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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
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**ANALYSIS OF THE IMPLICATIONS OF PARALLEL OR INTEGRATED
IMPLEMENTATION OF HCFC PHASE-OUT AND HFC PHASE-DOWN ACTIVITIES
(DECISION 81/69)**

BACKGROUND

1. At its 80th meeting, the Executive Committee considered the document on the consolidated business plan of the Multilateral Fund for 2018-2020.¹ The document included a section on the capacity of the Multilateral Fund to address HFC phase-down, noting that the implementation of the Kigali Amendment could expand the scope and complexity of the work of the Executive Committee, the implementing agencies, the Secretariat and the Treasurer. Subsequent to a discussion, where some members pointed out that responsibilities under the Kigali Amendment and in other areas would entail additional work in the future for the Fund's institutions, the Executive Committee requested the Secretariat to submit to the 81st meeting a document on the implications for Multilateral Fund institutions in terms of expected workload in the coming years, including in relation to the Kigali Amendment for the phase-down of HFCs (decision 80/34(f)).

2. In line with decision 80/34(f), at its 81st meeting the Executive Committee considered the document on Implications for Multilateral Fund institutions in terms of expected workload in the coming years, including in relation to the Kigali Amendment for the phase-down of HFCs.² During the discussion, it was acknowledged that certain aspects needed further consideration, including whether HCFC phase-out and HFC phase-down activities were to be carried out in parallel or in an integrated manner, the implications of that balance for replenishment levels and resource availability, cost-effectiveness, implementation and reporting, and the capacities of Fund institutions and Article 5 countries to carry out such work. Other aspects that merited further discussion, included partnerships and co-financing to generate co-benefits in areas such as climate change and energy efficiency.

¹ UNEP/OzL.Pro/ExCom/80/16

² UNEP/OzL.Pro/ExCom/81/55

3. Accordingly, the Executive Committee *inter alia* requested the Secretariat:
 - (a) To submit to the 84th meeting an analysis, conducted in consultation with the bilateral and implementing agencies, of the implications of parallel or integrated implementation of HCFC phase-out and HFC phase-down activities, taking into account, *inter alia*, resource availability and cost-effectiveness and the capacity of Fund institutions and Article 5 countries, especially national ozone units (NOUs) and programme management units (PMUs); and
 - (b) To take into account in the analysis relevant partnerships and the engagement of Fund institutions with other institutions, particularly in HFC phase-down activities, supported by the Multilateral Fund, in line with the Kigali Amendment (decision 81/69).

Scope and structure of the document

4. The Secretariat has prepared this preliminary document in response to decision 81/69.
5. In the context of the Multilateral Fund, the terms “parallel” implementation and “integrated” implementation have not been defined *per se*. However, throughout the history of the Fund, phase-out activities have been implemented in a “parallel” and/or “integrated” manner, as illustrated below.
6. Since the establishment of the Fund and up to 2015, Article 5 countries were able to completely phase out their consumption and production of Annex A Group I (CFCs), Annex A Group II (halons) and Annex B Group II (CTC) substances prior to 1 January 2010; and Annex B Group III (TCA) and Annex E (MB) substances prior to 1 January 2015.³ During this process, the majority of the phase-out of controlled substances was achieved through stand-alone investment projects and/or technical assistance programmes that were implemented concurrently, i.e., “parallel” implementation.
7. Towards the end of the 2010 compliance target for CFCs and halons, several Article 5 countries developed national phase-out plans (NPPs) that involved “integrated” implementation of activities in the manufacturing sector (conversion of enterprises using different Annexes/Groups of controlled substances) and the refrigeration servicing sector.
8. With the acceleration of the HCFC phase-out targets, emerging HCFC stand-alone investment projects were implemented in parallel to the remaining activities in the NPPs and terminal ODS phase-out management plans (TPMPs). Subsequently, many Article 5 countries took into consideration the partnerships and structure already created by the NPPs and TPMPs when preparing their HCFC phase-out management plans (HPMPs). Eventually, in a few countries outstanding activities in the refrigeration servicing sector from the NPPs and TPMPs were integrated in their HPMPs.
9. In line with the implementation modalities under the Multilateral Fund, for the purposes of this document, “parallel” implementation refers to HFC phase-down activities that will have to be implemented simultaneously with ongoing HCFC phase-out activities with separate actions and sometimes with different stakeholders. On the other hand, “integrated” implementation refers to the HFC phase-down activities that can be incorporated into ongoing or planned HCFC phase-out activities, sharing specific actions and with common stakeholders.

³ These are the most commonly consumed and produced substances by Article 5 countries. Countries that reported consumption and production of substances in Annex B Group I (other CFCs) and Annex C Group II (HBFCs) were in compliance with their phase-out obligations. In a few countries, Parties allowed the consumption and production of some controlled substances (mainly CFCs, CTC and MB) after the phase-out date for essential or critical uses.

10. The present document has been structured in the following three parts and a recommendation:

I An overview of HCFC and HFC consumption and needed reductions:

In order to determine the magnitude of the additional challenge of commencing HFC phase-down while HCFCs are still being phased out, it is important to understand the current levels of production and consumption of these substances, and to forecast the amounts that will need to be reduced during the 2020-2030 period. Accordingly, this section describes the compliance phase-out targets for HCFCs and phase-down targets for HFCs for Article 5 countries; forecasts the 2020-2030 consumption of HCFCs and HFCs; and estimates the distribution of HCFCs and HFCs among the manufacturing and refrigeration servicing sectors.

II Parallel or integrated implementation of HCFC phase-out and HFC phase-down activities:

This section reviews the variables that have an influence on whether activities could be implemented in an integrated manner or in parallel; and presents an analysis of the extent to which HCFC phase-out and HFC phase-down activities are expected to be implemented in an integrated or parallel manner in the production, consumption manufacturing and refrigeration servicing sectors during the 2020-2030 period. For each of these sectors, the analysis covers matters related to resource availability and cost-effectiveness; the capacity of Fund institutions and Article 5 countries; and areas requiring policies to be formulated by the Executive Committee.

III Observations:

This part presents a set of observations by the Secretariat based on the analysis contained in the document, the last of which contains a recommendation.

11. In preparing this document, the Secretariat reviewed several policy documents and associated decisions adopted by the Executive Committee that shed light on different elements of decision 81/69(a).

Discussions at the Inter-agency Coordination Meeting

12. During the Inter-agency Coordination Meeting hosted by the Secretariat,⁴ the Secretariat presented the structure of the analysis requested by the Committee under decision 81/69, and outlined the elements (e.g., resources available, cost-effectiveness and capacity of Fund institutions and Article 5 countries) to be considered for a parallel or integrated implementation of HCFC phase-out and HFC phase-down activities. During the discussions, bilateral and implementing agencies provided comments and shared experiences in assisting Article 5 countries to initiate activities related to HFC phase-down, which were reflected in the document. Prior to finalizing the present document, the Secretariat sent it to bilateral and implementing agencies for their comments. One bilateral agency provided comments to the document. The Secretariat highly appreciates the insights, information and comments provided by the bilateral and implementing agencies.

PART I AN OVERVIEW OF CONSUMPTION OF HCFCs AND HFCs

13. In order to determine the magnitude of the additional challenge of starting HFC phase-down while HCFCs are still being phased out, it is necessary to forecast the levels of consumption of these controlled substances and the amounts that will need to be reduced during the 2020-2030 period.

⁴ Montreal, 9 – 11 October 2019.

Compliance phase-out targets for HCFCs and HFCs

14. Currently, Article 5 countries are required to reduce their consumption and production of Annex C Group I substances (HCFCs) and, for those Article 5 countries that have ratified the Kigali Amendment,⁵ their consumption and production of Annex F substances (HFCs), according to the schedules agreed under the Protocol, as shown in Table 1.

Table 1. Compliance phase-out for HCFCs and phase-down for HFCs for Article 5 countries

Description	HCFC	HFC
Baseline	Annex C Group I (HCFC)	Annex F (HFC) and 65% of baseline of Annex C Group I
Base years	2009 and 2010	2020, 2021, 2022 for group 1 countries ⁶ 2024, 2025, 2026 for group 2 countries ⁷
Compliance schedule	Reduction steps: <ul style="list-style-type: none"> • 2013–2014: 0% of baseline • 2015–2019: 10% of baseline • 2020–2024: 35% of baseline • 2025–2029: 67.5% of baseline • 2030-2039: 97.5% of baseline • 2040 and thereafter: 100% of baseline 	Reduction steps: Group 1 countries: <ul style="list-style-type: none"> • 2024–2028: 0% of baseline • 2029–2034: 10% of baseline • 2035–2039: 30% of baseline • 2040–2044: 50% of baseline • 2045 and thereafter: 80% of baseline Group 2 countries: <ul style="list-style-type: none"> • 2028–2031: 0% of baseline • 2032–2036: 10% of baseline • 2037–2041: 20% of baseline • 2042-2046: 30% of baseline • 2047 and thereafter: 85% of baseline
Number of controlled substances	40, of which only 10 are consumed by Article 5 countries. Over 99.0% of the aggregated HCFC baseline consists of three substances: HCFC-22 (60.6%), HCFC-141b (33.1%) and HCFC-142b (6.0%)	17 in Annex F Group I and 1 in Group II (i.e., HFC-23 ⁸). Over 98.5% of the aggregated HFC baseline consists of two pure substances and four blends: HFC-134a (21.6%), R-410A (40.1%), R-407C (21.8%), R-404A (6.9%), R-507A (6.9%), HFC-152a (1.3%)
Data reporting under Article 7 of the Protocol	Mandatory once a country ratifies the Montreal Protocol	Mandatory once a country ratifies the Kigali Amendment (the earliest report would be due on 30 September 2020, several Article 5 countries already reported 2018 consumption)
Data reporting under the CP implementation report	Required to access Multilateral Fund assistance	Required to access Multilateral Fund assistance (the earliest report would be on 1 May 2020)
Measurement	ODP tonnes (consumption and production in metric tonnes (mt) multiplied by the ozone depleting potential (ODP) of each	CO ₂ equivalent (consumption and production in metric tonnes (mt) multiplied by the global-warming potential (GWP) of

⁵ The Kigali Amendment entered into force on 1 January 2019.

⁶ Group 1 countries: all Article 5 countries except for the 10 countries in group 2.

⁷ Group 2 countries: Bahrain, India, Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the United Arab Emirates. As a reference, the aggregate HCFC baseline for compliance of these countries is equivalent to 13.7 per cent of the aggregate HCFC baseline for all Article 5 countries.

⁸ HFC-23, with a GWP of 14,800, is mainly a by-product of the production of HCFC-22.

Description	HCFC	HFC
	substance: 0.055 for HCFC-22; 0.11 for HCFC-141b; 0.065 for HCFC-142b)	the substance, which ranges from 124 for HFC-152a to 14,800 for HFC-23)
Consuming sectors	<ul style="list-style-type: none"> • Manufacturing of rigid polyurethane (PU) and extruded polystyrene (XPS) foams • Manufacturing of air conditioners and commercial refrigerators • Solvent applications • Aerosol applications • Refrigeration servicing sector 	Same manufacturing and servicing sectors as for HCFCs plus: <ul style="list-style-type: none"> • Manufacturing of domestic refrigerators • Manufacturing of other commercial refrigerators (e.g., based on R-404A) • Manufacturing and servicing mobile air-conditioning systems • Manufacturing of metered-dose inhalers
Available reference production and consumption ⁹	Production (mt) Average 2009-2010: 501,265 Actual 2015: 374,313 Target 2020: 346,752 Target 2030: 13,337 Consumption (mt) Average 2009-2010: 535,722 Actual 2015: 389,360 Target 2020: 348,219 Target 2030: 13,393	Production (mt) Average 2009-2010: n/a Estimated 2015: 312,515 Estimated 2020: n/a Estimated 2030: n/a Consumption (mt) Average 2009-2010: n/a Estimated 2015: 284,325 Estimated 2020: 477,618 Estimated 2030: 1,021,216

Forecast of HCFC and HFC consumption in the 2020-2030 period

15. The levels of consumption and production of HCFCs have been reported under Article 7 of the Montreal Protocol from the time countries ratified the Montreal Protocol. For Article 5 countries, HCFC baselines for compliance were established once they submitted their 2010 data reports.¹⁰ However, information on the levels of consumption and production of HFCs is not yet available under the Protocol, as reporting only becomes mandatory once a country ratifies the Kigali Amendment. As at 3 November 2019, 57 Article 5 countries have ratified the Kigali Amendment, and will report the levels of HFC consumption and production in 2019 under Article 7 of the Montreal Protocol in 2020. So far, only a limited number of Article 5 countries have submitted HFC consumption or production data for the year 2018.

16. Information on the levels of consumption and production of HFCs in Article 5 countries is limited to reports prepared by the TEAP Task Force under decisions XXV/5 and XXVI/9,¹¹ and a scientific journal article published in Atmospheric Science.¹²

Production sector

17. Based on the information in the reports by the TEAP Task Force, aggregate production of HFCs in Article 5 countries was estimated at 312,515 mt in 2015,¹³ consisting of: 71,000 mt of HFC-32; 98,500 mt of HFC-125; 126,000 mt of HFC-134a and 17,000 mt of HFC-143a. A substantial proportion of HFC-32,

⁹ Sources: Article 7 data and TEAP Task Force report under decisions XXV/5 and XXVI/9.

¹⁰ HCFC baseline consumption is calculated based on the average consumption of 2009 and 2010.

¹¹ A survey of ODS alternatives was also completed in 119 Article 5 countries which provided very preliminary information on their HFC consumption, for the years 2012-2015.

¹² The TEAP Task Force reports include aggregate HFC consumption and production data and projections for each five-year period between 2010 and 2030. The Velders et al. (2015) report provides information on future atmospheric abundances and climate forcings from scenarios of global and regional HFC emissions.

¹³ As a reference, the aggregate HCFC production baseline in Article 5 countries amounted to 501,265 mt (with the production of one country amounting to 430,962 mt).

HFC-125, HFC-134a and HFC-143a was used for the production of HFC blends (i.e., R-410A, R-407C, R-404A, R-407F and R-507A). It appears that China and India are the only producers of HFCs in Article 5 countries.

18. HCFCs are being produced in seven Article 5 countries, with an aggregate production baseline of 501,265.6 mt (32,988.9 ODP tonnes). Following the compliance schedule of the Montreal Protocol, the aggregate production of HCFCs should decrease from a maximum of up to 346,752 mt (21,443 ODP tonnes) in 2020 to 13,337 mt (825 ODP tonnes) in 2030 (a reduction of 333,415 mt), as shown in Table 2.

Table 2. HCFC production for controlled uses in Article 5 countries (mt and ODP tonnes)

Party* (mt)	Baseline	2015	2018	% (2018 / baseline)	Target 2020**	Target 2025**	Target 2030**
Argentina	4,082.6	2,446.0	1,192.2	29.2	2,653.7	1,326.8	102.1
China	430,962.1	330,011.1	319,039.9	74.0	280,125.4	140,062.7	10,774.1
Democratic People's Republic of Korea	501.0	498.0	-	-	325.7	162.8	12.5
India	43,626.7	31,411.3	34,079.7	78.1	28,357.4	14,178.7	1,090.7
Mexico	12,671.9	2,926.1	3,341.7	26.4	8,236.7	4,118.4	316.8
Republic of Korea***	7,184.3	6,344.4	5,270.6	73.4	4,669.8	2,334.9	179.6
Venezuela (Bolivarian Republic of)	2,236.9	676.5	34.1	1.5	1,454.0	727.0	55.9
Total	501,265.6	374,313.3	362,958.1	72.4	325,882.6	162,911.3	12,531.6
Party* (ODP tonnes)	Baseline	2015	2018	% (2018 / baseline)	Target 2020**	Target 2025**	Target 2030**
Argentina	224.5	134.5	65.6	29.2%	146.0	73.0	5.6
China	29,121.9	21,898.4	20,754.0	71.3%	18,929.3	9,464.6	728.0
Democratic People's Republic of Korea	27.6	27.4	-	0.0%	17.9	9.0	0.7
India	2,399.5	1,727.6	1,874.4	78.1%	1,559.7	779.8	60.0
Mexico	697.0	160.9	183.8	26.4%	453.0	226.5	17.4
Republic of Korea***	395.1	348.9	289.9	73.4%	256.8	128.4	9.9
Venezuela (Bolivarian Republic of)	123.0	37.2	1.9	1.5%	80.0	40.0	3.1
Total	32,988.6	24,335.0	23,169.5	70.2%	21,442.6	10,721.3	824.7

(*) Except for China, all other Article 5 countries are only producing HCFC-22.

(**) Based on Montreal Protocol targets for production of HCFCs.

(***) The Party is not receiving assistance from the Multilateral Fund.

19. As a result of accelerating the phase-out of HCFCs agreed in decision XIX/6, the Executive Committee has approved funding for the HCFC production phase-out management plan (HPPMP) for China, representing approximately 86 per cent of the aggregate production level in Article 5 countries. So far, implementation of the approved HPPMP, together with other factors external to the Multilateral Fund (e.g., economic situation prevailing in HCFC-producing countries), have resulted in the reduction of HCFC production for controlled uses in advance of the allowable levels under the Protocol. For example, the aggregate production of HCFC for controlled uses in 2018 (362,958.1 mt) represented 72.4 per cent of the aggregate HCFC production baseline.

Consumption sector

20. The aggregate level of HFC consumption in Article 5 countries amounted to 284,325 mt in 2015 and, in the absence of the Kigali Amendment (i.e., business-as-usual scenario) consumption is expected to increase to 1,021,216 mt by 2030, as shown in Table 3.¹⁴

¹⁴ Source: UNEP/OzL.Pro/ExCom/82/66 (Table 2).

Table 3. HFC consumption in Article 5 countries reported by the TEAP Task Force

HFC	Consumption (mt)				Growth rate (%) [*]
	2015	2020	2025	2030	
R-410A	106,661	192,770	284,682	364,845	8.5
HFC-134a	78,688	106,731	139,547	177,432	5.6
R-407C	55,278	101,216	174,433	285,500	11.6
R-404A	18,202	31,982	55,964	83,845	10.7
R-507A	18,202	31,982	55,964	83,845	10.7
HFC-152a	3,364	5,669	11,280	15,225	10.6
HFC-245fa	2,172	3,840	4,986	5,504	6.4
HFC-365mfc/HFC-227ea	1,758	3,428	4,546	5,020	7.2
Total	284,325	477,618	731,402	1,021,216	8.9

* Average growth rate between 2015 and 2030.

21. Following the compliance schedule of the Montreal Protocol, the aggregate consumption of HCFCs should decrease from a maximum of up to 348,219 mt (23,225 ODP tonnes) in 2020 to 13,393 mt (893 ODP tonnes) in 2030 (a reduction of 334,826 mt), as shown in Table 4.

Table 4. Maximum allowable levels of consumption of HCFCs during the 2020-2030 period

Controlled substance	Baseline	2020	2025	2030
HCFC (mt)*				
HCFC-22	394,655	256,525	128,263	9,866
HCFC-141b	107,872	70,117	35,058	2,697
HCFC-142b	33,195	21,577	10,789	830
Total HCFC	535,722	348,219	174,110	13,393

(*) Main HCFCs consumed representing over 99.0% of the aggregated baseline.

22. However, the actual levels of consumption of HCFCs and HFCs in Tables 3 and 4 will depend on a number of factors, *inter alia*, the speed of completion of approved projects to phase out HCFCs, the expected growth in the use of refrigeration and air-conditioning (RAC) equipment in Article 5 countries, the introduction of alternative refrigerants that could be used as drop-ins for certain applications (e.g., R-407A or R-407F as replacement for R-404A), and the introduction of cost-effective alternative technologies in HCFC and HFC applications.

23. The Executive Committee has approved funding for the phase-out of HCFCs in 145 Article 5 countries, mainly through HPMPs.¹⁵ So far, implementation of the approved HPMPs has resulted in the reduction of HCFC consumption well in advance of the allowable levels under the Protocol. For example, the aggregate consumption of HCFCs in 2018 (365,131 mt) represented 68 per cent of the aggregate HCFC baseline and was 117,019 mt lower than the allowable level of consumption for that year (482,150 mt), as shown in Table 5.

Table 5. HCFC consumption of the three main HCFCs (mt)

Consumption	Baseline	2014	2015	2016	2017	2018	%2018 to baseline
Reported							
HCFC-22	394,655	341,207	298,506	301,003	296,258	297,000	75.3
HCFC-141b	107,872	89,452	69,091	65,103	63,493	56,990	52.8
HCFC-142b	33,195	15,414	18,243	15,899	16,628	11,140	33.6
Actual	535,722	446,073	385,840	382,005	376,380	365,131	68.2

¹⁵ Only one country, Syrian Arab Republic, does not have an approved HPMP due to the circumstances prevailing in the country. At the 62nd meeting, funding was approved for a stand-alone investment project to phase out 12.9 ODP tonnes of HCFC in the refrigeration and air-conditioning sector, representing 9.6 per cent of the HCFC baseline; and at the 83rd meeting, additional funding was approved for the preparation of stage II of the HPMP.

Consumption	Baseline	2014	2015	2016	2017	2018	%2018 to baseline
Allowable	535,722	535,722	482,150	482,150	482,150	482,150	
Difference		(89,649)	(96,310)	(100,145)	(105,770)	(117,019)	

24. Considering that the HPMPs approved so far will address the phase-out of approximately 60.6 per cent of the HCFC baseline once completed, and that additional stages of HPMPs will be approved possibly prior to 2025, it is expected that the 2020-2030 levels of consumption of HCFCs will likely be lower than those indicated in Table 4.

Distribution of HCFCs and HFCs in the manufacturing and refrigeration servicing sectors

25. Information from approved HPMPs shows that in 95 countries (mostly categorized as low-volume-consuming (LVC) countries) HCFCs are solely used in the refrigeration servicing sector; for the remaining 50 countries, HCFCs are used both in the manufacturing sector (namely PU and XPS foams, room AC, commercial refrigeration, aerosols and solvents), and in the refrigeration servicing sector.

26. Information in the reports prepared by the TEAP Task Force shows that over 95 per cent of the total HFC consumption in Article 5 countries is in the RAC sector, as shown in Table 6.

Table 6. Distribution of HFC consumption in Article 5 countries

Sector	2015	2020	2025	2030
Metric tonnes				
RAC manufacturing	185,838	281,619	392,390	510,596
RAC servicing	87,033	176,493	305,922	468,550
Other sectors	11,454	19,506	33,090	42,070
Total (mt)	284,325	477,618	731,402	1,021,216
Per cent (%)				
RAC manufacturing	65.4	59.0	53.6	50.0
RAC servicing	30.6	37.0	41.8	45.9
Other sectors	4.0	4.1	4.5	4.1

27. Similar to the sectoral distribution of HCFCs, it is assumed that in approximately 100 Article 5 countries HFC is solely used in the refrigeration servicing sector. This assumption is supported by information available from surveys of ODS alternatives in 119 Article 5 countries,¹⁶ which indicates that HFC consumption in the refrigeration servicing sector accounted for 97 per cent of total consumption for LVC countries and 76 per cent for non-LVC countries.¹⁷

PART II PARALLEL OR INTEGRATED IMPLEMENTATION OF HCFC PHASE-OUT AND HFC PHASE-DOWN ACTIVITIES

28. A parallel and/or an integrated implementation of activities for HCFC phase-out and HFC phase-down will depend on several factors, including the sectoral use of controlled substances (i.e., manufacturing or refrigeration servicing) and implementation timelines; the resources available to

¹⁶ Paragraph 4 of decision XXVI/9 requested 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. On this basis, funding for 127 surveys was approved. At the 80th meeting, the results from surveys in 119 countries (42 non-LVC and 77 LVC countries) were presented in document UNEP/OzL.Pro/ExCom/80/54.

¹⁷ The aggregate HCFC baseline of the 42 non-LVC countries represents 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. Surveys were not submitted by the largest consuming countries, including Brazil, China and India.

support these activities and potential cost efficiencies; the capacity of institutions related to the Multilateral Fund; and the policies that the Executive Committee may wish to establish.

Considerations for the refrigeration servicing sector

29. The vast majority of the activities being implemented in the refrigeration servicing sector could apply to both HCFC phase-out and HFC phase-down. These activities relate to *inter alia* training and certification of technicians; strengthening technical/vocational schools and refrigeration associations; the distribution of basic equipment and service tools including recovery/recycling units; refrigerant containment strategies; and the adoption of standards and codes of practice to facilitate the safe adoption of flammable and/or toxic low-GWP refrigerants.

30. Under these circumstances, the overlapping schedule of HCFC phase-out and HFC phase-down could represent an opportunity to develop integrated cost-effective and long-term sustainable strategies in Article 5 countries, which would entail, *inter alia*:¹⁸

- (a) Developing, revising or adopting standards, codes and norms that could facilitate the adoption, operation and servicing of refrigeration technologies based on low-GWP refrigerants;
- (b) Strengthening regulatory frameworks for refrigerant management through *inter alia* certification of technicians; access to selling/buying refrigerants by trained/certified technicians, licensing of service enterprises/workshops; labelling of refrigerants, record keeping, monitoring and reporting; and capacity building for authorities and stakeholders;
- (c) Reviewing and periodically updating the curricula of the training programmes for customs and enforcement officers addressing the obligations under the Montreal Protocol including its Kigali Amendment;
- (d) Strengthening the capacity of vocational training systems and certification bodies by periodically reviewing the curricula of the training programmes to address good servicing practices and safety issues related to flammability and/or toxicity of refrigerants being phased in;
- (e) Developing or strengthening self-sustained refrigerant containment strategies to ensure that installed refrigeration equipment can continue operating until end-of-life; assessing the benefits and challenges of recovering, recycling and reclaiming refrigerants;
- (f) Strengthening technical support for the assembly, installation and initial-refrigerant-charge subsector as it could influence the introduction of technologies in local markets;
- (g) Assessing through business models the long-term sustainability of activities implemented in the refrigeration servicing sector, in particular recovering, recycling and reclaiming schemes and end-user incentive schemes;
- (h) Strengthening RAC associations, and ensuring their engagement in the implementation of activities related to the sector.

31. An integrated approach in the refrigeration servicing sector could be implemented with the existing institutions established with the assistance of the Multilateral Fund that are currently implementing the HCFC phase-out activities. The components required to ensure this coordination at the national level would need to be assessed during the preparation of harmonized national strategies and phase-out/phase-down

¹⁸ Extracted from paragraph 92 of document UNEP/OzL.Pro/ExCom/82/64.

plans to ensure the sustained implementation of activities. While many elements of these strategies can be applied for both HCFC and HFC refrigerants, consideration would also need to be given to potential activities to address HFC applications that are not being addressed by HPMPs (e.g., use of HFC-134a in mobile air-conditioning and transport refrigeration).

Considerations for the manufacturing sector

32. For most of the 50 Article 5 countries with HCFC-based manufacturing enterprises, the use of HCFCs in the manufacturing sector has been or will be completely phased out once the approved conversion projects have been completed. For several countries, additional activities would be required to complete the phase-out of HCFCs used in the manufacturing sector. An overview of the HCFC phase-out activities potentially to be approved in the manufacturing sector is presented below:

- (a) Stage III of the room AC sector plan in China, to phase out 2,260 ODP tonnes of HCFC-22, and stage III of the industrial and commercial refrigeration (ICR) sector plan in China, to phase out 1,610 ODP tonnes of HCFC-22; both expected to be submitted between 2020 and 2021;
- (b) Projects in the PU and XPS foam sectors, commercial refrigeration, and AC sectors in several countries (e.g., Algeria, Bahrain, Costa Rica, Egypt, Kuwait, Libya, Morocco, Pakistan, Somalia, South Africa), to phase out approximately 50.54 ODP tonnes of HCFC-141b, 96.50 ODP tonnes of HCFC-22, and 11.10 ODP tonnes of HCFC-142b;¹⁹ and
- (c) Additional phase-out activities mostly in the commercial refrigeration and AC manufacturing sectors after 2022 as part of stage III of the HPMPs for several Article 5 countries.

33. The extent and the timing of implementation of HFC investment projects will depend on *inter alia* the need of these conversions to ensure compliance with the Montreal Protocol, the availability of cost-effective alternative technologies in local markets; the availability of components (e.g., compressors, heat exchangers, controls) required for the conversion of the manufacturing lines; discussions related to HFC investment projects by the Executive Committee; and the availability of financial resources under the Multilateral Fund. As some of the HCFC phase-out investment projects are being completed, HFC phase-down investment projects could be gradually initiated, maintaining even workload distribution for the institutions.

34. Given the broader use of HFCs in the manufacturing sector as compared to HCFCs, it is expected that HFC investment projects would be implemented separately from HCFC investment projects. However, there could be opportunities of integrated implementation in enterprises that manufacture both HCFC-based and HFC-based equipment/products and wish to convert both technologies, as explained below:

- (a) Enterprises manufacturing PU foam applications based on HCFC-141b, HFC-245fa and/or HFC-365mfc/HFC-227ea polyol systems. Low-GWP polyol systems are currently available for all PU foam applications (although HFO-based technologies have limited commercial availability in several markets). Only few Article 5 countries where the phase-out of HCFC-141b used as a foam blowing agent has not been completed (including China, which will completely phase out HCFC-141b by 2026) could consider potential benefits of integrated HCFC phase-out and HFC phase-down in this sector;

¹⁹ Based on information contained on the 2020-2022 business plans submitted to the 84th meeting (UNEP/OzL.Pro/ExCom/84/26 to 84/31).

- (b) Enterprises manufacturing XPS foam applications based on HCFC-22/HCFC-142b and HFC-134a/HFC-152 blowing agents. Only few Article 5 countries where the phase-out of HCFC-22/HCFC-142b has not been completed (including China, which will completely phase out HCFC-22/HCFC-142b used in XPS foam applications in 2026) could consider potential benefits of integrated HCFC phase-out and HFC phase-down in this sector, considering that low-GWP technologies are currently available;
- (c) Enterprises manufacturing room and/or commercial AC equipment with production lines based on HCFC-22 and R-410A refrigerants. The conversion of both production lines could be integrated, with the potential of reducing conversion costs associated with *inter alia*, project design; safety if the alternative selected is flammable; components (e.g., compressors and heat exchangers due to economies of scale), and training, certification, verification and commissioning;
- (d) Enterprises manufacturing commercial refrigeration with production lines based on different refrigerants (e.g., HCFC-22, HFC-134a and/or R-404A). Conversions of HFC-based products could be integrated with the ongoing conversion of HCFC-22-based products (which in most cases are at an advanced stage of implementation), ensuring the phase-out of both HCFC and HFC, with potential reductions in the overall conversion costs; and
- (e) Enterprises manufacturing chillers or using controlled substances in aerosol, solvent and/or fire-fighting applications. The amount of controlled substances used in these sectors is smaller as compared to the amount used in the foam and RAC sectors; therefore, conversions of these enterprises could be considered on a case-by-case basis.

35. Based on the above considerations, Table 7 presents a preliminary analysis of modalities of implementation of investment projects during the 2020-2030 period, based on information so far available. As more information on the consumption of HFC and availability of alternatives in different sectors become available, this analysis could vary.

Table 7. Summary of modalities of implementation of investment projects

Sector	HCFC	HFC	Type of implementation	Other considerations
PU foam	HCFC-141b	HFC-245fa HFC-365mfc / HFC-227ea	PU foam sector plans are in advanced stages of implementation in most countries, where low-GWP alternatives are being introduced. Therefore, integrated implementation might be limited to cases where substantive HCFC phase-out work would be expected in the next years.	HFC phase-out in this sector could help ensure sustainability of adoption of low-GWP alternatives by the HCFC phase-out plans. Market structure to promote HFC phase-down with low-GWP blowing agents uptake increasing in the near future, i.e., next 2-3 years.
XPS foam	HCFC-22/ HCFC-142b	HFC-134a/ HFC-152	XPS foam sector plans are in advanced stages of implementation in most countries where low-GWP alternatives are being introduced. Therefore, integrated implementation might be limited to cases where substantive HCFC phase-out work is expected in the next years.	Low-GWP alternatives being introduced through HPMPs (i.e., CO ₂ , isobutane and HFO).
Domestic refrigeration (refrigeration system)		HFC-134a	Conversion of HCFC-141b panels already completed in most countries. Integrated implementation not possible.	As cost-effective alternatives to HFC are commercially available in local markets, this sector could be converted now.

Sector	HCFC	HFC	Type of implementation	Other considerations
Commercial refrigeration (stand-alone units)		HFC-134a R-404A Blends	Conversion of HCFC-141b panels already completed in most countries. Integrated implementation possible in enterprises using multiple refrigerants for different applications (e.g., HCFC-22, HFC-134a and R-404A).	Several technical options are currently commercially available while others are under development. New standards for flammable refrigerants can help faster adoption of low-GWP technology. Manufacturing of smaller units could be converted in the short term.
Larger commercial and industrial refrigeration	HCFC-22	HFC-134a R-404A	To be considered on a case-by-case basis given the variety of applications and types of enterprises. Integrated implementation may be feasible in enterprises using multiple refrigerants for different applications (e.g., HCFC-22, HFC-134a and R-404A).	Drop-in conversions may help reduce dependence on R-404A at a relative low cost. New blends with GWP lower than 250 (in A2L category) ²⁰ and lower than 1,400 in non-flammable category available.
Room and commercial AC	HCFC-22	R-410A R-407C Blends	Parallel implementation is highly likely due to high consumption and growth of HFCs in these applications. Potential for integrated implementation in enterprises consuming HCFC and HFCs, mainly R-410A. There could be enterprises which were not eligible under HCFC phase-out that could explore integrated implementation.	Energy efficiency standards in AC could favour adoption of R-410A and other high GWP refrigerants in the short run; policy measures may be needed to avoid this.
Chillers	HCFC-22	HFC-134a, R-410A, R-407C, R-413A	Similar to commercial AC, although consumption levels may be lower. This sector relates more to end-user and/or assembly enterprises. Parallel implementation is highly likely.	Limited information available.
Aerosol	HCFC-22, HCFC-141b	HFC-134a in MDI	To be implemented in parallel.	Levels of consumption of HFCs in MDI and other aerosol applications appear to be low. Time required to develop HFC-free technology for MDI.
Solvent	HCFC-141b, HCFC-22, HCFC-225ca HCFC-225cb	Several HFC blends	To be determined.	Levels of consumption of HFCs appear to be low.
Fire fighting	HCFC-123	HFC-227ea, HFC-236fa, HFC-23, HFC-125 and other HFCs and blends	Integrated implementation could be considered in approximately 10 countries that have not addressed HCFC-123 in their HPMPs.	Levels of consumption of both HCFC-123 and HFCs in this sector appear to be low.

²⁰ A2L refrigerants are referred to as “mildly flammable.”

Considerations for the production sector

36. Given that HFCs are produced in different lines from HCFCs, the HFC phase-down would be implemented in parallel to the HCFC phase-out activities. As production of HCFCs and HFCs occurs only in two Article 5 countries, the impact on the institutions will be limited to the level of work required in those countries.

37. In addition, a limited number of countries producing HCFC-22 would need to implement in parallel the emission control of HFC-23 as by-product in the production of HCFC-22.

Resource availability and cost-effectiveness

38. The financial resources required to achieve the complete phase-out of HCFCs can be estimated based on the information contained in approved HPMPs and the cost-effectiveness thresholds established for projects for the phase-down of HCFCs. However, the financial resources required for HFC phase-down cannot yet be assessed as that will depend on the level of consumption of HFCs at the country level (which still is unknown) and on a number of policy decisions by the Parties to the Montreal Protocol and the Executive Committee.

Funding for HCFC phase-out

39. Since its 60th meeting, the Executive Committee has been approving funding in principle for the implementation of HPMPs. In line with decision XIX/6, the Committee has, to the extent possible, given priority to cost-effective projects and programmes that focus, *inter alia*, on alternatives that minimize other impacts on the environment, including on the climate. In order to facilitate the introduction of low-GWP technologies, the cost guidelines for stages I and II of HPMPs²¹ provided incentives when low-GWP technologies were adopted.²²

40. The Executive Committee has approved stage I of HPMPs for 144 countries and stage II for 34 countries, at a total value of US \$1.36 billion (approved in principle) of which US \$805.33 million has been disbursed to address compliance with the Montreal Protocol control levels as follows:

- (a) Three countries (one LVC (Antigua and Barbuda), and two non-LVC countries (Qatar and Yemen)) to address compliance up to 2015. Although these countries have not submitted a request for stage II, they are in compliance with the Montreal Protocol;
- (b) One hundred and nine countries (62 LVC and 35 non-LVC countries, and the 12 Pacific Island Countries) to address compliance up to 2020;
- (c) Twenty countries to address compliance up to 2025; and
- (d) Twelve LVC countries to completely phase out HCFCs between 2020 and 2025 (Bhutan, Cambodia, Croatia²³, Guyana, Kenya, Kyrgyzstan, Maldives, Mauritius, Namibia, Papua New Guinea, Saint Vincent and the Grenadines, and Seychelles).

²¹ Decision 60/44 and decision 74/50, respectively.

²² Up to 25 per cent above the cost-effectiveness threshold is provided when low-GWP alternative technologies are introduced (decision 60/44(f)(iv)); and for stage II HPMPs, up to 40 per cent above the cost-effectiveness threshold is provided when low-GWP alternative technologies are introduced by SMEs in the foam sector with consumption of less than 20 mt (decision 74/50(c)(iii)).

²³ Croatia became a non-Article 5 country in 2014, and completely phased out HCFCs by 2015.

41. Implementation of the approved HPMPs will result in the phase-out of over 61 per cent of the starting point for aggregate reduction of HCFC consumption and 85 per cent of the consumption of HCFC-141b contained in imported pre-blended polyols, as shown in Table 8.

Table 8. Total remaining HCFC consumption by substance (ODP tonnes)*

HCFC	Baseline	Starting point	Approved	Remaining	% of approved
HCFC-123	32.22	30.25	3.12	27.13	10.31
HCFC-124	26.57	26.20	0.49	25.71	1.87
HCFC-141	1.90	0.94	0.94	0.00	100.00
HCFC-141b	10,680.79	10,677.15	10,572.20	104.95	99.02
HCFC-142b	1,996.91	2,016.79	1,290.01	726.78	63.96
HCFC-21	1.50	0.74	0.74	0.00	100.00
HCFC-22	20,351.61	19,876.31	8,199.54	11,676.77	41.25
HCFC-225	4.12	2.82	1.13	1.69	40.07
HCFC-225ca	0.50	0.42	-	0.42	0.00
HCFC-225cb	0.70	0.68	-	0.68	0.00
Total	33,096.82	32,632.30	20,068.17	12,564.13	61.50
HCFC-141b Polyol**	53.20	661.81	559.39	102.42	84.52

* As of the 83rd meeting, for both LVC and non-LVC countries.

** HCFC-141b contained in imported pre-blended polyols.

42. If all funding tranche requests that have been submitted to the 84th meeting are approved by the Executive Committee, the balance of the funding approved in principle to be disbursed in the 2020-2030 period amounts to US \$379.5 million (i.e., US \$5.1 million for LVC countries and US \$374.4 million for non-LVC countries).

43. Additional funding will be required to achieve the complete phase-out of HCFCs in Article 5 countries. For LVC countries, the additional funding amounts to US \$56.1 million, based on the maximum level of funding established under decision 74/50. For non-LVC countries, the remaining HCFC consumption to be phased out amounts to 12,340 ODP tonnes. While it will be possible to determine the funding eligibility of the remaining consumption and its sectoral distribution upon submission by Article 5 countries of their requests for the subsequent stage of their HPMPs, for the purposes of this document it can be assumed that 90 per cent of the remaining consumption is eligible for funding (i.e., 11,000 ODP tonnes). Of that amount, approximately 4,000 ODP tonnes are HCFC-22 used in the manufacturing sector and the remaining 7,000 ODP tonnes are HCFC-22 used in the refrigeration servicing sector (with a cost-effectiveness of US \$4.80/kg).

Funding for HFC phase-down

44. Since the adoption of the Kigali Amendment, the Executive Committee has discussed cost-effectiveness thresholds for the HFC manufacturing sector and has decided that additional information is necessary to gain experience in the incremental capital costs and incremental operating costs associated with phasing down HFCs. Accordingly, the Committee approved, up to the 84th meeting,²⁴ a limited number of stand-alone HFC investment projects fulfilling certain prerequisites, to be considered on a case-by-case basis in terms of technology maturity, replicability and geographic distribution (decisions 78/3 and 79/45). As at the 83rd meeting, the Committee had approved a total of US \$14.4 million for 10 HFC-related investment projects in nine Article 5 countries.²⁵ While the level of funding can only be assessed once the actual HFC consumption is known and the cost-effectiveness thresholds have been established; in similar situations where cost-effectiveness thresholds had not been established, the Executive Committee considered and approved phase-out investment projects on a case-by-case basis.

²⁴ Decision 81/53.

²⁵ Argentina, Bangladesh, China, Dominican Republic, Jordan, Lebanon, Mexico, Thailand and Zimbabwe.

45. With regard to the phase-down of HFCs in the refrigeration servicing sector, the Executive Committee requested the Secretariat to prepare, for the 85th meeting, a document analysing the level and modalities of funding for HFC phase-down in the refrigeration servicing sector (decision 83/65).

Capacity of Fund institutions and Article 5 countries

46. For the purposes of the present document, Fund institutions would refer to the bilateral and implementing agencies and their associated roles and responsibilities (as lead or cooperating agency) in assisting Article 5 countries in implementing their phase-out plans; and for Article 5 countries would refer to the NOUs, established through institutional strengthening (IS) support, which have had an increasing role in assisting in the implementation of phase-out activities, and PMUs funded under NPPs, which have strengthened the capacity of the NOUs. This document also includes a discussion of UNEP Compliance Assistance Programme (CAP), given its specific role in providing compliance assistance to all Article 5 countries.

NOUs and PMUs

47. Support to IS by the Multilateral Fund represents a unique feature in the realm of funding for environment and sustainable development inasmuch as Article 5 countries have received continuous support for capacity building for more than 25 years. In fact, IS support has been essential to the achievement of the targets set out by the Montreal Protocol.²⁶

48. This support has contributed to significant achievements, such as ratification of the Montreal Protocol and its five amendments, meeting the phase-out compliance targets established under the Montreal Protocol, the introduction of new legislation and regulations, the timely submission of consumption and production data of controlled substances under Article 7 of the Montreal Protocol and under country programme reports, the successful integration of ozone-protection issues into national plans, awareness raising and coordination of numerous stakeholders, and support to the implementation of phase-out plans. In fact, there is sufficient evidence to claim that the targets set out by the Montreal Protocol could have not been attained without the IS support.

49. Since the first funding approval at the 7th meeting, IS funding levels have been increased at the 35th meeting (by 30 per cent), and at the 74th meeting (by 28 per cent). The increase in funding at the 74th meeting was an outcome of the review of the document on the Review of funding of institutional strengthening projects²⁷ prepared in line with decision 61/43(b).²⁸ At that meeting, members underscored the importance of IS projects and the NOUs, characterizing them as key to the success of the Montreal Protocol, and decided to increase IS funding level and to review IS, including funding levels, at the first meeting in 2020 (i.e., 85th meeting) (decision 74/51(c) and (d)).²⁹

50. The additional workload for NOUs relevant to the Kigali Amendment would be associated with collecting and reporting HFC production and consumption under Article 7 of the Montreal Protocol;

²⁶ At its 74th meeting, the Executive Committee considered a document on the review of funding for IS projects (UNEP/OzL.Pro/ExCom/74/51), which *inter alia* reviewed the history of IS funding, its linkage with other forms of institutional support provided through PMUs, and the CAP; and assessed the relevance of IS support in contributing to the achievement of Article 5 countries' compliance with the Protocol.

²⁷ UNEP/OzL.Pro/ExCom/74/51

²⁸ To maintain funding for IS support at current levels, and to renew IS projects for the full two-year period from the 61st meeting, taking into account decisions 59/17 and 59/47(b) that allowed Article 5 Parties to submit their IS projects as stand-alone projects or within their HPMPs, and to review continued IS funding at those levels at the first meeting of the Executive Committee in 2015.

²⁹ Decision 74/51 was adopted before the adoption of the Kigali Amendment (October 2016), where the Parties, through paragraph 21 of decision XXVIII/2, directed the Executive Committee to increase IS support in light of the new commitments related to HFCs under the Amendment.

reviewing, updating and expanding the legislative and regulatory frameworks, including operational import/export licensing and quota systems, addressing HCFCs and HFCs; and enforcing those regulatory frameworks. This additional workload would be part of the analysis of increased funding for IS to be discussed at the 85th meeting.

51. The role of the NOUs in coordinating the implementation of phase-out activities has been strengthened with the establishment of PMUs funded under NPPs. For the phase-out of HCFCs, the PMU became an integral component of the HPMPs, and specific functions, separate from those of the NOU, are assigned to the PMU for the preparation of annual action plans, the management of activities with stakeholders, and monitoring and reporting progress related to the HPMP. PMUs are established either with a distinct structure or in the broader context of project coordination, monitoring and management, with the terms of reference included in Appendix 5-A of the Agreement between the Government concerned and the Executive Committee.

52. The level of funding for the PMU is based on an assessment of the type of phase-out projects and activities that will be implemented during the overall stage of the HPMP, and ranges from an average 5 per cent to a maximum level not exceeding 10 per cent of the total HPMP funding for non-LVC countries; and up to 20 per cent of total HPMP funding for LVC countries.

Bilateral and implementing agencies

53. In 2001-2002, in the context of strategic planning for the Multilateral Fund, the Executive Committee adopted the country-driven approach³⁰ and eliminated the agency shares of investment project funds.³¹ At its 35th meeting, the Executive Committee approved for the first time the CAP budget³² for UNEP, and at its 38th meeting approved the core unit budgets for UNDP, UNIDO and the World Bank, and adjusted the agency support costs associated with project proposals.³³

54. The main duties of the core units include reviewing project applications and preparing project proposals; coordinating with representatives from the Governments, establishing legal agreements and terms of reference for subcontractors; submitting progress reports, business plans, project proposals on behalf of Article 5 countries, reports on specific on-going projects, project completion reports for consideration by the Committee, addressing all issues raised by the Secretariat; mobilizing additional resources for implementation of approved projects when required, processing contractual and accounting project documents, and undertaking bidding process; following up on implementation status, including country visits if there is evidence of undue delays or difficulties; and participating in meetings of the Executive Committee, and of the Secretariat.

³⁰ At its 33rd meeting, the Committee *inter alia* adopted as the basis for future work in strategic planning the framework on the objectives, priorities, problems and modalities for strategic planning of the Multilateral Fund in the compliance period (decision 33/54(a)).

³¹ At its 17th meeting, the Committee decided *inter alia* to allocate funding for investment projects as follows: World Bank 45 per cent, UNDP 30 per cent and UNIDO 25 per cent. Any shortfall in the shares of the World Bank and UNDP would be filled by UNIDO project approvals; UNDP and UNIDO would coordinate their project preparation activities in LVC countries, so that only one agency would be responsible for each such country (decision 17/21(a)(i)).

³² UNEP/OzL.Pro/ExCom/35/8 Add.1, and decision 35/36.

³³ For UNDP, UNIDO and the World Bank, agency support costs vary from up to 6.5 to 9.0 per cent depending on the type and cost of the project. For bilateral agencies and UNEP, agency support costs vary from 11 to 13 per cent depending on the cost of the project. Costs associated with verifications in non-LVC countries are usually covered by the agency support costs of the lead implementing agencies, while the verification costs for LVC countries are approved by the Executive Committee.

55. Funding requests for core unit costs are submitted for consideration by the Executive Committee at the last meeting of each year.³⁴ The Secretariat reviews the funding requests and provides a recommendation for their approval.

56. With regard to the implementation of phase-out plans, the roles and responsibilities of bilateral and implementing agencies, funded through the agency support costs, are described in Appendix 6 of the Agreements for HPMPs, and include:

- (a) Lead agency: Ensuring performance and financial verification in accordance with the Agreements and with internal procedures and requirements; preparing progress reports for previous funding tranches and plans of action for the following funding tranche; independent verification that the phase-out targets have been met and the associated tranche activities have been completed; fulfilling the reporting requirements for the progress reports and the overall plans; ensuring that independent technical experts carry out technical reviews; carrying out supervision missions; ensuring that the mechanism in place allows for effective, transparent implementation of the phase-out plan and accurate data reporting; and providing policy, management and technical support;
- (b) Cooperating agency: Providing assistance with policy, management and technical support when required; implementing the activities funded by the cooperating agency while referring to the lead agency to ensure a coordinated sequence in the activities; and reaching consensus with the lead agency on planning, coordination and reporting arrangements to facilitate the implementation of the plan.

57. As Article 5 countries ratify the Kigali Amendment and acquire related obligations, support from bilateral and implementing agencies would be needed during the design of their HFC phase-down strategies, in addition to the support currently provided in implementing their HPMPs. To achieve HFC reductions by 2024 (first control measure for Article 5 group 1 countries) implementation of HFC activities should start at least two years in advance. However, in the absence of HFC consumption data it is not possible to determine the number of Article 5 countries that would require immediate assistance.

58. Based on the 2020-2022 business plans of the implementing agencies, the additional workload for preparing HFC phase-down plans during that period appears to be similar to the workload when stages of HPMPs were being prepared. The inception of HFC phase-down plans seems to be gradual (i.e., the first six plans could be expected for submission in 2022) and thus the initial workload for the next few years can be absorbed with existing resources and the additional support cost associated to the new activities.

59. Bilateral and implementing agencies indicated that ongoing work on HCFC phase-out and implementation of the Kigali Amendment through the associated HFC phase-down activities present new challenges in their work and support to Article 5 countries in meeting their Montreal Protocol compliance obligations and preparations for the implementation of the Kigali Amendment.

UNEP CAP

60. The UNEP CAP³⁵ was approved to provide services and assistance to Article 5 countries, through a regional presence, to ensure and sustain the countries' compliance obligations under the Montreal

³⁴ Requests for core unit funding has been submitted to the 84th meeting (UNEP/OzL.Pro/ExCom/84/38).

³⁵ See Annexes 1A and 1B of document UNEP/OzL.Pro/ExCom/80/28. CAP supports 145 Article 5 countries that cover a broad spectrum in terms of size, population, and consumption and production of ODS. The countries include 48 countries classified by the UN as Least Developed Countries (LDCs) and 38 countries classified as Small Island Developing States (SIDS). While the approaches and challenges between regions and countries differ, there are some general challenges facing Article 5 countries in implementing their national HPMPs. CAP offers on average over 500 compliance assistance services annually to Article 5 countries to achieve and sustain compliance. CAP services

Protocol. The CAP has been strengthening the capacity of governments, particularly the NOUs, ministries and other stakeholders, to elaborate and enforce policies and regulations required to implement the Montreal Protocol, and to make informed decisions about regulatory, institutional and policy frameworks as well as alternative technologies in line with agreed phase-out targets.

61. Funding requests for the CAP budget are submitted for consideration by the Executive Committee on an annual basis and include a comprehensive progress report on the activities implemented in the previous year, a financial report on disbursements, and a work programme for the following year.³⁶ The overall CAP funding request includes 82 per cent for staff and operational costs, and 18 per cent for activity costs. The Secretariat reviews the requests and provides a recommendation regarding approval.

Engagement of Fund institutions with other institutions

62. The need and level of engagement of the Multilateral Fund institutions with institutions different from the ones already involved in the HCFC phase-out (i.e., customs departments, the private sector and its associations, importers and distributors of controlled substances and equipment, training and vocational institutions, academia, and non-governmental organizations) will be subject to additional considerations brought by the Kigali Amendment, such as controlling emissions of HFC-23, and energy efficiency in the refrigeration servicing and/or manufacturing sectors.

63. With regard to the production sector, emission control of HFC-23 as by-product in the production of HCFC-22 relates to a limited number of countries. With regard to matters related to energy efficiency, the Executive Committee's guidance is required regarding how it wishes to address the energy efficiency issue and potential engagement with other institutions. At its 82nd meeting, the Executive Committee requested the Secretariat to prepare a paper for the 83rd meeting, providing, as a first step, information on relevant funds and financial institutions mobilizing resources for energy efficiency that might be utilized when phasing down HFCs under the Multilateral Fund (decision 82/83(d)). The Executive Committee considered the paper at its 83rd meeting,³⁷ and will continue discussing it at the 84th meeting (decision 83/63); accordingly, the Secretariat has resubmitted the document.³⁸

Executive Committee policies

64. While additional policies related to the phase-down of HFCs might need to be developed, decision 79/46(b)(iii) allows Article 5 group 1 countries³⁹ that have ratified the Kigali Amendment to request funding for the preparation of national plans to meet initial HFC reduction obligations, five years prior to those obligations (i.e., 2019, as the freeze in consumption is in 2024).⁴⁰

Preparation of HFC phase-down project proposals

65. The guidelines for the preparation of HFC phase-down plans could be developed following a similar approach as the guidelines for the preparation of HPMPs (adopted at the 54th meeting). During the preparatory phase of HPMPs, the Executive Committee provided funding to include HCFC control measures in legislation, regulations and licensing systems, and decided that confirmation of the implementation of the same should be required as a prerequisite for funding implementation of the HPMP

cover a wide range of topics, including technical capacity-building support on regulatory infrastructure, policies, licensing and quota systems, enforcement, and refrigeration technicians. These services have enabled NOUs to smoothly transition the different technology challenges, sustain compliance and meet national ODS phase-out targets.

³⁶ UNEP CAP budget for 2020 has been submitted to the 84th meeting (UNEP/OzL.Pro/ExCom/84/37).

³⁷ UNEP/OzL.Pro/ExCom/83/41

³⁸ UNEP/OzL.Pro/ExCom/84/68

³⁹ As of 3 November 2019, 57 Article 5 countries had ratified the Kigali Amendment.

⁴⁰ The 2020-2022 business plans submitted by the bilateral and implementing agencies to the 84th meeting included preparatory funding for HFC phase-down plans for 16 countries in 2020, 12 in 2021 and one in 2022.

(decision 54/39).⁴¹ The cost structure for determining funding levels for preparation of investment projects and associated activities, and elements for funding the preparation of an overall HPMP were agreed at the 56th meeting (decision 56/16).⁴² Guidelines for preparation of stage II of HPMPs were adopted at the 71st meeting (decision 71/42).⁴³

66. Bilateral and implementing agencies have included funding for the preparation of HFC project proposals in their 2020-2022 business plans. However, guidelines to prepare and submit HFC phase-down plans would need to be developed and approved. Various elements of the guidelines developed for stage I and stage II of HPMPs are relevant for HFC phase-down; however, a decision on whether to implement different elements of the HCFC phase-out and the HFC phase-down during the 2020-2030 period in a parallel or integrated manner will have an impact on the development of the HFC guidelines.

PART III OBSERVATIONS

67. The parallel or integrated implementation of HCFC phase-out and HFC phase-down in Article 5 countries will depend on a number of factors, in particular the amounts of HCFCs and HFCs that would need to be reduced by Article 5 countries during the 2020-2030 period to achieve compliance with the control targets under the Protocol; the sectoral use of the controlled substances in the manufacturing and/or refrigeration servicing sectors; availability of financial resources; the capacity of the institutions implementing the proposed activities; as well as new policies and decisions by the Executive Committee.

68. From the analysis presented in this document, it could be concluded that during the 2020-2030 period:

- (a) While the level of HCFC production and consumption to be reduced between 2020 and 2030 as well as the sectors from which those reductions would be achieved are known, it is still early to have a reliable aggregated estimate of the amount of HFC that Article 5 countries will need to reduce to ensure compliance with the Montreal Protocol, as consumption and production data will only start to be collected and reported under Article 7 of the Montreal Protocol in the next few years;
- (b) The refrigeration servicing sector will play a key role in phasing out the remaining (and declining) consumption of HCFCs in all Article 5 countries and will play a key role in phasing down the consumption of HFCs, noting that in approximately 100 countries HFCs are only used in this sector;
- (c) As the majority of the activities being implemented in the refrigeration servicing sector could apply to both HCFC phase-out and HFC phase-down, their overlap presents opportunities for Article 5 countries to implement comprehensive plans in the refrigeration servicing sector addressing all refrigerants, allowing for a cost-effective and holistic implementation of activities using an integrated approach. The Executive Committee will consider, at its 85th meeting, a document providing an analysis on the level and modalities of funding for HFC phase-down in the refrigeration servicing sector (decision 83/65);
- (d) The remaining consumption of HCFCs used in the manufacturing sector still to be addressed will be related only to few Article 5 countries, and is mainly used in RAC applications;
- (e) Investment projects for the phase-out of HCFCs and/or HFCs in the manufacturing sector are expected to be implemented in parallel given the different nature of the enterprises,

⁴¹ UNEP/OzL.Pro/ExCom/54/59

⁴² UNEP/OzL.Pro/ExCom/56/64

⁴³ UNEP/OzL.Pro/ExCom/71/64

except for enterprises that manufacture both HCFC-based and HFC-based equipment or products and wish to convert both at the same time;

- (f) Cost-effective replacement technologies are currently available for the conversion of HFC-based domestic and unitary commercial refrigeration equipment and a few other applications that could be implemented immediately, reducing the future demand for HFCs associated with servicing practices;
- (g) Based on available information, HFC production would be limited to only two Article 5 countries. The HFC production phase-down would be implemented in parallel to the HCFC phase-out activities, as the controlled substances are produced in different lines. The timing to address HFC production would depend on the rate of phase-out of HFCs in different applications; and
- (h) The increased workload for the NOUs associated with the HFC phase-down, and the related funding would be discussed at the 85th meeting.

69. The funding associated with the HFC phase-down will depend on a number of policy decisions by the Parties to the Montreal Protocol and the Executive Committee, including those resulting from the discussions on IS projects and the refrigeration servicing sector at the 85th meeting, as well as decisions on the cost-effectiveness thresholds for the manufacturing sectors in the context of the cost guidelines for HFC phase-down. Other decisions, such as those related to the submission of HFC stand-alone investment projects or HFC phase-down plans, would help understanding when those funds could be available to Article 5 countries.

70. At their Thirty-First Meeting, the Parties to the Montreal Protocol agreed on the terms of reference for the study on the 2021-2023 replenishment of the Multilateral Fund for the implementation of the Montreal Protocol.⁴⁴ The Parties requested the TEAP to prepare a report for submission to the Forty-Second Meeting of the Open-Ended Working Group to enable the Thirty-Second Meeting of the Parties to adopt a decision on the appropriate level of the 2021–2023 replenishment of the Multilateral Fund. In preparing the report, the TEAP should take into account, among others: the decisions, rules and guidelines agreed by the Executive Committee at its meetings, up to and including its 85th meeting; the cost of supporting a limited number of stand-alone projects transitioning out of HFCs in accordance with paragraph 4 of decision XXX/5;⁴⁵ and the need to allocate resources for Article 5 parties to comply with the Kigali Amendment, including the preparation and, if needed, the implementation of phase-down plans for HFCs that could include early activities in the servicing/end-users sector in order to comply with the Kigali Amendment by addressing the high growth rate in HFC consumption. Consequently, any decisions on these matters at the 84th and 85th meetings would be considered by the TEAP.

71. It could be expected that the workload will increase as funding for HFC phase-down is approved in addition to HCFC phase-out activities. As previously reported to the Executive Committee,⁴⁶ HFC phase-down activities, together with ongoing HCFC phase-out activities, are expected to expand the scope and complexity of work under the Multilateral Fund, including that of the Executive Committee, the bilateral and implementing agencies, the Secretariat and the Treasurer.

72. Bilateral and implementing agencies have already witnessed an increase in the volume of work related to the preparation of project proposals and enabling activities to respond to challenges related to the HFC phase-down, such as for example the additional regulatory measures to be established and the increased number of substances and blends for which information needs to be collected and reported by the

⁴⁴ UNEP/OzL.Pro.31/L.2/Add.2

⁴⁵ To continue supporting stand-alone projects in parties operating under paragraph 1 of Article 5 in accordance with decision 79/45.

⁴⁶ UNEP/OzL.Pro/ExCom/80/16

NOUs, the design of a strategy for HFC phase-down that is compatible with HCFC phase-out, or the preparatory work in the refrigeration servicing sector to facilitate the safe adoption of low-GWP technologies which could be flammable or toxic.

73. The workload of Fund institutions will be determined by mandated multi-year activities, the capacity and readiness of Article 5 countries to handle HCFC phase-out and HFC phase-down activities concurrently, and the scheduling of those activities during the 2020-2030 period. Activities that are or will be part of the Fund institutions' portfolios include, but are not limited to:

- (a) Implementing the approved HPMPs, and reporting obligations to the Multilateral Fund;
- (b) Completing the approved enabling activities that will support the early ratification of the Kigali Amendment as required and build the capacity of national stakeholders for the long-term implementation of HCFC phase-out and HFC phase-down activities;
- (c) Reviewing the legal, regulatory and institutional frameworks, including the import/export licensing and quota systems and enforcement regimes, in support of HCFC phase-out and HFC phase-down;
- (d) Analysing HCFC and HFC consumption and production levels and trends, and strengthening the capacity of national institutions in data collection, reporting and monitoring;
- (e) Strengthening the technical capabilities and skills of representatives from Governments responsible for the implementation of the Montreal Protocol, customs officers, refrigeration technicians, and other key actors involved in HCFC phase-out and HFC phase-down; and
- (f) Supporting a limited number of Article 5 countries with HCFC production facilities in the phase-out of HFC-23 by-product emissions.

74. Potential funding increases for the operation of NOUs funded through the IS projects will be reviewed by the Executive Committee at its 85th meeting. Potential funding increases for the Fund Secretariat, the Treasurer, the core units of UNDP, UNIDO and the World Bank, and UNEP CAP can only be assessed once the actual workload during the 2020-2030 period is better known.

75. Potential engagement with other institutions to address matters related to energy efficiency, particularly in the manufacturing sector, would require guidance from the Executive Committee. At its 84th meeting, the Executive Committee will continue its deliberations on this matter.

Recommendation

76. The Executive Committee may wish:

- (a) To note the analysis of the implications of parallel or integrated implementation of HCFC phase-out and HFC phase-down activities contained in document UNEP/OzL.Pro/ExCom/84/65;
- (b) To request the Secretariat to prepare an update of the analysis referred to in sub-paragraph (a) for the 87th meeting.