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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
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**KEY CONSIDERATIONS FOR DEVELOPING A METHODOLOGY FOR ESTABLISHING
THE STARTING POINT FOR SUSTAINED AGGREGATE REDUCTIONS FOR THE
CONSUMPTION AND PRODUCTION SECTORS UNDER THE KIGALI AMENDMENT
(DECISION 81/67(e))**

INTRODUCTION

1. In October 2016, the Twenty-Eighth meeting of the Parties to the Montreal Protocol agreed to amend the Protocol and adopted decision XXVIII/2.¹ In paragraph 19 of that decision, the Executive Committee was requested 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.

2. At the time of the adoption of the Kigali Amendment, limited knowledge was available on the amount of Annex F substances produced and consumed by each Article 5 country, and their specific uses. Aggregated information on HFCs was provided in the reports prepared by the Technology and Economic Assessment Panel (TEAP) Task Force under decisions XXV/5 and XXVI/9, and in a scientific journal article.²

¹ Decision related to the amendment phasing down of HFCs.

² The TEAP Task Force reports include HFC consumption and production data and projections for each five-year period between 2010 and 2030. Velders et al. (2015) report provides information on future atmospheric abundances and climate forcings from scenarios of global and regional HFC emissions.

3. Additional information on HFC consumption has been made available in surveys of ODS alternatives conducted in 119 Article 5 countries³ in response to paragraph 4 of decision XXVI/9,⁴ which were submitted to the 80th meeting. The surveys provide disaggregated data on the level of consumption of HFCs and other alternatives to HCFCs. Although surveys were conducted in 82 per cent of Article 5 countries (119 out of 145), those countries' aggregate HCFC baseline represents only 25 per cent of the aggregate HCFC baseline of all the Article 5 countries.⁵

4. At the 81st meeting, the Executive Committee requested the Secretariat to prepare for the 82nd meeting a preliminary information document containing key considerations that could assist the Executive Committee in developing a methodology for establishing the starting point for sustained aggregate reductions under the Kigali Amendment for the consumption and production sectors, taking into account the discussions that had taken place at the 81st meeting (decision 81/67(e)).

Scope of the document

5. The Secretariat prepared the present document in accordance with decision 81/67(e). Accordingly, the document only provides relevant information and key considerations that could assist the Executive Committee to determine a methodology for establishing the starting point for sustained aggregate reductions in HFCs. It does not make any policy recommendation on the matter.

6. This document consists of the following sections and a recommendation:

- I Overview of sustained aggregate reductions in consumption of CFCs and HCFCs
- II HFC production and consumption in Article 5 countries
- III Sustained aggregate reductions in HFC consumption
- IV Key considerations in developing a methodology for establishing HFC starting points

Recommendation

7. In order to provide information relevant to determining a methodology for establishing the starting point for sustained aggregate reductions in HFCs, and as HFC baselines will be established⁶ by 2023 only for Article 5 group 1 countries⁷ and by 2027 for Article 5 group 2 countries,⁸ the present document provides an estimate of the HFC baselines for compliance, based on the consumption data contained in the reports by the TEAP Task Force. This information is provided for reference only and without prejudice to any policy decisions the Executive Committee may take and without prejudice to

³ Funding for 127 surveys was approved at the 74th (May 2015) meeting and the 75th (November 2015) meeting. Results from surveys in 119 countries were submitted to the 80th meeting (UNEP/OzL.Pro/ExCom/80/54), comprising 42 non-low volume consuming (LVC) countries and 77 from LVC countries.

⁴ To request the Executive Committee to consider providing additional funding to conduct inventories or surveys on alternatives to ODS in interested Article 5 parties upon their request.

⁵ The aggregate HCFC baseline of the 42 non-LVC countries represents only 24 per cent of the aggregate baseline of all non-LVC countries, while the aggregate HCFC baseline of the 77 LVC countries represents 91 per cent of the aggregate baseline of all LVC countries.

⁶ The Protocol currently requires Parties to report their HFC baseline, including Article 5 countries whose baseline may only be established several years from becoming a Party, within 6 months of becoming a Party. The Parties are currently considering how to address this issue (paragraphs 10 to 14 of document UNEP/OzL.Pro.30/8/Rev.1).

⁷ Group 1 countries: all Article 5 countries except for the 11 countries in group 2.

⁸ Group 2 countries: Bahrain, India, Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the United Arab Emirates.

Parties' actual baselines, which will be established once HFC consumption in the relevant baseline years is submitted to the Ozone Secretariat under Article 7 of the Protocol.

I. OVERVIEW OF SUSTAINED AGGREGATE REDUCTIONS IN CONSUMPTION OF CFCs AND HCFCs

8. At the 34th meeting in July 2001, the Executive Committee discussed proposals for implementing the framework on the objectives, priorities, problems and modalities for strategic planning of the Multilateral Fund during the compliance period. Further to a discussion in which several members expressed their wish for an agreed definition of sustained, permanent, aggregate reductions in production and consumption, the Executive Committee requested the Secretariat to prepare a document that included a definition of the starting point for determining the sustained reduction of ODS consumption of each Article 5 country (decision 34/66(a)).

Aggregate reductions in CFC consumption

9. Prior to the establishment of the starting point, a phase-out project funded by the Multilateral Fund could lead to a phase-out in consumption of CFCs at the relevant enterprise(s); however, that phase-out could be offset by increased consumption at new or other enterprises.

10. In response to decision 34/66(a), at the 35th meeting in December 2001, the Executive Committee considered a study on defining a starting point for determining the remaining ODS consumption eligible for funding by the Multilateral Fund.⁹ The study provided an analysis of Annex A Group I substances, CFCs, only, as they accounted for approximately 78 per cent of the total ODS consumption by Article 5 countries.¹⁰ Two possible approaches were analysed: one based on the established CFC baseline for compliance;¹¹ and the other based on the most recent CFC consumption.

11. In concluding its deliberations on the above-mentioned study, the Executive Committee decided,¹² *inter alia*, that further funding had to be predicated on a commitment by the country to achieve sustainable, permanent, aggregate reductions in consumption and production, as relevant. In determining their starting points, Article 5 countries could select one of the following two options:

- (a) The CFC baseline for compliance less the consumption associated with projects that had been approved, but not yet implemented, when the baselines were established, and new projects that had been approved since (Option 1); or
- (b) The latest reported CFC consumption (i.e., 1999 or 2000) less the consumption associated with projects that had been approved, but not yet implemented (Option 2).¹³

⁹ UNEP/OzL.Pro/ExCom/35/61.

¹⁰ Other controlled substances were either being funded on the basis of sectoral agreements (e.g. halon and methyl bromide) or their baselines for compliance had yet to be established (i.e., carbon tetrachloride and methyl chloroform).

¹¹ Average CFC consumption over the period 1995 to 1997. The baselines were established after September 1998, which was the deadline for reporting CFC consumption for 1997 under Article 7 of the Montreal Protocol.

¹² Decision 35/57.

¹³ For starting points established based on Option 2, one of the provisos relating to decision 35/57 stated as follows: "the Executive Committee may agree in exceptional cases to adjust the resulting baseline at the first instance a project from a country is considered, to take into account the demonstrated non-representative nature of the last year's consumption data for reasons such as clearly demonstrated stockpiling in the specific 12-month period, and/or national economic difficulties in the specific 12-month period" (UNEP/OzL.Pro/ExCom/35/67 and Corr.1).

12. In implementing this provision, the Executive Committee believed that all Article 5 countries should be treated equally.¹⁴ In provisos related to decision 35/57, the Executive Committee acknowledged that some future years' reported consumption could go above or below the levels that resulted from the agreed calculation, but if consumption numbers were to go above the resulting levels, such increases in consumption would not be eligible for funding. The starting point represented the maximum residual ODS that the Fund will pay to reduce, and existing Funds guidance related to eligibility of projects would be maintained in all respects.¹⁵ To avoid the scenario of phasing-in CFCs in established or new manufacturing facilities while phasing out CFCs in other existing production facilities the Executive Committee developed the starting point, which represented the maximum residual controlled substances that could be phased out using the financial resources of the Multilateral Fund, and therefore represented the maximum funding liability of the Fund.

13. For each Article 5 country, the starting point for sustained aggregate reductions in consumption eligible for funding was established as the aggregate consumption of each Annex A Group I substance, measured in ODP tonnes.¹⁶ The starting points were agreed three years after the CFC baselines for compliance had been established, and almost two years after the CFC production and consumption freeze of July 1999.¹⁷ At that time, the Executive Committee had already approved approximately US \$747 million for the phase-out of 113,000 ODP tonnes of CFCs used by 64 countries. The starting point for CFCs was therefore only established mid-way through the CFC phase-out.

Aggregate reductions in HCFC consumption

14. At the 60th meeting in April 2010, the Executive Committee adopted criteria for funding HCFC phase-out in the consumption sector in Article 5 countries.¹⁸ In line with the criteria, Article 5 countries submitting projects for the phase-out of HCFCs before the establishment of their baseline had to establish the starting point at the time of submission of such projects, on the basis of one of two options: the most recent HCFC consumption reported under Article 7; or the average consumption forecast for 2009 and 2010. The criteria also allowed for adjustments to the agreed starting points in cases where the baselines calculated using data reported under Article 7 of the Protocol were different from the consumption forecast for 2009 and 2010. As had been the case for CFCs, starting points for HCFC reductions were based on ODP tonnage. Similar to the CFC phase-out, the establishment of a cut-off date for HCFC-based manufacturing capacity helped ensure that additional consumption due to increased capacity established after the cut-off date would not be funded by the Multilateral Fund.

15. Different from CFCs, the majority of Article 5 countries had to establish their starting points for HCFCs prior to the time when their baselines for compliance had been established using data reported under Article 7 of the Protocol.¹⁹ Furthermore, individual starting points were established for each of the substances in Annex C Group I consumed by the country, rather than a single value for the starting point based on the aggregate consumption of all HCFCs. With regard to the consumption by eligible enterprises

¹⁴ Excerpt from decision 35/57(c).

¹⁵ UNEP/OzL.Pro/ExCom/35/67 and Corr.1.

¹⁶ CFC-11 and CFC-12 (both with an ODP value of 1.0) were the CFCs most commonly used by all Article 5 countries. CFC-113 and CFC-115, with ODP values of 0.8 and 0.6, respectively, were also used, to a lesser extent, in several Article 5 countries.

¹⁷ Based on information from 99 Article 5 countries (64 LVC countries and 35 non-LVC countries) available at the 35th meeting, the remaining unfunded CFC consumption amounted to 71,873 ODP tonnes (comprising 3,183 ODP tonnes for LVC countries and 68,690 ODP tonnes for non-LVC countries), representing approximately 49 per cent of their CFC baselines for compliance.

¹⁸ Decision 60/44.

¹⁹ Average HCFC consumption over the period 2009 to 2010. The baselines were established after September 2011, which was the deadline for reporting HCFC consumption for 2010 under Article 7.

of HCFC-141b contained in imported pre-blended polyols, which is not considered as a controlled substances and therefore does not count toward a country's HCFC consumption, the Executive Committee established conditions for funding such enterprises²⁰ in decisions 61/47, 63/15, 66/51²¹ and 68/42(c).²²

16. Notwithstanding that some Article 5 countries chose different years as the basis for determining their starting point, all Article 5 countries were treated equally as all countries were given the same options. In a number of cases, the Executive Committee agreed to adjust the starting points after they had been established, including to account for apparent stockpiles, in cases where the forecasted consumption for the baseline years was different from that reported under Article 7, and other cases.

17. Although Annex C Group I substances consisted of 40 different HCFCs, only 10 were consumed by Article 5 countries. Moreover, the consumption of three HCFCs, namely HCFC-22, HCFC-141b and HCFC-142b, represented 99.8 per cent of the total aggregate consumption baseline.

18. The established aggregate HCFC consumption baselines and starting points for each of the 10 HCFCs consumed by Article 5 countries are presented in Table 1.

Table 1. HCFC baselines for compliance and starting points by HCFC

HCFC	Baseline			Starting point (ODP tonnes)
	ODP tonnes	metric tonnes	(% of baseline)	
HCFC-123	46.8	2,337.3	(0.43)	30.2
HCFC-124	29.2	1,326.9	(0.25)	26.2
HCFC-141	0.5	13.4	(0.00)	0.9
HCFC-141b	11,864.4	107,858.0	(19.99)	10,738.4
HCFC-142b	2,158.2	33,202.6	(6.15)	2,016.8
HCFC-22	21,710.0	394,726.7	(73.15)	19,883.1
HCFC-225	1.2	30.3	(0.01)	2.8
HCFC-225ca	1.8	70.0	(0.01)	0.4
HCFC-225cb	0.7	20.9	(0.00)	0.7
Total	35,812.6	539,586.1	(100.0)	32,699.7
HCFC-141b in polyols*				600.5

* The average amount of HCFC-141b contained in polyols imported in 2007, 2008 and 2009. This amount is not reported under Article 7 of the Montreal Protocol.

19. Given the comparatively low ODP values of the three most commonly used HCFCs (0.055 for HCFC-22; 0.11 for HCFC-141b; and 0.065 for HCFC-142b) in relation to CFC-11 and CFC-12 (1.0 each), the aggregated HCFC baseline is approximately 15 times greater when calculated in metric tonnes than when calculated in ODP tonnes.

²⁰ The starting point for HCFC-141b contained in imported pre-blended polyols is the average tonnage used of HCFC-141b between 2007 and 2009.

²¹ To consider discounting from a country's starting point for aggregate reductions in HCFC consumption the amount or average amount of HCFC-141b contained in pre-blended polyols exported for the year or years on which the starting point had been based.

²² To encourage relevant Article 5 countries to consider establishing a national system for recording the amounts of HCFC-141b contained in pre-blended polyols imported and/or exported (where applicable) to support the ban on imports of pure HCFC-141b, as well as that contained in pre-blended polyols, to be issued once all the foam enterprises had been converted, and to facilitate monitoring of these enterprises to sustain the phase-out of HCFC-141b.

II. HFC PRODUCTION AND CONSUMPTION IN ARTICLE 5 COUNTRIES

20. The TEAP Task Force's reports provide global data on the most commonly produced HFCs and data on the most commonly consumed HFCs, aggregated into Article 5 countries and into non-Article 5 countries.

Global HFC production

21. Aggregate global production of HFCs in 2015 was estimated at 314,515 metric tonnes (mt), consisting of: 98,500 mt of HFC-125; 71,000 mt of HFC-32; 17,000 mt of HFC-143a and 126,000 mt of HFC-134a.²³ A substantial proportion of HFC-32 and HFC-125 was used for the production of HFC blends, mainly R-410A,²⁴ R-407C,²⁵ R-404A,²⁶ R-407F²⁷ and R-507A.²⁸

22. As a reference, the aggregate HCFC production baseline in Article 5 countries amounted to 501,266 mt (with the production of one country amounting to 430,962 mt).

Aggregate HFC consumption in Article 5 countries

23. The aggregate level of HFC consumption in Article 5 countries amounted to 284,325 mt in 2015; consumption of HFC-134a, R-410A, R-407C, R-404A and R-507A represented more than 97 per cent of the total consumption. Under a business-as-usual scenario, aggregate HFC consumption would be expected to increase to 1,021,216 mt in 2030, with an average annual growth rate of 9.9 per cent between 2015 and 2025, as shown in Table 2.

Table 2. HFC consumption in Article 5 countries reported by the TEAP Task Force

HFC	Consumption (mt)				Growth rate (%)*
	2015	2020	2025	2030	
HFC-134a	78,688	106,731	139,547	177,432	5.9
R-410A	106,661	192,770	284,682	364,845	10.3
R-407C	55,278	101,216	174,433	285,500	12.2
R-404A	18,202	31,982	55,964	83,845	11.9
R-507A	18,202	31,982	55,964	83,845	11.9
HFC-152a	3,364	5,669	11,280	15,225	12.9
HFC-245fa	2,172	3,840	4,986	5,504	8.7
HFC-365mfc/HFC-227ea	1,758	3,428	4,546	5,020	10.0
Total	284,325	477,618	731,402	1,021,216	9.9

* Average growth rate between 2015 and 2025.

Surveys of ODS alternatives

24. The surveys of ODS alternatives completed in 119 Article 5 countries reported consumption of 13 (pure) HFCs and 37 HFC blends. The majority of countries, however, consumed only HFC-134a, R-410A, R-404A, and R-407C; R-507A was consumed by 70 countries. Table 3 summarizes the HFC consumption reported in the surveys over the period 2012 to 2015.

²³ TEAP, Task Force Report on Decision XXVI/9, Additional Information on Alternatives to Ozone-Depleting Substances.

²⁴ HFC-32 (50 per cent), HFC-125 (50 per cent).

²⁵ HFC-32 (23 per cent), HFC-125 (25 per cent), HFC-134a (52 per cent).

²⁶ HFC-125 (44 per cent), HFC-143a (52 per cent), HFC-134a (4 per cent).

²⁷ HFC-32 (30 per cent), HFC-125 (30 per cent), HFC-134a (40 per cent).

²⁸ HFC-125 (50 per cent), HFC-143a (50 per cent).

Table 3. HFC consumption in 119 Article 5 countries as reported in the surveys of ODS

HFC	42 non-LVC countries				77 LVC countries			
	2012	2013	2014	2015	2012	2013	2014	2015
Metric tonnes								
HFC-134a	42,422	43,927	50,240	54,815	5,177	5,278	5,583	6,711
R-410A	26,856	33,346	51,782	75,700	1,597	1,677	2,073	2,791
R-404A	7,432	8,545	11,757	9,818	1,762	1,597	1,938	2,591
HFC-152a	3,349	4,894	5,816	6,523	250	287	203	246
HFC-245fa	2,853	3,462	3,496	3,696	14	14	13	26
R-407C	2,835	3,478	3,912	8,865	1,621	1,027	1,301	1,531
R-507A	685	779	1,706	1,235	85	100	93	124
HFC-365mfc	-	19	8	125	7	8	8	16
Other HFCs	1,160	1,427	2,405	3,567	12	8	8	19
Other HFC blends	1,332	1,631	1,832	2,578	557	586	848	1,163
Total	88,924	101,508	132,954	166,922	11,082	10,582	12,068	15,218
Percentage of total								
HFC-134a	47.7	43.3	37.8	32.8	46.7	49.9	46.3	44.1
R-410A	30.2	32.9	38.9	45.4	14.4	15.8	17.2	18.3
R-404A	8.4	8.4	8.8	5.9	15.9	15.1	16.1	17.0
HFC-152a	3.8	4.8	4.4	3.9	2.3	2.7	1.7	1.6
HFC-245fa	3.2	3.4	2.6	2.2	0.1	0.1	0.1	0.2
R-407C	3.2	3.4	2.9	5.3	14.6	9.7	10.8	10.1
R-507A	0.8	0.8	1.3	0.7	0.8	0.9	0.8	0.8
HFC-365mfc	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Other HFCs	1.3	1.4	1.8	2.1	0.1	0.1	0.1	0.1
Other HFC blends	1.5	1.6	1.4	1.5	5.0	5.5	7.0	7.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

25. The aggregate HFC consumption of 166,922 mt in 2015 reported by the 119 surveys (see Table 3) accounts for over 61 per cent of the 284,325 mt of aggregate consumption by all Article 5 countries reported by the TEAP Task Force (see Table 2). The aggregate of the HCFC baselines of the 119 countries concerned, however, represented approximately 25 per cent of the aggregate HCFC baseline for all Article 5 countries.

III SUSTAINED AGGREGATE REDUCTIONS IN HFC CONSUMPTION

26. Although all starting points were selected in accordance with decision 35/57, the circumstances prevailing in Article 5 countries during the phase-out of HCFCs were slightly different from those during the phase-out of CFCs. The methodologies used for the selection of the starting points were, therefore, adjusted accordingly. In the same vein, the circumstances in countries during the phase-down of HFCs are different from those prevailing during the phase-out of CFCs or of HCFCs.

27. Table 4 presents the key differences in the selection of starting points for CFCs, HCFCs and (potentially) HFCs.

Table 4. An overview of baselines and starting points for aggregate reductions in CFC, HCFC and HFC consumption

Description	CFC	HCFC	HFC
Baseline: aggregated consumption of substances	Annex A Group I (CFC)	Annex C Group I (HCFC)	Annex F and (65 per cent of baseline of) Annex C Group I. Two different baselines and phase-out schedules*
Base years	1995, 1996, 1997	2009, 2010	2020, 2021, 2022 for group 1 2024, 2025, 2026 for group 2

Description	CFC	HCFC	HFC
Number of controlled substances	5, of which CFC-11 and CFC-12 represented most of the consumption	40, of which HCFC-22, HCFC-141b and HCFC-142b represented over 99 per cent of the total consumption	17, in Annex F Group I and 1 in Group II** The most highly consumed are four pure substances (mainly HFC-134a and to a lesser extent HFC-152a, HFC-245fa, HFC-365mfc, HFC-227ea), and four blends (R-410A, R-407C, R-404A, R-507A), containing two or more of HFC-32, HFC-125, HFC-134a, HFC-143a
Inclusion of controlled substances contained in pre-blended polyols	Not applicable	Included (average of 2007-2009)	To be decided
Measurement	ODP tonnes; 1.0 for CFC-11 and CFC-12; 0.8 for CFC 113; 0.6 for CFC-115	ODP tonnes: 0.055 for HCFC-22; 0.11 for HCFC-141b; 0.065 for HCFC-142b	CO ₂ equivalent (consumption in mt multiplied by the global warming-potential (GWP) of the substance, which ranges from 124 for HFC-152a to 14,800 for HFC-23. Starting point measured in tonnage
Consumption data used for calculating the starting point	CFC baselines for compliance had already been established under Article 7 when Article 5 countries selected their CFC starting points	HCFC baselines were estimated,***as the majority of Article 5 countries selected their HCFC starting point prior to 2011 (when consumption for the base years was reported under Article 7)	Not yet available. Annex F substances will become controlled substances on 1 January 2019, when the Kigali Amendment enters into force

*The following phase-down schedule was agreed: group 1, 2024–2028: 100 per cent of baseline; 2029–2034: 90 per cent of baseline; 2035–2039: 70 per cent of baseline; 2040–2044: 50 per cent of baseline; 2045 and thereafter: 20 per cent of baseline. group 2, 2028–2031: 100 per cent of baseline; 2032–2036: 90 per cent of baseline; 2037–2041: 80 per cent of baseline; 2042-2046: 70 per cent of baseline; 2047 and thereafter: 15 per cent of baseline.

**HFC-23, with a GWP of 14,800, is mainly a by-product of the production of HCFC-22.

*** Countries had to report HCFC consumption and production, where applicable, under Article 7 from the moment they became parties to the Montreal Protocol.

HFC baseline for compliance

28. In the Kigali Amendment, two different HFC consumption baselines for compliance (expressed in CO₂ equivalent) were agreed for Article 5 countries:

- (a) For Article 5 group 1 countries: their average consumption levels over 2020, 2021 and 2022 (“HFC component”), plus 65 per cent of their HCFC baseline consumption (“HCFC component”); and
- (b) For Article 5 group 2 countries: their average consumption levels over 2024, 2025 and 2026 (“HFC component”), plus 65 per cent of their HCFC baseline consumption (“HCFC component”).

29. For the purposes of the present document, the “HFC component” of the HFC baseline for all Article 5 countries has been calculated using the projected average consumption over the base years of 2020 to 2022 (applicable to Article 5 group 1 countries),²⁹ as HFC consumption disaggregated by country is not available.³⁰ The Secretariat notes that this method of estimating an aggregated HFC component of the baseline does not account for the growth of HFC consumption in Article 5 group 2 countries between 2023 and 2026; results from ODS alternatives surveys from some Article 5 group 2 countries suggest such growth could be substantial.

30. Accordingly, the aggregate “HFC component” of the HFC baseline is estimated at 520,909 mt (1,091,111,362 CO₂ equivalent), as shown in Table 5.

Table 5. Estimated “HFC component” of the HFC baseline for compliance in Article 5 countries

HFC	2020	2021	2022	Baseline	% of base
Metric tonnes					
HFC-134a	106,731	112,610	118,813	112,718	21.6
R-410A	192,770	208,403	225,303	208,825	40.1
R-407C	101,216	112,856	125,835	113,302	21.8
R-404A	31,982	35,769	40,004	35,918	6.9
R-507A	31,982	35,769	40,004	35,918	6.9
HFC-152a	5,669	6,505	7,465	6,546	1.3
HFC-245fa	3,840	4,046	4,263	4,050	0.8
HFC-365mfc/HFC-227ea	3,428	3,627	3,838	3,631	0.7
Total mt	477,618	519,585	565,525	520,909	100.0
CO₂ equivalent					
HFC-134a	152,625,330	161,032,154	169,902,037	161,186,507	14.8
R-410A	402,407,375	435,040,855	470,320,767	435,922,999	40.0
R-407C	179,557,184	200,206,734	223,231,037	200,998,319	18.4
R-404A	125,420,611	140,271,531	156,880,933	140,857,692	12.9
R-507A	127,448,270	142,539,283	159,417,207	143,134,920	13.1
HFC-152a	702,956	806,657	925,655	811,756	0.1
HFC-245fa	3,955,200	4,167,280	4,390,731	4,171,070	0.4
HFC-365mfc/HFC-227ea	3,802,955	4,023,823	4,257,519	4,028,099	0.4
Total CO ₂ equivalent	995,919,881	1,088,088,317	1,189,325,888	1,091,111,362	100.0

31. The “HCFC component”³¹ for all Article 5 countries amounts to 565,091,392 CO₂ equivalent. The aggregate HFC compliance baseline for all Article 5 countries, therefore, amounts to 1,656,202,754 CO₂ equivalent, as shown in Table 6.

Table 6. Estimated aggregate HFC baseline for compliance for all Article 5 countries

Description	Metric tonnes	CO ₂ equivalent	% of total mt	% of total CO ₂ eq
HFC component				
HFC-134a	112,718	161,186,507	21.6	14.8
R-410A	208,825	435,922,999	40.1	40.0
R-407C	113,302	200,998,319	21.8	18.4
R-404A	35,918	140,857,692	6.9	12.9
R-507A	35,918	143,134,920	6.9	13.1
HFC-152a	6,546	811,756	1.3	0.1

²⁹ The annual growth rate between 2020 and 2025 has been calculated using the aggregate consumption stated for each of the HFCs for the years 2020 and 2025 in the TEAP Task Force reports.

³⁰ As a reference, the aggregate HCFC baseline for compliance of Article 5 group 2 countries of 4,913 ODP tonnes is equivalent to 13.7 per cent of the aggregate HCFC baseline of 35,814 ODP tonnes for all Article 5 countries.

³¹ The “HCFC component” does not include the consumption of HCFC-123, HCFC-225, HCFC-124 and HCFC-141 as the Kigali Amendment has assigned a default GWP value of zero for these (and other) HCFCs until a GWP value is decided upon by means of the procedures foreseen in paragraph 9(a)(ii) of Article 2.

Description	Metric tonnes	CO ₂ equivalent	% of total mt	% of total CO ₂ eq
HFC-245fa	4,050	4,171,070	0.8	0.4
HFC-365mfc/ HFC-227ea	3,631	4,028,099	0.7	0.4
Total HFC	520,909	1,091,111,362	100.0	100.0
HCFC component (65%)				
HCFC-22	256,572	464,395,998	73.7	82.2
HCFC-141b	70,108	50,828,097	20.1	9.0
HCFC-142b	21,582	49,853,674	6.2	8.8
HCFC-225ca	46	5,553	0.0	0.0
HCFC-225cb	14	8,071	0.0	0.0
Total 65% of HCFC	348,321	565,091,392	100.0	100.0
Combined HFC baseline				
HFC component	520,909	1,091,111,362	59.9	65.9
HCFC component	348,321	565,091,392	40.1	34.1
HFC baseline	869,230	1,656,202,754	100.0	100.0

32. Prior to the Kigali Amendment, compliance with the Montreal Protocol had been assessed against the reported consumption and production of the controlled substances measured in ODP tonnes; starting points for consumption were similarly measured in ODP tonnes. Under the Kigali Amendment, compliance with the Montreal Protocol will be assessed against the reported consumption and production of Annex F substances measured in CO₂ equivalent.

IV. KEY CONSIDERATIONS IN DEVELOPING A METHODOLOGY FOR ESTABLISHING HFC STARTING POINTS

33. At the 78th meeting, the Executive Committee considered the issue of the starting point for HFCs under agenda item 6(a)(i), draft criteria for funding. Annex I to the present document contains an extract of the 78th meeting report of those discussions. At the 80th meeting, the Executive Committee decided to include in the draft template of the cost guidelines for the phase-down of HFCs text related to sustained aggregate reductions in line with paragraph 19 of decision XXVIII/2 (decision 80/76(a)(i)).

34. Discussions on the development of a methodology for establishing the starting point have been limited, with members of the contact group discussing matters related to the Kigali Amendment at the 81st meeting expressing different views of how the starting point could be determined. In line with decision 81/67(e), the Secretariat has identified key considerations that could assist the Executive Committee in developing a methodology for establishing the starting point, taking into account those discussions. The initial list of key considerations suggested by the Secretariat might be augmented based on further discussions of the Executive Committee.

35. Calculation of the HFC baseline is based on consumption and production of Annex F substances (“HFC component”) and consumption and production of Annex C Group I substances (“HCFC component”), both measured in CO₂ equivalent (rather than metric tonnes). Given this fact, a number of points that were not relevant for CFCs or HCFCs would need to be assessed when determining the starting points for HFC consumption eligible for funding, *inter alia*:

- (a) Starting point as a combination of different groups of substances;
- (b) The time of establishment of the starting point;
- (c) The need to ensure that the methodology to determine the starting is equitable to all Article 5 countries;
- (d) Starting points based on pure HFCs only or on pure HFCs and HFC blends;

- (e) Measurement of HFC starting points in tonnage, CO₂ equivalent, and/or both;
- (f) Additional tonnage of HFCs associated with the “HCFC component”;
- (g) The HCFC baseline or the HCFC starting point as the basis for the “HCFC component”;
- (h) Potential double counting associated with the “HCFC component”;
- (i) Import and export of controlled substances contained in pre-blended polyols;
- (j) The role of the starting point in the servicing sector; and
- (k) The starting point for the production sector.

36. These points are briefly described below.

Starting point as a combination of different groups of substances

37. The baseline for compliance and the starting points for CFCs and for HCFCs for Article 5 Parties were determined exclusively from the respective consumption and production of those substances, respectively. In contrast, the baseline for compliance for HFCs comprises both Annex F and Annex C, Group I substances. There is no precedent for determining the starting point for one group of substances based on a combination of different groups of substances.

38. Discussions on a methodology to determine the starting point for HFCs have been limited. During the discussions of the contact group on the development of the cost guidelines for the phase-down of HFCs in Article 5 countries: draft criteria for funding established at the 81st meeting, some Executive Committee members suggested that the HFC starting point be determined by the “HFC component” of the baseline, while others suggested the HFC baseline (i.e., the “HFC component” plus the “HCFC component”).

Time of establishment of the starting point

39. To date, seven stand-alone investment projects have been approved at a total cost of US \$11,511,871 (plus agency support cost) to phase down 837.45 mt (1.34 million mt CO₂-eq) of HFCs in the air-conditioning, domestic and commercial refrigeration manufacturing sectors in six countries.³² In approving those projects, the Executive Committee decided to deduct the relevant quantities of HFCs (expressed in both metric tonnes and CO₂-eq) from the country’s starting point for sustained aggregate reduction in HFCs once it has been established. Accordingly, the fact that a starting point has not yet been established has not prevented the Executive Committee from approving HFC phase-down projects. Moreover, in line with decision 81/53(b), the Executive Committee will consider additional HFC stand-alone investment projects up to and including the 84th meeting.

40. At the time of finalization of the present document, a total of 34 Article 5 countries had ratified the Kigali Amendment. As those countries belong to group 1, in line with decision 79/46(b)(iii), those countries would be eligible in 2019 for funding for the preparation of national implementation plans to meet initial reduction obligations for the phase-down of HFCs.

³² HFC-investment projects have been approved for Argentina, Bangladesh, Dominican Republic (the), Jordan, Lebanon, and Mexico (two).

41. The first compliance obligation related to HFC consumption is 2024 for Article 5 group 1 countries and 2028 for Article 5 group 2 countries. The Parties agreed to a cut-off date for eligible capacity in paragraph 17 of decision XXVIII/2.³³ In the absence of a starting point for HFCs, that cut-off date for eligible capacity per se would not limit the funding liability of the Multilateral Fund, unless a mechanism were put in place to ensure that consumption at ineligible enterprises could not be funded for phase-out. Such a mechanism would be particularly complex if the starting point would be based on a single value.

The need to ensure that all Article 5 countries are treated equally

42. In the case of CFCs and HCFCs, Article 5 countries were permitted to choose from two different options in order to determine their starting point notwithstanding the fact that their baseline was determined in the same manner and that all Article 5 countries followed the same Montreal Protocol control schedule. In contrast, the baseline and control schedule for Article 5 group 1 and group 2 countries differ under the Kigali Amendment. It would be necessary to ensure that the methodology for determining the starting point for HFCs treats all Article 5 countries equally notwithstanding differences in the baseline years and in the control schedule for Article 5 group 1 and group 2 countries.

43. In addition, unlike the phase-out of CFCs and HCFCs, the control schedule for HFCs is a phase-down, with different targets for Article 5 group 1 and group 2 countries.³⁴ On addressing this situation, it might be relevant considering whether to deduct the respective phase-down “tail” (i.e., 20 per cent for Article 5 group 1 countries and 15 per cent for Article 5 group 2 countries) from the starting point, or alternatively, not deduct the phase-down “tail” and only fund those phase-out activities necessary to achieve compliance. In such case, however, the starting point would not represent the maximum funding envelope as only part of that starting point would be funded for phase-out.

Starting points based on pure HFCs only or on pure HFCs and HFC blends

44. Of the 17 HFCs listed in Annex F Group I of the Montreal Protocol, eight are the most commonly consumed in Article 5 countries, namely HFC-134a, HFC-152a, HFC-32, HFC-125, HFC-143a, HFC-245fa, HFC-365mfc and HFC-227ea, as a pure substance or contained in HFC blends consisting of precise quantities of two or more of HFC-32, HFC-125, HFC-134a and/or HFC-143a.

45. Compliance with the Montreal Protocol will be assessed against reported consumption of Annex F substances. The composition of the 520,909 mt of HFCs associated with the estimated HFC baseline, by HFC listed under Annex F Group I, is shown in Table 7.

Table 7. Composition of the “HFC component” of the baseline by substance listed under Annex F Group I

HFC/ HFC-blend	HFC-134a	HFC-32	HFC-125	HFC-143a	HFC-152a	HFC-245fa	--365mfc/ -227ea	Baseline
Metric tonnes								
HFC-134a	112,718							112,718
R-410A		104,413	104,413					208,825
R-407C	58,917	26,060	28,326					113,302
R-404A	1,437		15,804	18,678				35,918
R-507A			17,959	17,959				35,918
HFC-152a					6,546			6,546
HFC-245fa						4,050		4,050
-365mfc/-227ea							3,631	3,631

³³ 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.

³⁴ Article 5 group 1 countries would need to phase-down 80 per cent of the HFC baseline by their final control step in 2045, while Article 5 group 2 countries would need to phase-down 85 per cent of their HFC baseline by their final control step in 2047.

HFC/ HFC-blend	HFC-134a	HFC-32	HFC-125	HFC-143a	HFC-152a	HFC-245fa	--365mfc/ -227ea	Baseline
Total mt	173,072	130,472	166,502	36,637	6,546	4,050	3,631	520,909
Total CO₂ eq								
HFC-134a	161,186,507							161,186,507
R-410A		70,478,569	365,444,430					435,922,999
R-407C	84,251,606	17,590,185	99,139,531					200,981,323
R-404A	2,054,534		55,314,373	83,488,785				140,857,692
R-507A			62,857,242	80,277,678				143,134,920
HFC-152a					811,756			811,756
HFC-245fa						4,171,070		4,171,070
-365mfc/-227ea							4,026,779	4,026,779
Total CO ₂ eq	247,492,647	88,068,754	582,755,577	163,766,463	811,756	4,171,070	4,026,779	1,091,093,047*

* The difference between this figure and that of 1,091,111,362 in Table 5 is due to the rounding of the GWP values of the HFC blends.

46. If the same approach as for the HCFCs is followed, the starting point for HFC should list all the HFCs consumed, both pure or in blends, as if they were pure substance, and any amount of HFC that is phased out (both pure or contained in blends) would be deducted as pure substance from the starting point. In such case, it would be necessary to consider how to account for the HCFC component of the starting point, if any. Moreover, in the course of their HFC phase-down, Article 5 countries may phase in lower-GWP HFCs that were not included in their respective starting point. Such consumption, where eligible, should be funded by the Multilateral Fund. For example, one approach could be that lower-GWP HFCs that are phased in during the HFC phase-down might be deducted from the HCFC component, which could be a single number; other approaches might also be possible.

47. It is noted that errors could occur when breaking down HFC blends into their constituent HFC components, particularly if the precise amounts of each of the component of the blends are incorrectly reported. When planning the HFC phase-down strategies, the phase-out of a unit of an HFC blend should reflect the amount of each of its components; otherwise, the aggregated amount of the components will not tally with the total amount of the blend. Moreover, a situation could potentially occur where the remaining consumption eligible for funding of the constituent HFC components of an HFC blend differ from the composition of that blend (i.e., there is sufficient remaining consumption eligible for funding of some but not all the constituent HFC components of a blend).

48. Alternatively, if the same approach as for CFCs is used, a single value for the starting point that combines all the HFCs listed in Annex F consumed by a country could be utilized. In such case, the "HCFC component" of the starting point, if any, would be added to the starting point and any amount of HFC that is phased out (both pure or contained in blends) would be deducted from that starting point. The subsequent phase-out of any lower-GWP HFCs that are phased in would similarly be deducted from that starting point.

49. In general, consumption of HCFCs at enterprises ineligible for funding (e.g., non-Article 5 owned or established after the cut-off date for eligible capacity) was included in the HCFC starting point when it was established. However, such consumption was not funded during the phase-out. Rather, funding was approved only for the phase-out of the HCFCs that had been included in the starting point and that complied with the eligibility criteria of the Multilateral Fund. In several Article 5 countries, the total consumption of a specific HCFC eligible for funding was lower than the level of consumption established as the starting point. The remaining consumption of that particular HCFC could not be "transferred" to any other HCFC. Should a single value for the starting point that combines all the HFCs consumed by a country be used, it may be necessary to determine the ineligible consumption at the time of establishment of the starting point so that such consumption can be excluded from the starting point. However, it is unlikely that such a determination could be made at that time. In the case of HCFCs, such ineligible consumption was only identified during detailed surveys conducted in the planning at each stage of an HPMP.

50. Moreover, while the conversion of capacity established after the cut-off date was not funded, the consumption of HCFCs associated with that specific capacity was not always deducted from the country's remaining consumption eligible for funding and thus, was subsequently funded. This situation was mainly relevant to the conversion of refrigeration and air-conditioning manufacturing capacity, where the consumption of HCFCs associated with capacity established after the cut-off date may have been funded in the servicing sector or at other manufacturing enterprises eligible for funding.

Measurement of HFC baselines in tonnage, CO₂ equivalent, and/or both

51. Contrary to the case of HCFCs, where the phase-out of an HCFC did not result in phase-in of another HCFC, during the initial years of phase-down of HFCs, it is expected that HFCs currently used for manufacturing and/or servicing commercial and air-conditioning equipment could be replaced with other HFCs or HFC-blends with lower GWP. This approach could result in major reductions in terms of CO₂ equivalent, but minimal reductions in terms of metric tonnes.

52. For example, replacement of the total R-410A consumption in the HFC baseline with HFC-32 would result in the phase-out of 208,825 mt of R-410A, or 435,922,999 CO₂ equivalent, and the phase-in of 208,825 mt of HFC-32, or 140,957,137 CO₂ equivalent. While the net phase-out is zero when measured in metric tonnes, it represents a 68 per cent reduction in consumption in CO₂ equivalent. In this scenario, Article 5 countries could ensure compliance with one or more of the compliance obligations without reducing the metric tonnes of HFCs consumed, and even increase the metric tonnes of HFCs they consume and remain in compliance. In such case, as cost-effectiveness is measured in US \$/kg, funding for phase-out could lead to additional funding liability to the Multilateral Fund. If the starting point is intended to continue to represent the maximum funding envelope under which compliance with the HFC phase-down is achieved, then it should be measured in metric tonnes. However, if the starting point is intended to only consider compliance with the Montreal Protocol targets and be independent of maximum funding envelope, it could be measured in CO₂ equivalent.

53. Furthermore, the cost-effectiveness of the projects funded under the Multilateral Fund are based on metric tonnage rather than ODP tonnage, as the capacity of the equipment in the manufacturing enterprises is measured in metric tonnage, irrespective of the ODP value of the controlled substance. This approach: is consistent with the principle of incremental costs rather than, for example, a market-based approach; has facilitated the project review and approval processes; and has allowed for a comparative analysis of similar projects (e.g. the cost-effectiveness associated with the phase-out of CFC-11 or HCFC-141b as foam blowing agents in several applications).

54. The selection of the units used to establish the starting point and whether the starting point would continue to represent the maximum funding envelope of the Fund also depends on whether a single value for the starting point is used, or a starting point that lists all the HFCs consumed in a country. In the latter case, the additional funding liability to the Multilateral Fund associated with the phase in of lower-GWP HFCs would be limited by the starting point. In particular, the phase in of that substance, as well as any growth in its consumption, could be funded as long as the consumption remained within the starting point established for that substance, and other eligibility criteria were met.

55. During the discussions in the contact group established to discuss the cost guidelines for HFC phase-down, some Executive Committee members suggested measuring the HFC starting point in both metric tonnes and CO₂ equivalent. Such an approach could reduce the potential risks of calculation errors and facilitate the preparation and implementation of HFC phase-down activities. However, cases where there is remaining consumption eligible for funding in one metric but not the other would need to be addressed.

Additional tonnage of HFCs associated with the “HCFC component”

56. Once established, the HFC baseline will be a single value, consisting of the total consumption of the “HCFC component” and the “HFC component”, measured in CO₂ equivalent. Compliance with the Montreal Protocol will be determined on the basis of that single amount.

57. As the HFC starting point will be the maximum consumption eligible for funding, the “HCFC component”, if any, of the HFC baseline might need to be converted into an HFC or HFCs, the aggregate amount of which has a CO₂ equivalent equal to that of the “HCFC component.” For example, the 348,321 mt of HCFCs in the “HCFC component” of the HFC baseline, could be converted to 141,805 mt of R-507A (one of the most commonly used HFC blends having the highest GWP value), or to 395,169 mt of HFC-134a (the most commonly used HFC having the lowest GWP value), or to a combination of HFCs and HFC-blends. In all cases, the CO₂ equivalent would be the same (i.e., 565,091,392).

58. Table 8 presents six examples of the tonnage of HFCs associated with the “HCFC component” of the HFC baseline.

Table 8. Examples of tonnage of HFCs equivalent to the “HCFC component” of the HFC baseline when expressed in CO₂ equivalent

Description	All HFCs* (Example 1)	HFC-134a (Example 2)	R-410A (Example 3)	R-407C (Example 4)	R-404A (Example 5)	R-507A (Example 6)
HFC-134a	75,372	395,169				
R-410A	139,637		270,702			
R-407C	75,763			318,541		
R-404A	24,018				144,097	
R-507A	24,018					141,805
HFC-152a	4,377					
HFC-245fa	2,708					
HFC-365mfc/HFC-227ea	2,428					
Total additional mt	348,321	395,169	270,702	318,541	144,097	141,805
Total CO ₂ equivalent	565,091,392	565,091,392	565,091,392	565,091,392	565,091,392	565,091,392

* Distribution of the aggregate consumption across HFCs in Article 5 countries in the TEAP Task Force report.

59. It is to be noted that the 348,321 mt associated with the “HCFC component” of the HFC baseline consists mainly of HCFC-22 (61.5 per cent of the baseline), HCFC-141b (32.3 per cent) and HCFC-142b (6.0 per cent), distributed as follows:

- (a) 256,572 mt of HCFC-22, consisting of 206,215 mt consumed in the refrigeration and air-conditioning sector, by all countries, and 50,357 mt consumed as a co-blowing foam agent, by some countries;³⁵
- (b) 70,108 mt of HCFC-141b consumed as a blowing foam agent by 68 countries; and
- (c) 21,582 mt HCFC-142b consumed by as a co-blowing foam agent by 50 countries.

³⁵ This amount assumes that the total consumption of HCFC-142b is used as a co-blowing agent with HCFC-22 for the manufacturing of extruded polystyrene foam, at a ratio of 3 parts HCFC-22 to 1 part HCFC-142b.

60. According to the TEAP Task Force reports, over 96 per cent of the total HFC consumption in Article 5 countries takes place in the refrigeration and air-conditioning sector. Therefore, of the 348,321 mt (565,091,392 CO₂ equivalent) of HCFCs associated with the “HCFC component”, it is likely that only some portion of the 206,215 mt (373,249,150 CO₂ equivalent) of HCFC-22 consumed in the refrigeration and air-conditioning sector would be converted to HFCs. In contrast, virtually none of the HCFC-141b included in the “HCFC component” is likely to be converted to HFCs.

“HCFC component” based on the HCFC baseline or the HCFC starting point

61. In line with decision 35/57, for several Article 5 countries that had selected their HCFC baselines as their starting points, the starting points were adjusted downwards to take into account the demonstrated non-representative nature of the consumption data for reasons such as stockpiling, national economic difficulties, and/or other causes (e.g., excessive leakage rates in refrigeration equipment still in operation). For other Article 5 countries, the HCFC consumption reported after 2010 was substantially lower than the established HCFC baseline, suggesting that their HCFC consumption during the base years had been overestimated. The majority of these countries agreed to revise their HCFC starting points (adjusting the funding levels when applicable) rather than changing their compliance baselines, in line with the established procedures relating to changes to baselines for compliance.

62. When considering how to include the “HCFC component” of the HFC baseline in the starting point, consideration should be given to whether the HCFC baseline or the HCFC starting point is more representative of the actual HCFC consumption in the country, is a way of ensuring equity among Article 5 countries.

Potential double-counting associated with the “HCFC component”

63. One of the basic principles of the Multilateral Fund is that project proposals requesting funding should involve the careful scrutiny of the cost items listed in an effort to ensure that there is no double-counting. In relation to this principle, if funding were to be provided for the “HCFC component,” care would need to be taken to ensure that part of that funding did not constitute double-counting. Funding has already been (and will continue to be) provided for the complete phase-out of substances in Annex C Group I. In particular, as at the 81st meeting, funding had been approved in principle to phase out over 60 per cent of the aggregated HCFC baseline for compliance, which is above the 35 per cent required for the 2020 compliance target.

64. Given that part of the HCFCs in use up to 2030 could be replaced by HFCs, the HFCs to be phased in could be eligible for funding (e.g., if the phase-in occurred at enterprises that were eligible in line with paragraph 18 of decision XXVIII/2, and other eligibility criteria). The actual amount of the HFCs that could be phased in, however, is unknown. On this basis, Table 9 illustrates the potential amounts of HFCs that could be phased in (measured in metric tonnes and CO₂ equivalent) in relation to different levels of HCFCs to be phased out (i.e. from 10 per cent to 65 per cent of the established HCFC baseline). Table 9 also presents, for illustrative purposes, the specific amounts that could be phased in for each of the HFCs in the estimated baseline.

Table 9. HFCs that could be phased in in relation to different levels of HCFCs that will be phased out

Component	10%	20%	30%	40%	50%	60%	65%
Metric tonnes							
HCFC component	53,588	107,176	160,763	214,351	267,939	321,527	348,321
HFC component	520,909	520,909	520,909	520,909	520,909	520,909	520,909
Total mt	574,497	628,085	681,673	735,261	788,848	842,436	869,230
CO₂ equivalent							
Total HCFC component	86,937,137	173,874,275	260,811,412	347,748,549	434,685,686	521,622,824	565,091,392
Total HFC component	1,091,111,362	1,091,111,362	1,091,111,362	1,091,111,362	1,091,111,362	1,091,111,362	1,091,111,362
Total CO ₂ equivalent	1,178,048,499	1,264,985,637	1,351,922,774	1,438,859,911	1,525,797,048	1,612,734,186	1,656,202,754
Total HCFC (%)	7.4	13.7	19.3	24.2	28.5	32.3	34.1

Component	10%	20%	30%	40%	50%	60%	65%
Total HFC (%)	92.6	86.3	80.7	75.8	71.5	67.7	65.9
Total CO ₂ eq (%)	100	100	100	100	100	100	100
Additional ton (mt)							
HFC-134a	11,596	23,191	34,787	46,383	57,978	69,574	75,372
R-410A	21,483	42,965	64,448	85,930	107,413	128,896	139,637
R-407C	11,656	23,312	34,967	46,623	58,279	69,935	75,763
R-404A	3,695	7,390	11,085	14,780	18,475	22,170	24,018
R-507A	3,695	7,390	11,085	14,780	18,475	22,170	24,018
HFC-152a	673	1,347	2,020	2,694	3,367	4,041	4,377
HFC-245fa	417	833	1,250	1,666	2,083	2,500	2,708
HFC-365mfc/-227ea	374	747	1,121	1,494	1,868	2,241	2,428
Total additional mt	53,588	107,176	160,763	214,351	267,939	321,527	348,321
Additional ton (CO₂)							
HFC-134a	12,842,954	25,685,909	38,528,863	51,371,818	64,214,772	77,057,726	83,479,204
R-410A	34,733,299	69,466,599	104,199,898	138,933,198	173,666,497	208,399,796	225,766,446
R-407C	16,015,064	32,030,128	48,045,192	64,060,256	80,075,321	96,090,385	104,097,917
R-404A	11,223,203	22,446,406	33,669,610	44,892,813	56,116,016	67,339,219	72,950,821
R-507A	11,404,647	22,809,295	34,213,942	45,618,589	57,023,236	68,427,884	74,130,207
HFC-152a	64,679	129,358	194,036	258,715	323,394	388,073	420,412
HFC-245fa	332,341	664,682	997,023	1,329,364	1,661,704	1,994,045	2,160,216
HFC-365mfc/-227ea	320,949	641,899	962,848	1,283,797	1,604,746	1,925,696	2,086,170
Total additional CO ₂	86,937,137	173,874,275	260,811,412	347,748,549	434,685,686	521,622,824	565,091,392

Import and export of controlled substances in pre-blended polyols

65. It is likely that there will be enterprises in Article 5 countries using HFCs contained in imported pre-blended polyols. If such consumption would continue to be eligible for funding, as was the case of HCFC-141b contained in imported pre-blended polyols, it would be necessary to decide on the conditions for accessing funding to convert eligible enterprises using these pre-blended polyols (i.e., establishing the HFC consumption reference that would need to be added to the starting point).

66. In the case of Article 5 countries exporting HFC contained in pre-blended polyols, those countries should deduct from the starting point the amounts of HFCs contained in such exports at the time of establishing their starting points. Accordingly, a reporting mechanism for such exports would be necessary. Such a reporting mechanism was lacking for the case of exports of HCFC-141b contained in pre-blended polyols.

The role of the starting point in the servicing sector

67. For the majority of Article 5 countries, the only HFC consumption will be in the servicing sector. And even for Article 5 countries with HFC consumption in both the manufacturing and servicing sectors, the servicing sector will account for a substantial portion of the country's consumption.

68. The initial years of the phase-down of HFCs will overlap with the phase-out of the remaining consumption of HCFCs, which for the majority of Article 5 countries would be mainly used in the refrigeration servicing sector. The overlapping schedule of HCFC phase-out and HFC phase-down could represent an opportunity for Article 5 countries to plan comprehensive, cost-effective and longer-term strategies for their refrigeration servicing sector that could strengthen relevant institutions and stakeholders and ensure a proper and sustained introduction of low-GWP alternatives.

69. During this period, it could also be expected that HFCs currently used for manufacturing and/or servicing refrigeration equipment could be replaced with other HFCs or HFC-blends with lower GWP. For example, a country may wish to comply with its obligations in part by encouraging the retrofit of existing equipment to lower-GWP alternatives. Giving this situation, consideration could be given for

establishing two separate starting points, one for the manufacturing sector and another for the servicing sector.

70. In the case of HCFCs, the cost-effectiveness threshold for the servicing sector for non-LVC countries was specified in decisions 60/44(f)(xv) and 74/50(c)(xvi). In contrast, funding for the servicing sector for LVC countries was specified in a table in the respective decisions, where funding was determined based on the level of consumption in the refrigeration servicing sector, on the understanding that project proposals would still need to demonstrate that the funding level was necessary to achieve the respective phase-out targets. While the particular activities undertaken by an LVC country to phase out its HCFC consumption could vary based on the circumstances in the country, the maximum funding eligibility was based on the consumption in the servicing sector.

71. To ensure that sufficient funding would be available to phase-down consumption of HFCs in the refrigeration servicing sector, the starting point applied to LVC countries for the servicing sector (only) could be extended for both LVC and non-LVC countries. In such case, countries with consumption in the manufacturing sector would also have a separate starting point for the manufacturing sector (only). Funding for the servicing sector could thus be determined based on the activities necessary to ensure compliance with the phase-down steps, rather than a specific tonnage to be phased out.

Starting point for the production sector

72. Production phase-out plans for CFCs did not establish a starting point for aggregate reductions in production but instead specified a maximum allowable production by year, and associated funding level. In addition, agreements for CFC production sector phase-out specified that the funding provided was for the complete closure of the CFC production capacity in the country. Similarly, the HCFC production phase-out management plan (HPPMP) approved by the Executive Committee for one country, specified that total compensation for the entire HCFC production sector for phasing out HCFC production for controlled uses in accordance with the Montreal Protocol phase-out schedule shall not exceed a specified value. In addition, the agreement specified the total amount of phase-out to be achieved in metric tonnes, by substance. That amount was based on the last verification of production data of the substances conducted prior to the decision approving the stage I of the HPPMP.

73. The Secretariat notes that Annex F includes HFC-23. The Secretariat further notes that at the time of issuance of the present document, the Parties are discussing how to report HFC-23 by-product generated during the production of HCFC-22 under Article 7 of the Protocol.³⁶ As the GWP of HFC-23 is 14,800, the outcome of those discussions could substantially affect a country's HFC production baseline. Moreover, depending on the outcome of those discussions, it is possible that a Party could report production of HFCs without having any dedicated HFC production capacity.³⁷

74. While HFC production from Article 5 countries accounts for a substantial proportion of global HFC production, virtually all of that production is in a single Article 5 country. It is expected that only a very limited number of Article 5 countries will produce HFCs. To date, proposals in the production sector have been considered on a case-by-case basis by the production sector sub-group, which then made recommendations to the Executive Committee. A similar approach could be used to address the starting point for the production of HFCs.

³⁶ Paragraph 20 of document UNEP/OzL.Pro.30/2.

³⁷ Unless that Party destroyed the HFC-23 by-product with a technology approved by the Parties or the HFC-23 by-product is entirely used as feedstock in the manufacture of other chemicals. The Secretariat is unaware of any feedstock uses of HFC-23.

RECOMMENDATION

75. The Executive Committee may wish:

- (a) To note the key considerations for developing a methodology for establishing the starting point for sustained aggregate reductions for the consumption and production sectors under the Kigali Amendment (decision 81/67(e)) contained in document UNEP/OzL.Pro/ExCom/82/66; and
- (b) To consider that information in the context of its discussions on the development of the cost guidelines for the phase-down of HFCs in Article 5 countries: draft criteria for funding, under agenda item 11(d).

Annex I

EXTRACT OF EXECUTIVE COMMITTEE DISCUSSIONS ON THE STARTING POINT AT THE 78TH MEETING³⁸

Sustained aggregate reductions in HFC consumption and production

44. The representative of the Secretariat introduced paragraphs 32 to 39 of document UNEP/OzL.Pro/ExCom/78/5.

45. There was overall agreement with the principle applied in decision XXVIII/2, whereby remaining eligible consumption for funding would be determined on the basis of the starting point of national aggregate consumption. One member said that Article 5 countries had been in favour of the inclusion of that principle because a sector- or substance-specific approach would limit the opportunities for funding, owing to the lack of flexibility. That was especially the case where new technologies were not available. She stressed that this stance was consistent with the text of decision XXVIII/2, whereby eligible consumption for funding was defined without any distinction in terms of substance or sector. Another member said that, in the context of a phase-down rather than a phase-out, limiting consumption and production reduction to particular sectors or substances would constrain a country's ability to take advantage of alternatives to HFCs that had a low-global warming potential (GWP), with considerable impact on conversion and market decisions, and indeed on the sectoral and national economy. Another member said that the phase-down of HFC was more complex than the phase-out of ODS, given the greater proportion of blends than of pure substances, requiring a more flexible approach. Another member stated that it was clear from decision XXVIII/2 that reductions were to be based on national aggregate consumption, rather than sector- or substance-specific amounts, so there was no need to incorporate that as a specific principle in the guidelines. One member stressed that the two key elements of the discussion were flexibility and sustainability.

46. There was general recognition of the complexity involved in determining the formula by which the starting point would be calculated. One member said that, in the past, for phase-out of ODS, the starting point had been the baseline of consumption, or a year close to the baseline. In the present instance, a baseline comprising the average HFC consumption for the period 2020 to 2022, plus 65 per cent of the HCFC consumption baseline, would be too high as a starting point for funding eligibility. A starting point based solely on HFC consumption, however, could be considered too low, as phase-out projects might not address all the projected growth. Further discussion was therefore required on the approach for determining the starting point.

47. One member said that, in the past, funding had been made available for phase-out of consumption of controlled substances while new enterprises were still being established, which increased consumption. The principle of sustained aggregate reduction had been established to ensure that the Multilateral Fund assisted Article 5 countries in meeting their obligations. He stated that the inclusion of HCFCs in the formula for setting the baseline confounded the matter of how the starting point might be determined, and was different from what had been done previously. It was noted that the starting point for a country should be identified at the time of the first funded reduction project. Another member said that, historically, a clear distinction between consumption in the investment and non-investment sectors had been applied for calculating funding levels, and such a distinction might prove useful if distinction by sub-sector was considered too constraining.

48. There was some discussion of whether the starting point should be defined in terms of CO₂ equivalent, metric tonnes or both, and it was agreed that the matter should be considered further.

³⁸ Paragraphs 44-49 of UNEP/OzL.Pro/ExCom/78/11.

49. In subsequent discussions, there was some debate on the inclusion in the template for draft cost guidelines of paragraph 19 of decision XXVIII/2, which requested the Executive Committee to incorporate the principle that remaining eligible consumption for funding in tonnage would 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 HFC phase-down plans. One member said that the language of the Kigali Amendment made it clear that that principle should be included among the principles already agreed by the Parties. The Executive Committee agreed to defer further consideration of the matter to a future meeting.
