred to the HFC Management Contact Group for discussion.

During Friday's Contact Group, Rwanda introduced the draft Kigali Decision on Energy Efficiency (UNEP/OzL.Pro.28/CRP.5/Rev.1). She noted limited time available for discussion

but stressed the proponents' desire to reach agreement at MOP 28. She said the decision, *inter alia*: establishes a task force on emerging energy efficiency opportunities in the RAC sectors related to a transition to climate-friendly refrigerants; and requests the task force to assess information submitted by parties and to report to OEWG 39 in 2017.

The EU stated its intent to further discuss the draft CRP with Rwanda. Australia suggested the task force report to MOP 29, rather than OEWG 39, and that parties submit information by June 2017, rather than March 2017. The US informed that TEAP would like to take on this work without having to form a task force and proposed removing reference to the task force. Saudi Arabia expressed interest in further discussing the draft decision with Rwanda and other interested parties.

During Saturday morning's plenary, Rwanda introduced a revised version of the CRP (UNEP/OzL.Pro.28/CRP.5/Rev.3), "Kigali Decision on Energy Efficiency," saying that the CRP's proponents intend to come up with a review of the technology in the energy efficiency sector. She noted that the CRP incorporates parties' ideas and aims to have a meaningful assessment to present to MOP 29.

Qatar and Saudi Arabia urged adoption of the CRP. Bahrain requested postponing the decision to MOP 29 due to the late hour.

Rwanda stated that the review has been simplified to investigate national efforts, submissions will be on a voluntary basis, and the submissions would be compiled and presented to the MOP.

Following interventions from many parties in support of adopting of the decision, including Burkina Faso, Canada, Colombia, FSM, India, and Switzerland, Bahrain withdrew its objection. The MOP approved the decision as part of the amendment decisions.

Final Outcome: In its decision UNEP/OzL.Pro.28/CRP.5/Rev.3), "Kigali Decision on Energy Efficiency," the MOP:

- decides to request TEAP to review energy efficiency opportunities in the RAC and heat pump sectors related to a transition to climate-friendly alternatives, including not in-kind options;
- invites parties to submit, on a voluntary basis, relevant information on energy efficiency innovations in these sectors to the Ozone Secretariat by May 2017; and
- requests TEAP to assess the information submitted by parties on energy efficiency opportunities in the RAC sectors during the transition to low- and zero-GWP alternatives and to report to MOP 29.

Adoption of the Amendment: The amendment and its associated decisions were adopted as orally amended at 6:54 am on Saturday, 15 October.

Nigeria proposed, and President Birtuta agreed, to name the amendment the "Kigali Amendment to the Montreal Protocol." Stressing the importance of enhanced climate ambition and financial support, Micronesia announced his country would share a declaration supporting early phase-down action to which delegates could become signatories. Mexico, Marshall Islands, Fiji, Morocco, Costa Rica, Chile, Colombia and Burkina Faso expressed support for FSM's proposed declaration.

Colombia requested its support for ambitious action and concomitant financial support be captured in the meeting report. Many, including Kuwait, China, Saudi Arabia, and India, thanked the Co-Chairs of the HFC Management Group, the Ozone Secretariat and its Executive Secretary, Article 5 and non-Article 5 parties, and the Government of Rwanda for their efforts in securing an amendment.

The US highlighted the adoption of a "historic" agreement, saying parties had helped to protect the future of their children. Egypt recalled that negotiations on HFCs had begun in the African city of Port Ghalib, and now ended in the African city of Kigali. South Africa said that "together we can always do more." The EU said the Kigali amendment is feasible and starts the world off on a good footing in implementing the Paris Agreement. Switzerland highlighted his country's long-standing support for inclusion of HFCs under the Montreal Protocol.

A BRIEF ANALYSIS OF MOP 28

AGREEMENT AND PRIDE

"We have an amendment." With those words, participants at the 28th Meeting of the Parties (MOP 28) expressed both joy and relief that seven years of considering options and proposals to amend the Montreal Protocol on Substances that Deplete the Ozone Layer to enable it to address HFCs—a chemical with significant climate impacts but that is not traditionally considered an ozone-depleting substance (ODS)—had finally reached not only a positive conclusion but, in the words of one delegate, "an agreement that we will be proud of for the rest of our lives."

The road to Kigali has been neither short nor smooth, leading one sleepy Co-Chair to introduce the text as an "amendment that delegates have been working on for five years...I mean five days!" In the end, despite moments of near collapse and a nearly 24-hour marathon to finalize the details, the Kigali Amendment tackles a critical global challenge, provides room for ambition while achieving universal agreement, and honors the spirit of the Montreal Protocol by achieving consensus and relying on the wisdom of the Protocol's founders who allowed for both amendments and adjustments.

This brief analysis reflects on the process that led to the Kigali Amendment, including the role of compromise and concession in reaching agreement, and the Protocol's ability to "start and strengthen" its work. The analysis then reflects on what this historic achievement means for the future of the Montreal Protocol and the wider climate regime.

AMBITIOUS BUT UNIVERSAL

Parties first considered HFCs at MOP 21 in 2009 when the Federated States of Micronesia (FSM) and Mauritius introduced a proposal to amend the Protocol to address HFCs. After several years of discussion on whether the MOP should even form a contact group to consider discussion of a possible HFC amendment, parties reached agreement on the Dubai pathway at MOP 27. Under the Dubai pathway, parties to the Montreal Protocol agreed to work towards an amendment to phase down HFCs in 2016, an agreement that marked the beginning of the culmination of a process first set in motion in 2009. This pathway has been a "remarkable period in this treaty," with parties making incremental progress in overcoming their differences and ultimately drawing upon their creativity and trust in one another and the process to agree on an ambitious, balanced Kigali Amendment. Key agreements at the 37th meeting of the Open-ended Working Group (OEWG 37), OEWG 38 and the Third Extraordinary MOP (ExMOP 3) in July 2016 allowed parties to discuss and develop solutions on exemptions for high-ambient temperature (HAT) countries, financing, and other challenges on the road to Kigali. Most participants left Vienna confident that an amendment could be adopted but questioned how ambitious it would be.

Progress throughout 2016, combined with significant intersessional work by some countries and high-level statements such as the New York Declaration of the Coalition to Secure an Ambitious HFC Amendment just prior to MOP 28, set the stage in Kigali for the adoption of an amendment, even though key details still needed to be resolved. This optimism contributed to a sense of confidence among delegates that an agreement would be adopted that proved critical to keeping the process on track. Still, the slow progress at the resumed OEWG 38 and the first days of MOP 28 caused many to lose hope by Thursday night, when the Contact Group adjourned without even discussing critical outstanding and emerging issues, much less making progress towards their solutions. As one seasoned delegate commented, "We went to the brink, where we thought it would not happen, and we came back from there."

Several delegates underscored the role of ministers in helping parties to overcome tensions and disagreements and achieve an agreement in time. The presence of over 40 ministers, who pushed and encouraged negotiators to reach agreement during the High-Level Segment, also meant that negotiators could not stall by saying they needed to consult with their capitals. Others pointed to the significant number of informal and bilateral dialogues that took place during the week, underscoring that, while little progress appeared to occur in the Contact Group, real flexibility, creativity and compromise emerged from informal sessions, including several high-level bilaterals on Friday morning and an informal group on Friday evening that developed the final package.

Another delegate attributed the "extreme perseverance" shown by a few key Article 5 and non-Article 5 delegates as a critical component in reaching agreement. Many delegates simply continued working when all appeared lost, reaching deep within themselves to remain optimistic and find ways to be flexible. In the end, even some of the newer participants in the "ozone family," who were initially less familiar with the strength of the family's respect for the Protocol and trust in its institutions, appreciated the "hard time" their colleagues gave them when negotiating the amendment text, admitting this back-and-forth resulted in a stronger, balanced agreement.

"Now, I really understand what 'the ozone family' means," one non-Article 5 country reflected after the amendment's adoption, stressing, "I am proud to be in this family and part of this Kigali Amendment." Pride in the family and the family's achievements in reaching a consensus agreement was a common reflection among participants Saturday morning, reflecting delegates' desire to achieve an agreement with enough ambition that they could be proud, while also ensuring that the agreement did not leave anyone behind.

COMPROMISE AND CONCESSION

"We pushed ourselves to the maximum," to compromise everywhere that we could, one Article 5 party stressed as negotiations on the baseline, freeze dates and incremental steps concluded. As another Article 5 party put it, "everybody gave as much as they could." A third Article 5 party underscored, "always, our commitment is to ensure everyone is happy." In the end, although not all parties were completely satisfied, most praised the "spirit of compromise" that made reaching an agreement among 197 parties possible.

The baseline year was a key area of concession, with Article 5 parties managing to move from the six proposed groupings discussed at OEWG 38 and ExMOP 3 to two groups during the course of the week. Participants agreed to two Article 5 groupings, with most Article 5 parties following one set of baseline years and the Gulf Cooperation Council (GCC), India, Iran, Iraq and Pakistan opting for a later set of baseline years. Southeast Asian countries and the Like-minded Latin American countries both stressed they made concessions on the baseline. Southeast Asian countries strongly preferred a baseline of 2025 over 2024 but agreed to the package in order not to block consensus. Conversely, the Like-minded Latin American countries, as well as the African Group, the Island States and some others, preferred an earlier baseline and early action but agreed to the 2024 baseline to ensure that Article 5 countries were only grouped into two categories.

Parties also worked out a special arrangement for some non-Article 5 countries because Belarus, Kazakhstan, Russian Federation, Tajikistan, and Uzbekistan insisted an adjustment in the HCFC component of the baseline was necessary for any agreement. Delegates again demonstrated flexibility and creativity by agreeing to adjust the component of the baseline designed to account for a period in which conversion from HCFCs to HFCs may have taken place, known as "the HCFC component," to 25% (instead of the 15% for the rest of non-Article 5 parties). They also allowed an adjustment to the early portion of the phase-down schedule to enable these countries to start with smaller and later cuts while catching up to the rest of non-Article 5 parties by 2029.

These divisions of two groups for Article 5 parties and two for non-Article 5 parties represents the first time the Protocol has ever had such a division, reflecting a recognition by parties that the world is now more nuanced than simply developed versus developing counties. The codification of this recognition into the amendment further underscores the ingenuity of negotiators in finding new and creative ways to bring all countries on board. The Legal Drafting Group (LDG), for instance, said the Protocol has never contained elements that allow for different groupings beyond Article 5 and non-Article 5, which meant the LDG also had to be creative in drafting the legal text for such compromises.

Compromise and concession was also necessary during Friday evening's HFCs Management Contact Group, where the Co-Chairs asked for, and received, parties' indulgence to intervene only where necessary to allow the group to complete its work in time to adopt the amendment. Many had hoped for more time in the Contact Group to discuss a number of key issues, ranging from the list of controlled substances to a proposed draft decision on energy efficiency. Instead, participants limited themselves to minimal discussion, allowing only one or two parties to speak on most issues in order to swiftly agree on needed amendments to the Protocol. The proponent of the draft decision on energy efficiency, for instance, limited her introduction of the decision by explicitly stating that she recognized the pressure parties were under to wrap up discussion and finalize amendment text. On the whole, such concessions characterized the work of the Contact Group, which proceeded through amendment text at a steady pace—or, in the words of one seasoned delegate, "at a pace necessary to make history."

Indeed, some challenges, including the list of controlled substances and GWP values, cut-off dates for eligible capacity, non-party trade provisions, and by-product emissions, among others, still remained as parties reconvened in the early hours of Saturday morning to read through the amendment text for the first time. Delegates once again showed a spirit of flexibility by generally agreeing not to raise additional issues but to either withdraw their concerns or postpone discussion until OEWG 39, MOP 29 or through other intersessional work. As Co-Chair

McInerney jokingly said, he himself learned, the "next time deal I with an amendment parties have been addressing for seven years, I will give them at least one day to prepare the text." The LDG deserves significant credit for preparing amendment text while the decisions were literally still being discussed. As one LDG member put it, such rapid progress was only possible because the members "speeded through everything," departing from the traditional legal ways of working.

STARTING AND STRENGTHENING

"In the end, all that matters is that we got started," one insider reflected, pointing to the Montreal Protocol's unique construction that allows for parties to both amend and adjust the Protocol. By agreeing on the Kigali Amendment, parties took a critical step in officially recognizing the need to control HFCs under the Montreal Protocol.

Others pointed to the Protocol's history of accelerating phase-out schedules and achieving phase-out of substances in advance of deadlines as reason for confidence that parties may phase down HFCs faster than initially agreed under the schedules in the Kigali Amendment. The Protocol's London, Copenhagen, Montreal, and Beijing Amendments and Adjustments have all tightened existing control schedules and added new controls. Although the US withdrew its proposed text on a technology review early Saturday morning, in the spirit of compromise, a few insiders stressed the TEAP is already mandated to do this type of work and expressed confidence that future TEAP reports may identify emerging technologies or options for tightening the existing control schedules.

During the closing plenary, many parties expressed support for early action and readiness to join the Micronesia Declaration, which calls on all parties to take early action, including as early as 2021, and appeals to non-Article 5 parties to work with Article 5 parties to explore ways forward, including by delivering financial support. Such support for early action suggests parties' intention to build on the success achieved on the road from Dubai to Kigali by taking early action or further strengthening agreed action. Similarly, the High Ambition Coalition, a coalition of over 100 developed and developing countries that seeks the highest level of ambition in combating climate change, represents another group that may push for and achieve phase-down of HFCs in advance of 2036, 2045, or 2047, the plateau date for non-Article 5, Article 5 Group 1 and Article 5 Group II countries, respectively.

COMMITMENT AND CONCLUSION

Perhaps one of the most important outcomes of the Kigali Amendment is the signal to the rest of the world on the continued relevance of the Montreal Protocol. By agreeing on an amendment to address HFCs, delegates sent a message that the Protocol is no longer just a chemicals treaty but instead a universal treaty with relevance for chemicals, climate change and energy efficiency. Moreover, by addressing a family of chemicals that are not ODS per se but have significant global warming potential, the ozone family demonstrated its willingness to take responsibility for the problems created by its actions and show what it means to play a leading role in working towards an environmentally sustainable world where no one is left behind, as called for by the 2030 Agenda for Sustainable Development. This expansion of the Protocol's scope and recognition of parties' responsibilities ensure the Protocol will be a critical player in the climate regime.

Throughout the week, many participants underscored that adoption of an amendment would be the single-most important action taken to address climate change in 2016 and a clear signal of support for strong implementation of the Paris Agreement, which commits nations to limiting global warming to 2°C and to pursue efforts to limit it to 1.5°C. By committing the world's largest producing countries to begin phase-down of HFCs two years earlier than they desired back in July, and allowing countries to begin early action, the Kigali Amendment has the potential to avoid up to 0.5°C of warming. As MOP 28 President Biruta highlighted, "Kigali shows the 1.5°C target is achievable."

The Kigali Amendment is one of several recent climate-related signals that instill hope that the world will avoid significant warming. It follows news that the Paris Agreement crossed its ratification threshold earlier than expected and will enter into force on 4 November, and the International Civil Aviation Organization (ICAO) reached agreement on a new standard to control GHG emissions from international flights.

The agreement to approve the Kigali Decision on Energy Efficiency further signals the potential for the Protocol to contribute to another significant global challenge. Since at least MOP 26, several parties have underscored that it would be a mistake to phase down HFCs in the refrigeration and air-conditioning sector without concurrently maintaining and improving gains in the energy efficiency of refrigeration and cooling equipment. Although the decision could be more ambitious, the agreement for analysis of actions by parties on energy efficiency "is a start and keeps energy efficiency" in the spotlight as an issue for possible later action," in the words of one seasoned observer.

As MOP 28 ended, one delegate, who admitted his hope and confidence wavered during the process, expressed "immense gratitude to be going home with such a great success," saying he was "so, so happy" to have achieved the Kigali Amendment. His sentiments speak for the ozone family, who persevered when all seemed lost, welcomed new and different members to the family with open arms, and concluded Saturday morning with pride in a treaty that they have believed in and strengthened.

UPCOMING MEETINGS

44th Session of the IPCC: The 44th session of the Intergovernmental Panel on Climate Change (IPCC-44) will discuss the outline of the Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related GHG emission pathways in the context of strengthening the global response to the threat of climate change, sustainable development and efforts to eradicate poverty. Other sixth Assessment Report (AR6) products under consideration are: the outline of the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; workshop on Climate Change and Cities; and an Expert Meeting on Mitigation, Sustainability and Climate Stabilization Scenarios. **dates:** 17-20 October 2016 **location:** Bangkok, Thailand **contact:** IPCC Secretariat **phone:** +41-22-730-8208/54/84 **fax:** +41-22-730-8025/13 **email:** IPCC-Sec@wmo.int **www:** http://www.ipcc.ch/

51st Meeting of the GEF Council: The Global Environment Facility (GEF) Council meets twice a year to approve new projects with global environmental benefits in the GEF's focal areas of biodiversity, climate change mitigation, chemicals and waste, international waters, land degradation, and sustainable forest management. The Council also considers the GEF's integrated approach programmes on: sustainable cities; taking deforestation out of commodity chains; and sustainability and resilience for food security in Sub-Saharan Africa. The Council also provides guidance to the GEF Secretariat and Agencies. The

Council meeting will be preceded by a consultation with civil society organizations. On 27 October the Council will convene as the 21st meeting of the Least Developed Countries Fund (LDCF) and Special Climate Change Fund (SCCF). **dates:** 24-27 October 2016 **location:** Washington D.C., US **contact:** GEF Secretariat **phone:** +1-202-473-0508 **fax:** +1-202-522-3240 **email:** secretariat@thegef.org **www:** http://www.thegef.org/gef/council_meetings

GEO-XIII: The 13th plenary session of the Group on Earth Observations (GEO-XIII) will, among other things, consider adoption of the Data Management Principles Implementation Guidelines. **dates:** 7-10 November 2016 **location:** St. Petersburg, Russian Federation **contact:** GEO Secretariat **email:** secretariat@geosec.org **phone:** +41-22-730-8505 **fax:** +41-22-730-8520 **www:** http://www.earthobservations.org

19th CCAC Working Group: The 19th CCAC WG will be the preparatory session for the eighth High Level Assembly (HLA), taking place on the margins of UNFCCC COP 22. **date:** 12 November 2016 (TBC) **location:** Marrakesh, Morocco **contact:** James Morris, Partnership & Programme Officer, CCAC Secretariat **phone:** +33-1-44-37-14-73 **fax:** +33-1-44-37-14-74 **email:** James.Morris@unep.org **www:** http://www.ccacoalition.org/en/events/19th-ccac-working-group-preparatory-session-8th-high-level-assembly

8th CCAC High Level Assembly: This event will take place on the margins of UNFCCC COP 22, and is expected to adopt a ministerial communiqué. **date:** 14 November 2016 (TBC) **location:** Marrakesh, Morocco **contact:** James Morris, Partnership & Programme Officer, CCAC Secretariat **phone:** +33-1-44-37-14-73 **fax:** +33-1-44-37-14-74 **email:** James.Morris@unep.org **www:** http://www.ccacoalition.org/en/events/8th-ccac-high-level-assembly

UNFCCC COP 22: During COP 22 of the UN Framework Convention on Climate Change (UNFCCC), parties will meet to, *inter alia*, address entry into force the Paris Agreement among other issues. **dates:** 7-18 November 2016 **location:** Marrakesh, Morocco **contact:** UNFCCC Secretariat **phone:** +49-228 815-1000 **fax:** +49-228-815-1999 **email:** secretariat@unfccc.int **www:** http://unfccc.int/

20th CCAC Working Group: The 20th CCAC WG and associated meetings will take place in Santiago, Chile. A science-policy dialogue will precede the WG meeting. **dates:** 24-28 April 2017 (TBC) **location:** Santiago, Chile **contact:** James Morris, Partnership & Programme Officer, CCAC Secretariat **phone:** +33-1-44-37-14-73 **fax:** +33-1-44-37-14-74 **email:** James.Morris@unep.org **www:** http://www.ccacoalition.org/en/events/20th-ccac-working-group

Basel COP-13, Rotterdam COP-8 and Stockholm COP-8: The 13th meeting of the COP to the Basel Convention, eighth meeting of the COP to the Rotterdam Convention and eighth meeting of the COP to the Stockholm Convention will convene back-to-back and include a high-level segment. The theme will be "A future detoxified: sound management of chemicals and waste." **dates:** 24 April – 5 May 2017 **location:** Geneva, Switzerland **contact:** BRS Secretariat **phone:** +41-22-917-8729 **fax:** +41-22-917-8098 **email:** brs@brsmeas.org **www:** http://synergies.pops.int/

Montreal Protocol OEWG 39: Montreal Protocol OEWG 39 will meet in July 2017, at a venue yet to be decided. **dates:** July 2017 **location:** TBC **contact:** Ozone Secretariat **phone:** +254-20-762-3851 **fax:** +254-20-762-0335 **email:** ozoneinfo@unep.org **www:** http://conf.montreal-protocol.org/

Vienna Convention COP 11 and Montreal Protocol MOP 29: The Vienna Convention COP 11 and Montreal Protocol MOP 29 will take place in 2017 in Montreal, Canada. **dates:** TBC **location:** Montreal, Canada **contact:** Ozone Secretariat **phone:** +254-20-762-3851 **fax:** +254-20-762-0335 **email:** ozoneinfo@unep.org **www:** http://conf.montreal-protocol.org/

For additional meetings, see http://climate-l.iisd.org/ and http://chemicals-l.iisd.org/

GLOSSARY

CFCs	Chlorofluorocarbons
CO2e	Carbon dioxide equivalent
CTC	Carbon tetrachloride
CRP	Conference room paper
CUEs	Critical use exemptions
EUEs	Essential use exemptions
ExCom	Executive Committee
FSM	Federated States of Micronesia
GHG	Greenhouse gases
GWP	Global warming potential
HAT	High ambient temperature
HCFCs	Hydrochlorofluorocabons
HFCs	Hydrofluorocarbons
HFOs	Hydrofluoroolefins
HLS	High-Level Segment
HPMP	HCFC Phase-out Management Plan
ICAO	International Civil Aviation Organization
ImpCom	Implementation Committee
LDG	Legal Drafting Group
MDIs	Metered dose inhalers
MLF	Multilateral Fund
MOP	Meeting of the Parties
ODS	Ozone-depleting substances
OEWG	Open-ended Working Group
RAC	Refrigeration and air conditioning
SAP	Scientific Assessment Panel
SMEs	Small and medium-sized enterprises
TEAP	Technology and Economic Assessment Panel
TOR	Terms of reference
UAE	United Arab Emirates
UNEP	UN Environment Programme
UV	Ultraviolet