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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Ninety-fourth Meeting
Montreal, 27-31 May 2024
Item 9(d) of the provisional agenda[1]

PROJECT PROPOSALS: BRAZIL

This document consists of the comments and recommendation of the Secretariat on the following project proposals:

Phase-out

• HCFC phase-out management plan (stage II, sixth tranche)	UNDP, UNIDO, Germany and Italy
• HCFC phase-out management plan (stage III, first tranche)	UNDP, UNIDO and Germany

[1] UNEP/OzL.Pro/ExCom/94/1

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Brazil

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase-out plan (stage II)	UNDP (lead), Germany, Italy, UNIDO	75th	45% phase-out by 2021

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2022	584.09 ODP tonnes

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)									Year: 2023
Chemical	Aerosol	Foam	Fire-fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22		2.67		64.09	378.31				445.07
HCFC-123					0.27				0.27
HCFC-124					0.25				0.25
HCFC-141b					41.40	4.60			46.00

(IV) CONSUMPTION DATA (ODP tonnes)			
2009–2010 baseline:	1,327.3	Starting point for sustained aggregate reductions:	1,327.3
CONSUMPTION ELIGIBLE FOR FUNDING			
Already approved:	685.36	Remaining:	641.94

(V) ENDORSED BUSINESS PLAN		2024	2025	2026	Total
UNDP	ODS phase-out (ODP tonnes)	0.0	0.0	0.0	0.0
	Funding (US $)	0	0	0	0
Germany	ODS phase-out (ODP tonnes)	15.60	0.0	0.0	15.60
	Funding (US $)	969,856	0	0	969,856

(VI) PROJECT DATA			2015	2016	2017	2018	2019	2020	2021	2022-2023	2024	Total
Montreal Protocol consumption limits (ODP tonnes)			1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.74	862.74	862.74	862.74	n/a
Maximum allowable consumption (ODP tonnes)			1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.74	730.02	730.02	730.02	n/a
Funding agreed in principle (US $)	UNDP	Project costs	3,078,900	0	2,627,704	7,168,396	0	0	1,400,000	0	0	14,275,000
		Support costs	215,523	0	183,939	501,788	0	0	98,000	0	0	999,250
	UNIDO	Project costs	1,748,175	0	0	1,902,953	0	0	116,000	0	0	3,767,128
		Support costs	122,372	0	0	133,207	0	0	8,120	0	0	263,699
	Germany	Project costs	1,299,386	0	686,978	2,363,637	0	1,004,545	1,500,000	0	872,727	7,727,273
		Support costs	144,614	0	76,457	263,059	0	111,800	166,941	0	97,129	860,000
	Italy	Project costs	250,000	0	0	0	0	0	0	0	0	250,000
		Support costs	32,500	0	0	0	0	0	0	0	0	32,500
Funds approved by ExCom (US$)		Project costs	6,376,461	0	3,314,682	11,434,986	0	1,004,545	3,016,000	0		25,146,674
		Support costs	515,009	0	260,396	898,053	0	111,800	273,061	0		2,058,319
Total funds recommended for approval at this meeting (US$)		Project costs	0	0	0	0	0	0	0	0	872,727	872,727
		Support costs	0	0	0	0	0	0	0	0	97,129	97,129

Secretariat's recommendation:	Individual consideration

PROJECT DESCRIPTION

1. On behalf of the Government of Brazil, UNDP as the lead implementing agency has submitted a request for funding for the sixth tranche of stage II of the HCFC phase-out management plan (HPMP) in the amount of US $872,727, plus agency support costs of US $97,129 for the Government of Germany only.[2] The submission includes a progress report on the implementation of the fifth tranche, the verification report on HCFC consumption for 2022, and the tranche implementation plan for 2024 to 2025.

Report on HCFC consumption

2. The Government of Brazil reported under its country programme (CP) implementation report a consumption of 491.59 ODP tonnes of HCFCs in 2023, which is 63 per cent below the country's HCFC baseline for compliance. The Article 7 data for 2023 has not been reported yet. The 2019–2023 HCFC consumption is shown in table 1.

Table 1. HCFC consumption in Brazil (2019-2023 Article 7 data)

HCFC	2019	2020	2021	2022	2023*	Baseline
Metric tonnes (mt)						
HCFC-22	10,277.15	7,652.80	8,352.53	9,764.37	8,092.24	14,401.0
HCFC-123	14.71	14.89	14.89	14.89	13.44	14.9
HCFC-124	26.69	24.73	19.85	17.70	11.34	351.3
HCFC-141b	2,479.10	282.43	280.02	421.46	418.15	4,741.3
HCFC-142b	0.35	0	0	0	0	86.3
Total (mt)	**12,798.00**	**7,974.85**	**8,667.29**	**10,218.42**	**8,535.17**	**19,594.8**
ODP tonnes						
HCFC-22	565.24	420.90	459.39	537.04	445.07	792.0
HCFC-123	0.29	0.30	0.30	0.30	0.27	0.30
HCFC-124	0.59	0.54	0.44	0.39	0.25	7.7
HCFC-141b	272.70	31.07	30.80	46.36	46.00	521.7
HCFC-142b	0.02	0	0	0	0	5.6
Total (ODP tonnes)	**838.84**	**452.81**	**490.93**	**584.09**	**491.59**	**1,327.3**

* CP data

3. The sharp reduction in HCFC-141b consumption since 2020 is related to the ban on imports of HCFC-141b used as a foam-blowing agent that went into effect on 1 January 2020, whereas reductions in the use of HCFC-22 recorded in 2020 are attributed to the COVID-19 pandemic-related restrictions. The HCFC-22 consumption between 2021 and 2023 reflects the post-pandemic recovery and the existing demand for the maintenance of the installed base of commercial refrigeration and air-conditioning (RAC) equipment using HCFC-22, which will still be kept in operation for several years.

Country programme implementation report

4. The Government of Brazil reported HCFC sector consumption data under the 2022 CP implementation report that is consistent with the data reported under Article 7 of the Montreal Protocol.

Verification report

5. The verification report confirmed that the Government was implementing a licensing and quota system for HCFC imports and exports and that the total consumption of HCFCs reported under Article 7 of the Montreal Protocol for 2022 was correct (as shown in table 1 above). The verification concluded that all importing enterprises met the requirements of the quota system and that the overall level of imports (595.39 ODP tonnes, of which 11.30 ODP tonnes were re-exported) was lower than the national quota

[2] As per the letter of 20 February 2024 from the Ministry of the Environment and Climate Change of Brazil to UNDP.

established for the year at 642.94 ODP tonnes, and below the maximum allowable consumption stated in the Agreement between the Government and the Executive Committee at 730.02 ODP tonnes. The national consumption reported to the Ozone Secretariat was also consistent with the import and export data issued by the Brazilian Institute of the Environment and Renewable Natural Resources.

6. The verification of the 2023 consumption had not been finalized at the time of posting of this document.

Progress report on implementation of the fifth tranche of stage II of the HCFC phase-out management plan

Legal framework

7. The Government of Brazil ratified the Kigali Amendment on 19 October 2023. The HCFC import and export licensing and quota system continues to be operational, and quota levels for the 2024 to 2040 period have been updated. The Government has also established a norm regulating the requirements and procedures for controlling HFC imports, and supported the Brazilian National Standards Organization (ABNT) in their ongoing development of standards for the RAC sector, including on the qualification and certification of personnel operating air-conditioning (AC) and refrigeration systems; the safe disposal of refrigerant cylinders; leak detection, refrigerant containment, maintenance and repair of commercial refrigeration equipment; and the guidelines on the design, installation, operation and maintenance of refrigeration systems in supermarkets.

Polyurethane foam manufacturing sector

Conversion of 13 stand-alone polyurethane foam enterprises (53.52 ODP tonnes)[3]

8. Twelve polyurethane (PU) foam enterprises[4] completed their conversions to water-based technology, methyl formate (MF), methylal, or hydrofluoroolefins (HFOs), phasing out 52.08 ODP tonnes of HCFC-141b. One enterprise (Tecpur, 1.43 ODP tonnes) withdrew from participating in the project due to the unavailability of HFOs in the domestic market, coupled with the availability of HFC-365mfc/227ea[5] at competitive prices. The remaining funds allocated for this conversion (US $89,810 plus agency support costs) were deducted from the sixth tranche of stage II at the 91st meeting.[6]

Conversion of 14 systems houses with 445[7] downstream users (116.20 ODP tonnes)

9. Nine eligible systems houses have completed developing their formulations with low-global-warming-potential (GWP) blowing agents, followed by plant conversions where needed, and are now in the process of assisting their downstream users (DSUs) in converting to the new formulations; 133 DSUs have already completed conversions. One additional systems house is undergoing conversion and one has declined participation in the project, with associated funds (US $950,562 plus agency supports costs) deducted from the sixth tranche at the 91st meeting.[8] The eligible DSUs associated with BASF and Dow (both ineligible systems houses) are being assisted directly by UNDP as it was not possible to reach an agreement with the two enterprises to support the conversion of their (eligible) DSUs. The status of progress of the group projects is presented in table 2.

[3] The project originally included 14 enterprises consuming 57.14 ODP tonnes of HCFCs. One enterprise (Poliumetka, 3.63 ODP tonnes) was removed and not funded from stage II as its conversion had been completed under stage I.
[4] Ananda Metais, Artico, Bulltrade, Cold Air, F. Ibipora, Gelopar, IBF, Isar, Niju, Refrimate, São Rafael and Termjet/Thermotelas.
[5] The blend being used in Brazil consists of 93 per cent of HFC-365mfc and 7 per cent of HFC-227ea.
[6] Decision 91/26(a)(iii)
[7] Included for funding under the Multilateral Fund.
[8] Decision 91/26(a)(iii)

Table 2. Status of progress of group conversion projects in the PU foam manufacturing sector

Participating systems houses	Selected alternative technologies*	Status of systems house conversions	Number of participating DSUs			Status of DSU conversions	HCFC phase-out (ODP tonnes)
			Planned**	Actual	Converted		
Amino	Methylal, MF, CO_2, HFO	Completed developing formulations and plant conversions; conversions of DSUs ongoing	46	43	12	Ongoing	69.90
Ariston	MF, methylal		28	28	0		
Ecoblaster	MF		31	26	3		
Flexível	HFO, methylal, MF, CO_2		33	30	8		
M. Cassab	HFO		23	21	3		
Polyurethane	MF, methylal, CO_2, HFO		16	16	58		
Purcom	MF		90	83	26		
Shimtek	HFO		11	9	3		
U-Tech	MF, HFO		5	5	0		
Comfibras	HFO	Ongoing	12	12	0	Not started	
Univar	Methylal, HFO, CO_2	Ineligible	84	76	16	Ongoing***	
BASF	HFO		8	7	1		
Dow	HFO		11	9	3		
Polisystem	MF	Removed from the HPMP	47	0	0	Removed from the HPMP	
Total		**14**	**445**	**365**	**133**		**69.60**

* Only including technologies for which formulation development was funded by Multilateral Fund.
** Only including enterprises funded by the Multilateral Fund. The total estimated number of DSUs in the country is over 700.
*** DSU conversions associated with BASF and Dow are being implemented directly by UNDP.

10. As reported in previous meetings, constraints imposed by the COVID-19 pandemic delayed the conversions of systems houses and DSUs and reduced the demand for foam products. Since the ban on imports of HCFC-141b entered into force on 1 January 2020, the systems houses used existing stocks of HCFC-141b followed by gradual adoption of low-GWP alternatives (i.e., MF, methylal, water-based and HFO). However, many DSUs have deferred their decision to join the project because they prefer not to commit to never using HFCs, citing concerns about the imbalanced supply of blowing agents with low GWP and zero ozone-depleting potential (ODP), especially HFOs.

11. At the 91st meeting, UNDP submitted a progress report on the implementation of the fifth tranche and a revised plan of action for stage II of the HPMP, including a request to revise the Agreement with the Executive Committee by cancelling the sixth tranche for UNDP in the amount of US $2,495,000, due to the non-participation of several PU foam enterprises in the sector plan for conversion to low-GWP alternatives.[9] The Agreement was accordingly revised by decision 91/26(a)(iv).

12. Upon the closure of production of the HFC-365mfc/HFC-227ea blend supplied to Brazil, the Government issued an awareness video to inform the PU foam enterprises and to invite additional manufacturers to join the project.[10] The Government and UNDP also held virtual workshops and visited systems houses and PU foam enterprises. With the HFC plant closure and the ratification of the Kigali Amendment by Brazil in 2023, it is expected that many DSUs that were postponing their decision to join the project will eventually decide to participate in 2024, once HFC stocks are depleted.

[9] Including the removal of one enterprise (Tecpur) and one systems house (Polisystem) that declined participation in the project, as well as 80 DSUs: 47 associated with Polisystem, four that had stopped manufacturing PU foam, 20 that had already received assistance under stage I, one identified as ineligible, and eight that had converted to HFC-365mfc/HFC-227ea with their own funds.
[10] https://www.protocolodemontreal.org.br/site/todas-as-noticias/382-fim-da-producao-mundial-do-hfc-365-227

Temporary use of technology with high global-warming potential

13. One systems house (U-Tech), which had completed the conversion of its manufacturing plant from HCFC-141b to MF in most applications, has temporarily used HFC-134a to replace HCFC-22 as a gaseous blowing agent in the froth application, which cannot be produced with the usual low-GWP alternatives to HCFC-141b. The enterprise committed to discontinue this use with its own resources, as soon as gaseous HFO was available on the market and polyol systems containing it had been developed and optimized. However, U-Tech eventually withdrew from the HPMP, reporting that despite years of efforts to procure a suitable blowing agent, it had proven financially unfeasible to complete the conversion to gaseous HFO in the froth application. During 2024, UNDP will directly assist the eligible DSUs linked to U-Tech in finding a low-GWP alternative for the froth application. If this proves unachievable, UNDP will return the unused balances for this project to the Fund by December 2024.

Refrigeration and air-conditioning manufacturing sector (61.05 ODP tonnes)

14. The status of implementation of activities undertaken in the commercial refrigeration and room AC manufacturing sectors is presented below:

(a) *Commercial refrigeration individual projects (8.67 ODP tonnes)*: Projects were completed, including conversions of two manufacturing enterprises with consumption above 35 mt of HCFC-22 (Eletrofrio and Plotter Rack) to R-290, development of R-290-based modular chiller prototypes, installation of the prototypes in supermarkets, and organization of workshops to disseminate project results and demonstrate the new technology in the supermarket sector;

(b) *Commercial refrigeration group projects (3.22 ODP tonnes)*: Projects were completed, including conversions of two manufacturing enterprises with consumption between 10 mt and 35 mt of HCFC-22 (Chopeiras Ribeirão Memo and Aquagel Refrigeração) to R-290 and installation of several units at customers' premises. The funds associated with the third enterprise (Freeart Seral, 0.93 ODP tonnes), which withdrew from the HPMP, were returned by UNIDO at the 90th meeting (US $202,100, plus agency support costs);

(c) *Technical assistance to small and medium-sized commercial refrigeration enterprises (3.85 ODP tonnes)*:[11] Eight workshops were held for 398 small and medium-sized enterprises (SMEs), installers and educational institutions, *inter alia* on the experiences of enterprises that had either converted or were in the process of converting to low-GWP technologies under the HPMP, the availability of components, and the revised standards. Out of the 20 SMEs manufacturing commercial refrigeration equipment completely in their plants, five have completed conversions to R-290-based technology, and nine are currently undergoing conversions to technologies based on R-290 and HFO. All conversions at SMEs are expected to be completed by the end of 2024; and

(d) *Room AC projects (45.31 ODP tonnes)*: Three enterprises initially included in the HPMP (Climazon, Elgin and Gree) had converted to R-410A-based technology with their own resources, resulting in the phase-out of 823.80 mt (45.31 ODP tonnes) of HCFC-22; the associated funding of US $7,147,469, plus agency support costs for UNIDO, was deducted from stage II at the 86th meeting.[12]

[11] Of the 33 SMEs initially included in the project, six had decided not to participate and were replaced by six other eligible enterprises; these changes were approved by decisions 82/62, 84/33 and 91/26.
[12] Decision 86/89(a)(iii) and (iv)

Refrigeration and air-conditioning servicing sector

15. The following progress has been reported in the servicing sector:

(a) *Training and capacity building on HCFC-22 containment:* Training of additional 2,635 technicians (for a total of 8,503) in best servicing practices for split and window-type air conditioners, training of additional 592 (for a total of 1,719) technicians in best commercial refrigeration practices, and training of additional 63 (for a total of 156) RAC instructors;

(b) *Training and capacity building on low-GWP alternatives:* Two demonstration mini-cascade systems[13] and associated tool kits for the use of carbon dioxide (CO_2)[14] procured in the previous tranche were delivered to two selected training institutions; R-290-based air conditioners and tool kits for the safe use of flammable refrigerants[15] have been purchased and delivered to five training institutions; training material has been developed, with training activities at assisted training institutions expected to start in June 2024; and 30 trainers from partner training institutions participated in the Cool Training Programme for International Instructors and Experts in Commercial Refrigeration with Natural Refrigerants in Germany; and

(c) *Outreach and awareness activities:* Additional videos were produced, including one awareness video and three videos focusing on good servicing practices, with one highlighting the first women's class on good servicing practices and another made available on a free online learning platform; six training workshops were held exclusively for women and two more are planned; and a free 160-hour "Refrigeration and Air-Conditioning Mechanics for Women" course was concluded in cooperation with the National Service for Industrial Training (SENAI).[16]

Project implementation and monitoring

16. The project implementation and monitoring unit (PMU) continues to provide both international and national technical assistance to the Government and the eligible enterprises, including undertaking missions and technical visits, as well as managing the implementation of investment projects; drafting, executing and monitoring service contracts; preparing periodic progress and financial reports and technical documentation; organizing follow-up meetings with the Ministry of the Environment and Climate Change and the Brazilian Cooperation Agency; undertaking technical analyses of products and financial control of the funds approved; and organizing awareness-raising activities. The PMU costs incurred in the first five tranches are presented in table 3.

[13] Units designed as a CO_2 dry expansion refrigerant circuit for product freezing and conventional indirect system for product cooling and with an integrated dry cooler.

[14] Including *inter alia* recovery units, vacuum pump, electronic gas detectors, portable air blower, manifolds, tools for brazing and tubing (e.g., tube cutters, reamers, and tube expanders), tools for electrical works (e.g., multimeters, voltage and insulation testers, and electrician pliers), personal protective equipment and tools for hydraulic systems (e.g., brine flushing and filling station, testing pump for pressure and tightness tests of piping systems and receptacles).

[15] Including *inter alia* recovery units, vacuum pump, electronic gas detectors, portable air blower, manifolds, tools for brazing and tubing (e.g., tube cutter, reamer, tube expander), tools for electrical works (e.g., multimeter, voltage and insulation tester, and electrician pliers), personal protective equipment and gas detection.

[16] Serviço Nacional de Aprendizagem Industrial is a network of secondary level professional schools providing formal industrial training to specialized workers in the areas of chemistry, mechanics, construction, etc.

Table 3. PMU costs under the first five tranches of stage II of the HPMP as of February 2024 (US $)

Activity	UNDP		UNIDO	
	Approved	Disbursed	Approved	Disbursed
Personnel (staff and international/national consultants)	1,300,000	748,220	668,000	*630,486
Travel (including monitoring costs)		153,597		0
Awareness (workshops/meetings/communication)		101,970		0
Operational costs		131,545		0
Total		**1,135,332**		**630,486**

*An additional US $37,117 have been committed

17. The submission indicates that given the extension of stage II to December 2025, largely due to the COVID-19 pandemic, UNIDO has incurred additional costs under its PMU. UNIDO's PMU had already been reduced by US $100,000 when the room AC manufacturing enterprises were removed from the HPMP (decision 86/89(a)(iii) and (iv)). UNIDO is requesting the reallocation of US $60,000 from the commercial refrigeration project to the PMU to allow completion of all remaining ongoing activities by December 2024 (one year before the end of the stage).

Level of fund disbursement

18. As of February 2024, of the US $25,146,674 approved so far, US $19,998,159 had been disbursed (US $11,478,230 for UNDP, US $2,895,318 for UNIDO, US $5,374,611 for the Government of Germany and US $250,000 for the Government of Italy), as shown in table 4. The balance of US $5,148,515 will be disbursed in 2024–2025.

Table 4. Financial report of stage II of the HPMP for Brazil (US $)

Tranche		UNDP	UNIDO	Germany	Italy	Total	Disbursement rate (%)
First	Approved	3,078,900	*1,748,175	1,299,386	250,000	**6,376,461**	99
	Disbursed	3,078,900	1,716,588	1,299,386	250,000	**6,344,874**	
Second	Approved	2,627,704	0	686,978	0	**3,314,682**	100
	Disbursed	2,627,704	0	686,978	0	**3,314,682**	
Third	Approved	7,168,396	**1,902,953	2,363,637	0	**11,434,986**	75
	Disbursed	5,454,009	1,144,089	1,948,576	0	**8,546,674**	
Fourth	Approved	0	0	1,004,545	0	**1,004,545**	85
	Disbursed	0	0	856,019	0	**856,019**	
Fifth	Approved	***1,400,000	116,000	1,500,000	0	**3,016,000**	31
	Disbursed	317,617	34,641	583,652	0	**935,910**	
Total	**Approved**	**14,275,000**	**3,767,128**	**6,854,546**	**250,000**	**25,146,674**	**80**
	Disbursed	**11,478,230**	**2,895,318**	**5,374,611**	**250,000**	**19,998,159**	
	Balance	2,796,770	871,810	1,479,935	0	5,148,515	

* Including a deduction of US $202,100 in line with decision 88/61(a)(iii).
** Value revised in line with decision 86/89(a)(ii).
*** Value revised in line with decision 88/61(a)(ii).

Implementation plan for the sixth and final tranche of stage II of the HCFC phase-out management plan

Manufacturing sectors

19. No funds are being requested under the sixth tranche of stage II of the HPMP for UNDP or UNIDO. Between June and December 2024, UNDP will complete conversions at the remaining DSUs in the PU foam sector and UNIDO will complete conversions of the remaining SMEs in the commercial refrigeration sector with funds approved in previous tranches.

Refrigeration servicing sector

20. The Government of Germany will implement the following activities in the refrigeration servicing sector between June 2024 and December 2025:

(a) *Training and capacity-building:* Hold four train-the-trainer workshops on the safe use of flammable refrigerants in AC systems and provide related training to 700 technicians; and train an additional 300 technicians in the safe use of CO_2 and hydrocarbon (HC) in commercial refrigeration (US $682,727);

(b) *Outreach and awareness campaign:* Develop informative material, technical publications and videos; operate and maintain the project's website;[17] disseminate the activities and results of stage II of the HPMP through articles published in relevant RAC specialized journals and on the website; participate in sectoral trade shows and events; hold follow-up meetings with servicing sector stakeholders at national and regional levels, including annual meetings of HPMP partner trainers in the multiplication of best refrigeration practices (US $100,000); and

(c) *Management, monitoring and evaluation:* Perform data processing, sampling, and quality control; hold follow-up and monitoring visits; support ABNT experts in reviewing, discussing and developing technical standards for the servicing sector;[18] and produce periodic reports as required (US $90,000, including US $63,000 for personnel, US $6,000 for data management, US $12,000 for monitoring visits, and US $9,000 for support in the development of technical standards).

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

Report on HCFC consumption

21. The submission included the independent verification of HCFC consumption for 2022 but not for 2023, as the country was still finalizing its CP implementation report, which was submitted on 10 May 2024. The report indicates an HCFC consumption level of 491.59 ODP tonnes, which is substantially below the maximum allowable consumption of 730.02 ODP tonnes for 2023 stated in the Agreement between the Government and the Executive Committee. UNDP confirmed that the verification report would be updated to include 2023 and submitted by the end of June 2024.

Progress report on implementation of the fifth tranche of stage II of the HCFC phase-out management plan

Legal framework

22. The Government of Brazil has already issued the HCFC import quotas for 2024 in accordance with the Montreal Protocol. The most recent regulation of December 2022 establishes a maximum consumption of 484.61 ODP tonnes (or 36.5 per cent of the baseline), which is lower than the Montreal Protocol control target and the maximum allowable consumption established in the Agreement between the Government and the Executive Committee for 2024.

[17] www.boaspraticasrefrigeracao.com.br and https://www.facebook.com/camadadeozonioerefrigeracaoeclima

[18] Translation of the international standard ISO 22043 – Ice cream freezers – Classification, requirements and test conditions; review of national standards ABNT NBR 16666 – Refrigerants – Designation and safety classification and ABNT NBR 13598 – Pressure Vessels; and translation and adoption of standards on the safe application of NH_3.

Finalization of the polyurethane foam sector plan

23. UNDP has continued to verify the eligibility of PU foam enterprises and to assist them in converting to low-GWP alternatives through systems houses. The enterprises that have been identified as ineligible, that have converted with their own resources, or that are no longer manufacturing PU foam, have not received Multilateral Fund assistance.

24. Noting the planned completion of the PU foam sector plan by December 2024, the Secretariat asked whether all remaining eligible DSUs would be able to complete conversions by that date. UNDP explained that the number of DSUs that had already converted to low-GWP alternatives through the project was much higher than the 133 enterprises reported as completed; however, many enterprises have still not signed agreements to never use HFCs, which is a condition established by the project to ensure its sustainability. Once those enterprises sign their agreements, they will be able to receive funding for their incremental operating costs and the projects will be considered completed. With the closure of production of HFC-365mfc, UNDP expects that many DSUs will sign these agreements. An additional 15 enterprises have recently decided to join the plan and eight more are expected to follow, as UNDP continues to make efforts to ensure the sustained conversion to low-GWP technologies of as many DSUs as possible.

25. The Secretariat considers that the system followed by UNDP to verify eligibility and to report on the assisted enterprises along with the tranche requests has been effective in ensuring that all eligible enterprises receive assistance and that those that are found ineligible or that have stopped manufacturing are removed from the project, in line with paragraph 7(d) of the Agreement.[19] Noting that there are no further tranches and that the project is set to finish in December 2024, the Secretariat recommends that UNDP provides, at the 96th meeting, the final list of downstream foam enterprises assisted by the Multilateral Fund under stage II, including their HCFC-141b consumption phased out, subsector, and technology adopted. As per established practice, any remaining fund balances associated with enterprises that are found to be non-eligible for funding would be returned to the Fund.

Commercial refrigeration

26. In discussing the status of conversions of the remaining SMEs in the commercial refrigeration sector, UNIDO assured the Secretariat that all beneficiary enterprises were contacted, had received technical visits to initiate the projects, and confirmed that they would adhere to the extremely strict deadlines to be able to complete their projects by December 2024.

Refrigeration servicing sector

27. Noting that this was the final tranche request under stage II of the HPMP, upon request, the Government of Germany provided an overview of cumulative results achieved in the refrigeration servicing sector during stage II, including *inter alia* the training of 156 trainers and 10,222 technicians in best practices for HCFC containment in commercial refrigeration and AC systems; strengthening of training institutes with equipment and tools for continued training on best practices in servicing and for the safe and efficient use of CO_2 and HCs in commercial refrigeration and AC equipment; the installation of two pilot training centres for the use of cascade CO_2/HC in commercial refrigeration installations; provision of technical support to the ABNT in the review and development of 13 technical standards for the refrigeration and AC servicing sector; and awareness and outreach activities.

28. The activities planned by the Government of Germany for stage III of the HPMP will focus on the continued training of additional technicians; the establishment of a technicians' certification scheme; and

[19] Any enterprise to be converted to non-HCFC technology included in the Plan and that would be found to be ineligible under the policies of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), would not receive financial assistance. This information would be reported as part of the Tranche Implementation Plan.

the provision of additional support to ABNT in the development of technical standards on the handling, installation and maintenance of RAC equipment and in creating a regulatory basis for the safe and efficient use of alternative low-GWP refrigerants. In addition, UNDP and UNIDO will provide support in strengthening the country's refrigerant recovery, recycling and reclaiming infrastructure and in implementing demonstration projects at key end users' sites to promote the adoption of low-GWP alternatives.

Reallocation of funding for project implementation and monitoring (UNIDO)

29. Regarding UNIDO's request to reallocate US $60,000 from the commercial refrigeration activities to the PMU, UNIDO informed that at present there is a balance of US $415,994 available (not committed) to implement the remaining activities in the project. With the reallocation of funds, the PMU will be able to continue providing technical support to the SMEs, and UNIDO will still be able to fund additional SMEs if they decide to join the plan and complete their conversions before 31 December 2024.

30. The Secretariat notes that the reallocation of funds will allow UNIDO to complete the project. The reallocation represents less than 10 per cent of the overall value of the PMU. The revised PMU funding level would be US $728,000, which is lower than the US $768,000 originally approved for UNIDO's PMU under stage II, before applying a deduction of US $100,000 at the 86th meeting. The Government of Brazil agreed to associate the increase of funds for UNIDO's PMU to reductions of HCFC-22 in stage II of the HPMP. At US $4.80/kg, this represents 12.5 mt (0.69 ODP tonnes) of HCFC-22. This value will be deducted from the country's remaining eligible consumption for funding and reflected in the Agreement for stage II.

Updated Agreement

31. In view of the deduction of 0.69 ODP tonnes of HCFC-22 from the remaining eligible consumption due to the increase of funding in UNIDO's PMU, the Agreement between the Government of Brazil and the Executive Committee has been updated. Specifically, Appendix 2-A has been revised and paragraph 16 has been modified to indicate that the revised updated Agreement supersedes that reached at the 91st meeting, as contained in annex I to the present document. The full updated Agreement will be appended to the final report of the 94th meeting.

Gender policy implementation

32. In line with decisions 84/92(d) and 90/48(c), UNDP reported that the development, implementation, and supervision of activities included in the HPMP continued to have significant participation by women, mainly in the National Ozone Unit and the PMU, where women make up more than 50 per cent of the team. Furthermore, UNDP has been deploying efforts to develop gender-sensitive indicators for stage II.

33. As one of the lessons learnt from the implementation of stage I was that male-dominated classrooms were more challenging for women, it was decided that offering training courses exclusively for women was fundamental to increasing the female presence in the RAC sector. Consequently, since 2023, a free "Refrigeration and Air Conditioning Mechanics for Women" course of 160 hours' duration was concluded in cooperation with SENAI, six training workshops were held exclusively for women and two more are planned, a video highlighting the first women's class on good servicing practices was created, and gender sensitization presentations took place at the Annual Meeting of HPMP Partner Trainers, highlighting the importance of including women in the sector.

Completion of stage II of the HCFC phase-out management plan

34. UNDP has confirmed that stage II for Brazil will be completed by 31 December 2025, in line with decision 91/23(b)(ii) of the Executive Committee. Noting that there are still several conversion activities ongoing in the manufacturing sectors and the refrigeration servicing sector, the Secretariat recommends that UNDP provides a progress report on the implementation of the last tranche of stage II of the HPMP to the 96th meeting of the Executive Committee.

Sustainability of the HCFC phase-out and assessment of risks

35. With the effective application of the licensing and quota system and the continued implementation of conversions in the manufacturing sectors, the risk of non-compliance during the remaining time of stage II of the HPMP for Brazil is low. The sustainability of transitioning to low-GWP alternatives in the PU foam sector is being secured through the ban on HCFC-141b imports and use as a foam-blowing agent, effective since 1 January 2020, and the commitment made by supported PU foam enterprises to refrain from adopting HFC-based technologies. Recent years have seen delays in implementing the PU foam sector plan due to the availability of HFC-365mfc/HFC-227ea in the local market at competitive prices. However, with the recent cessation of HFC-365mfc production by the plant supplying the Brazilian market, it is anticipated that many previously hesitant enterprises will now engage in the project.

36. The training of refrigeration technicians will continue beyond project completion, with relevant vocational schools incorporating best practices into regular training activities and the ABNT continuing to develop standards, including on the qualification and certification of personnel operating AC and refrigeration systems, to ensure long-term compliance with the minimum requirements for servicing RAC equipment in a safe and environmentally sound manner, which will also assist the country in developing the criteria for the certification of technicians during stage III of the HPMP.

Conclusion

37. The Government of Brazil continues to be in compliance with the Montreal Protocol and the HCFC consumption targets stated in its Agreement with the Executive Committee. HCFC consumption in 2023 was 63 per cent below the HCFC consumption baseline and 33 per cent below the limit established in the Agreement. The verification of the 2023 consumption will be submitted in June 2024. Project conversions to low-GWP alternatives in the PU foam sector continue progressing, with the completion of 12 individual projects (52.08 ODP tonnes of HCFC-141b phased out) and conversions of nine systems houses and 133 PU foam DSUs achieved so far. In the commercial refrigeration sector, five SMEs completed their conversions to R-290 and nine additional ones are undergoing conversion to R-290 and HFO. Training and capacity-building activities continue in the refrigeration servicing sector, with planned training on the best practices in commercial refrigeration and room AC for an additional 3,227 technicians, delivery of relevant equipment to two training centres, support to ABNT in developing relevant technical standards, and implementation of outreach and awareness activities. The bilateral and implementing agencies have met the 20 per cent disbursement threshold for the previous tranche, disbursing 80 per cent of funds approved overall.

RECOMMENDATION

38. The Executive Committee may wish to consider:

(a) Noting:

(i) The progress report on the implementation of the fifth tranche of stage II of the HCFC phase-out management plan (HPMP) for Brazil;

(ii) That the systems house U-Tech had withdrawn from stage II of the HPMP and UNDP would continue assisting the downstream users associated with U-Tech in the adoption of a low global warming potential (GWP) technology in the froth application, on the understanding that any incremental operational costs related to the conversions (where applicable) would not be paid until the technology originally selected or another low-GWP technology had been fully introduced;

(iii) That UNIDO would reallocate US $60,000 from the commercial refrigeration project to the project monitoring unit;

(iv) That 0.69 ODP tonnes would be deducted from the remaining eligible consumption of HCFC-22 associated to the increase in the project monitoring unit costs referred to in paragraph (a) (ii);

(v) That the Fund Secretariat has updated the Agreement between the Government of Brazil and the Executive Committee, as contained in annex I to the present document, specifically: Appendix 2-A, based on the reduction of the remaining eligible consumption referred to in sub-paragraph (a)(iii) above; and paragraph 16 that has been modified to indicate that the revised updated Agreement supersedes that reached at the 91st meeting;

(b) Requesting the Government of Brazil, UNDP, UNIDO and the Government of Germany to submit:

(i) A progress report on the implementation of the work programmes associated with the final tranche to the 96th meeting, and project completion reports to the second meeting of the Executive Committee in 2026; and

(ii) As part of the progress report referred to in subparagraph (b)(i), the complete list of downstream foam enterprises assisted by the Multilateral Fund under stage II, including their HCFC-141b consumption phased out, subsector, and technology adopted; and

(c) Approving the sixth and final tranche of stage II of the HPMP for Brazil, and the corresponding 2024–2025 tranche implementation plan, in the amount of US $872,727, plus agency support costs of US $97,129 for the Government of Germany, on the understanding that UNDP, as the lead agency for stage II of the HPMP, has committed to submit an updated verification report to include 2023 consumption data by June 2024.

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Brazil

(I) PROJECT TITLE	AGENCY
HCFC phase-out plan (stage III)	UNDP (lead), UNIDO and Germany

(II) LATEST ARTICLE 7 DATA (Annex C Group l)	Year: 2022	584.09 ODP tonnes

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)									Year: 2023
Chemical	Aerosol	Foam	Fire-fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22		2.67		64.09	378.31				445.07
HCFC-123					0.27				0.27
HCFC-124					0.25				0.25
HCFC-141b					41.40	4.60			46.00

(IV) CONSUMPTION DATA (ODP tonnes)			
2009-2010 baseline:	1,327.3	Starting point for sustained aggregate reductions:	1,327.3
CONSUMPTION ELIGIBLE FOR FUNDING			
Already approved:	*686.05	Remaining:	641.25

*Including an additional deduction of 0.69 ODP tonnes at the present meeting

(V) ENDORSED BUSINESS PLAN		2024	2025	2026	Total
UNDP	ODS phase-out (ODP tonnes)	41.25	0.00	0.00	41.25
	Funding (US $)	3,852,000	0	0	3,852,000
UNIDO	ODS phase-out (ODP tonnes)	5.00	0.00	0.00	5.00
	Funding (US $)	817,091	0	0	817,091
Germany	ODS phase-out (ODP tonnes)	0.00	0.00	0.00	0.00
	Funding (US $)	1,468,306	1,341,285	2,670,909	5,480,500

(VI) PROJECT DATA			2024	2025	2026	2027	2028	2029	2030	Total
Montreal Protocol Consumption limits (ODP tonnes)			862.74	431.37	431.37	431.37	431.37	431.37	0.00	n/a
Maximum allowable consumption (ODP tonnes)			484.46	431.37	431.37	152.64	152.64	152.64	0.00	n/a
Amounts requested in principle (US $)	UNDP	Project costs	5,010,039	0	5,010,039	0	5,010,039	0	1,670,013	16,700,130
		Support costs	350,703	0	350,703	0	350,703	0	116,900	1,169,009
	UNIDO	Project costs	2,351,587	0	2,351,587	0	2,351,587	0	783,861	7,838,622
		Support costs	164,611	0	164,611	0	164,611	0	54,871	548,704
	Germany	Project costs	2,709,081	0	2,795,415	0	2,845,438	0	927,770	9,277,704
		Support costs	300,919	0	310,509	0	316,065	0	103,055	1,030,548
Total amounts recommended in principle (US $)		Project costs	10,070,707	0	10,157,041	0	10,207,064	0	3,381,644	33,816,456
		Support costs	816,233	0	825,823	0	831,379	0	274,826	2,748,261
		Total funds	10,886,940	0	10,982,864	0	11,038,443	0	3,656,470	36,564,717

(VII) Request for approval of funding for the first tranche (2024)		
Implementing agency	**Funds recommended (US $)**	**Support costs (US $)**
UNDP	5,010,039	350,703
UNIDO	2,351,587	164,611
Germany	2,709,081	300,919
Total	10,070,707	816,233

Secretariat's recommendation:	Individual consideration

PROJECT DESCRIPTION

Background

39. On behalf of the Government of Brazil, UNDP as the lead implementing agency has submitted a request for stage III of the HCFC phase-out management plan (HPMP), at a total cost of US $36,564,717, consisting of US $16,700,130, plus agency support costs of US $1,169,009, for UNDP, US $7,838,622, plus agency support costs of US $548,704, for UNIDO and US $9,277,704, plus agency support costs of US $1,030,548, for the Government of Germany, as originally submitted.[20] The implementation of stage III of the HPMP will phase out the remaining consumption of HCFC by 2030.

40. The first tranche of stage III of the HPMP being requested at this meeting amounts to US $10,886,940, consisting of US $5,010,039, plus agency support costs of US $350,703, for UNDP, US $2,351,587, plus agency support costs of US $164,611, for UNIDO and US $2,709,081, plus agency support costs of US $300,919, for the Government of Germany, as originally submitted.

Status of implementation of stage II of the HCFC phase-out management plan

41. Stage II of the HPMP for Brazil was originally approved at the 75th meeting[21] (and subsequently revised at the 80th, 82nd, 86th, 88th, 91st and 94th meetings)[22] to phase out 465.75 ODP tonnes of HCFCs used in the refrigeration and air-conditioning (RAC) servicing, polyurethane (PU) foam manufacturing and refrigeration manufacturing sectors, and to meet the 45 per cent reduction from the baseline by 2021, at a total cost of US $26,019,401, plus agency support costs. Upon approval of its extension, stage II is set to be completed by 31 December 2025. An overview of the implementation of stage II, including the analysis of HCFC consumption; progress and financial reports on the implementation; and the request for the sixth and final tranche submitted to the current meeting, is available in paragraphs 1 to 38 of the present document.

Stage III of the HCFC phase-out management plan

Remaining consumption eligible for funding

42. After deducting 686.05 ODP tonnes of HCFCs associated with stages I and II of the HPMP,[23] the remaining consumption eligible for funding in stage III amounts to 641.25 ODP tonnes of HCFCs.

43. Brazil exclusively imports HCFCs. In 2022, HCFC-22 represented 92 per cent of national consumption in ODP tonnes, while HCFC-141b accounted for about 8 per cent, and HCFC-123 and HCFC-124 together accounted for less than 1 per cent. The main HCFC-consuming sectors are RAC servicing (85 per cent in ODP tonnes), followed by air-conditioning (AC) and refrigeration manufacturing (13 per cent), extruded polystyrene (XPS) foam manufacturing (0.6 per cent) and solvent applications (0.8 per cent). Table 5 presents the consumption of HCFCs in Brazil by sector and substance for the year 2022.

Table 5. Sectoral distribution of HCFC consumption in Brazil (2022)

Sector/Application	HCFC	Metric tonnes (mt)	Mt (%)	ODP tonnes	ODP tonnes (%)
Servicing	HCFC-22	8,299.71	81.22	456.48	78.15
	HCFC-141b	379.46	3.71	41.74	7.15
	HCFC-123	14.89	0.15	0.30	0.05

[20] As per the letter of 1 February 2024 from the Ministry of the Environment and Climate Change of Brazil to UNDP.
[21] Decision 75/43
[22] Decisions 80/64(a)(ii), 82/62(b)(v), 86/89(a)(vi), 88/60(a)(iv) and 91/26(a)(vii).
[23] Including the 0.69 ODP tonnes being deducted from stage II at the present meeting.

Sector/Application	HCFC	Metric tonnes (mt)	Mt (%)	ODP tonnes	ODP tonnes (%)
	HCFC-124	17.70	0.17	0.39	0.07
Subtotal servicing		*8,711.76*	*85.26*	*498.91*	*85.42*
Refrigeration and AC manufacturing	HCFC-22	1,404.66	13.75	77.26	13.23
XPS foam manufacturing		60.00	0.59	3.30	0.56
Solvent applications	HCFC-141b	42.00	0.41	4.62	0.79
Subtotal non-servicing		*1,506.66*	*14.74*	*85.18*	*14.58*
Total		**10,218.42**	**100.00**	**584.09**	**100.00**

HCFC consumption in the manufacturing sectors

44. Following the implementation of stage II, the use of HCFCs in the manufacturing sectors has decreased substantially, but it still accounts for around 15 per cent of total HCFC consumption in the country. Except for a technical assistance project in the solvent sector, stage III of the HPMP does not include activities to address the remaining consumption in the manufacturing sectors, as it is either non-eligible or is being phased out without assistance. The status of HCFC uses in different manufacturing sectors follows:

(a) *Polyurethane foam:* Following the ban on the imports of HCFC-141b as a blowing agent for PU foam manufacturing (in effect since 1 January 2020), the consumption of HCFC-141b in this sector has been phased out;

(b) *Extruded polystyrene foam:* The only XPS foam enterprise consuming HCFC-22 (60 mt) has manufacturing capacity that is not eligible for funding; HCFC consumption in the sector will therefore be phased out without assistance from the Multilateral Fund;

(c) *Solvents:* One non-Article 5-owned enterprise uses 20 mt of HCFC-141b for the deposition of silicone in needles, while other locally owned manufacturers have already adopted suitable alternatives. Small amounts of HCFC-141b (22 mt) are used as solvent and propellant for cleaning electronic circuits and boards; a technical assistance activity has been included in stage III of the HPMP to address this specific use;

(d) *Commercial refrigeration:* Most HCFC-22 consumption for manufacturing occurs in this sector, composed mainly of small regional enterprises outside the major economic centres. While several manufacturers have converted to alternatives with low global-warming potential (GWP) under stage II, other eligible enterprises have shown no interest in the project, in part due to the investment required. Most locally manufactured equipment for supermarkets no longer contains HCFC-22; however, the manufacturers of RAC equipment supplying grocery stores, warehouses, bakeries and butcheries still have the option of using HCFC-22 in their products. The most adopted alternatives in the sector are HFC-based, including HFC-134a, R-404A, R-407C, R-449A, R-513A, and R-454C; and

(e) *Air-conditioning:* Equipment manufactured in the country includes AC window units, medium and large split commercial units, and chillers. The manufacturers of window and split units are mostly multinational enterprises and joint ventures, with partial non-Article 5 ownership. All split-unit manufacturers have either already migrated to R-410A or are in the final stages of doing so. Conversion of three AC manufacturing enterprises planned under stage II had not been implemented, as those converted to R-410A with own resources; the associated funding was deducted from stage II. The manufacturing of chillers with HCFC-22 ceased in 2014; most chillers and variable-refrigerant-flow (VRF) equipment is now manufactured with R-410A. Residual HCFC-22 consumption was recorded for the manufacture of new window units in 2022, but all manufacturing lines

using HCFC-22 were expected to close in 2023. HFC-32 is becoming a popular alternative in the sector.

HCFC consumption in the refrigeration and air-conditioning servicing sector

45. HCFC-22 represents 95 per cent of all HCFCs used in this sector, followed by HCFC-141b used for cleaning the refrigerant circuits of RAC systems, and HCFC-123 and HCFC-24 mostly used for servicing chillers. An estimate of HCFC uses in different RAC servicing subsectors is presented in table 6.

Table 6. Estimated use of HCFCs in the RAC servicing sector in Brazil

Application	HCFCs consumed in servicing	
	mt	(%)
Commercial refrigeration	2,823	32
Industrial refrigeration	1,000	11
Total refrigeration	*3,823*	*44*
Window AC units	270	3
Split AC units	3,568	41
Medium-sized AC units	197	2
Total AC	*4,035*	*46*
Other servicing*	442	5
Total consumption of HCFC-22	**8,299**	**95**
Chillers and other industrial refrigeration (HCFC-123 and HCFC-124)	33	0
Flushing (HCFC-141b)	379	4
Total HCFC consumption for the servicing of all applications	**8,711**	**100**

*A significant portion of this consumption is attributed to use for the initial refrigerant charge of commercial refrigeration systems, particularly those that are field-assembled, such as condenser unit systems utilized in mini-markets and convenience stores.

Commercial and industrial refrigeration

46. In commercial refrigeration, supermarkets account for about 67 per cent of the installed charge of HCFC-22, with equipment manufactured prior to 2022, while some grocery stores, bakeries, and butcher shops continue installing HCFC-22-based equipment. HCFC-22-based systems are being replaced by equipment charged mainly with R-404A, HFC-134a and R-410A, a trend expected to continue over the next few years. In terms of low-GWP refrigerants, carbon dioxide (CO_2) has become the preferred choice for applications operating in subcritical (low-temperature) conditions and R-290 is used in self-contained displays, while central refrigeration systems based on this substance are limited to mostly large supermarket chains that were beneficiaries of stage II of the HPMP. Recently, hydrofluoroolefins (HFOs) have also been used in the sector.

47. The main applications of the industrial refrigeration sector include equipment cooling, process cooling, and temperature control in industrial environments. Over the past 20 years, HCFC-22 consumed in industrial parks has been gradually replaced with alternatives such as HFC-134a, R-404A, R-410A, ammonia (NH_3), glycol, CO_2 in cascade systems, and more recently HFO and blends such as R-449A, R-513A, HFO-1234yf, HFO-1234ze and R-454C. Installations charged with HCFC-22 are still relatively numerous, but are pending replacement as they are reaching end of life.

Air-conditioning

48. An estimated 33.7 million room split AC units (44 per cent charged with HCFC-22 and the rest with R-410A) and 6 million window units (75 per cent using HCFC-22), aged between one and 10 years, are currently in use. The installation and maintenance of larger equipment is mostly provided by enterprises, while the room AC subsector is dominated by self-employed professionals from the informal sector.

49. In the commercial and industrial AC sector, a significant installed charge of HCFC-22 (and, to a lesser extent, HCFC-123) persists in medium- and large-sized AC systems with chillers, operating mainly in commercial buildings, shopping malls, hospitals, hotels, banks and hyper/supermarkets; self-contained AC equipment of both split and VRF types; and medium-sized central AC units serving commercial buildings such as banks, small shopping centres and food stores including restaurants, ice cream shops, bakeries, and butcheries. The installation, assembly and maintenance of large AC systems is performed by specialized, trained teams, required by the complexity of this type of equipment.

50. HCFC-123 is used for low-pressure centrifugal chillers and HCFC-124 is used for chillers operating in very high external temperatures, e.g., in overhead cranes in steelworks. No new equipment charged with HCFC-123 has been installed in the country since 2017; however, the installed capacity has a lifespan of over 40 years and is expected to continue to generate demand and drive the market for reclaimed refrigerants in the maintenance of existing equipment. There is no record of new equipment manufactured using HCFC-124 either, as HFC-134a has become the main alternative for that specific application.

Technician profile

51. There are approximately 105,000 technicians operating in Brazil's servicing sector. Thirty per cent of them have had some training but lack conceptual knowledge and practical know-how in the handling of tools and equipment, making it difficult to provide quality installation and maintenance services. An estimated 15 per cent of technicians gained their experience with a more experienced refrigeration technician in the field. The quality of the workforce tends to be higher for large systems, which often require more specialized contracts.

52. Female participation in the sector has been increasing every year, especially in the administration of servicing enterprises. Work such as management (including leadership) and monitoring of technicians, previously carried out predominantly by men (80 per cent), has become the domain of women (90 per cent). The participation of women in field work is still small but has grown in the last years from 1 to 8 per cent.

53. A qualification, certification and registration (QCR) scheme for technicians needs to be developed to help promote the reduction of refrigerant leaks and to enable the safe and efficient introduction of alternative refrigerants to HCFC. However, there are still questions about the necessary preconditions and which authorities should be involved in creating and operationalizing the QCR system.

Phase-out strategy

54. Stages I and II of the HPMP mostly focused on phasing out HCFC consumption in the manufacturing sector, with the complete conversion of the PU foam sector to low-GWP alternatives and partial conversion of the commercial refrigeration manufacturing sector to low-GWP alternatives. The remaining enterprises in the commercial refrigeration sector have already converted or intend to convert, mostly to HFC-based technologies, with their own funds. Enterprises in the AC manufacturing sector have almost fully ceased manufacturing with HCFC-22 and the manufacturing line of the only enterprise in the XPS foam manufacturing sector using HCFC-22 is not eligible for funding. On this basis, stage III of the HPMP will address the remaining HCFC consumption in the refrigeration servicing sector and in one solvent application. Specifically, stage III of the HPMP will focus on:

(a) *Regulatory actions:* Providing assistance in the development of regulatory actions and standards to support the phase-out of HCFCs;

(b) *Strengthening of the integrated management system of refrigerants:* Updating and expanding the refrigerant recovery, recycling and reclaiming (RRR) capacity in the country, including a pilot destruction of a limited amount of refrigerant, establishing reclaiming support centres, establishing refrigerant and equipment collection centres and a

mechanism to ensure collection of refrigerant; developing and testing locally manufactured reclaiming units, supporting the phase-out of HCFC-141b used as flushing agent, supporting the local environmental control bodies in monitoring refrigerant use in the market; and carrying out awareness and outreach activities;

(c) *Technical assistance and demonstration projects for the commercial and industrial AC sector:* Demonstrating the replacement of HCFC-22-based AC equipment (i.e., chillers and several types of AC units) by equipment based on energy-efficient technologies with zero ozone-depleting potential (ODP) and low GWP; a feasibility study on district cooling; and awareness activities;

(d) *Training for the commercial and industrial refrigeration and residential AC sectors in the operation of flammable and toxic refrigerants*: Improving national capacity for practical training of engineering students as future decision makers responsible for AC and commercial refrigeration equipment operating with flammable technologies; and improving national capacity related to the qualification/training of professionals in the safe use of toxic refrigerants, such as NH_3 in the industrial refrigeration sector;

(e) *Technical assistance and demonstrations in the commercial and industrial refrigeration sectors:* Demonstrating the installation of indirect-expansion refrigeration systems based on low-GWP and zero-ODP refrigerants in eight supermarkets; converting machine-room installations at three industrial facilities from the use of HCFC-22 to low-charge NH_3 in air-condensing chillers; and to improve energy efficiency; and

(f) *Capacity building in the commercial refrigeration and room AC servicing sectors:* Training 5,000 technicians on best practices in HCFC-22 containment for AC and commercial refrigeration systems, and 8,000 technicians on the safe and efficient use of zero-ODP, low-GWP refrigerants in AC units and in commercial refrigeration systems, strengthening the training institutions and develop and implement a QCR pilot project.

Project activities and total cost

55. The activities proposed for implementation under stage III and their cost breakdown are presented in table 7.

Table 7. Description and cost of activities proposed in stage III of the HPMP (as submitted)

Activity	Implementing agency	Budget (US $)
I. Regulatory actions		
Review the 2022 Normative Instruction regarding reductions to HCFC import quotas; develop control mechanisms for the use of HCFC in servicing, including *inter alia* equipment labelling by manufacture date and regulations on the manufacturing of HCFC-based equipment; develop guidelines for the correct recovery and disposal of unusable or obsolete refrigerants from old transport trucks; develop a standard on the testing and safe handling of cleaning agents alternative to HCFC-141b for flushing RAC circuits; and support the adoption of standards for the safe handling of NH_3 in industrial refrigeration	UNDP	200,000
Subtotal I		**200,000**

Activity	Implementing agency	Budget (US $)
II. Strengthening of the integrated management system of refrigerants		
RRR: Strengthen the 6 operating reclaim centres with updated equipment[24] and anti-explosion systems; establish 3 additional reclaim centres in strategic locations, including material and equipment,[25] and pilot destruction of 17 mt of unwanted refrigerant stored in the reclaim centres; establish recycling and reclaim support centres at 3 selected institutions, including acquisition of materials and equipment[26] and technical training for employees; develop a mechanism to collect and deliver controlled substances and obsolete cylinders and equipment containing them to reclaim centres including a network of collection points; implement a pilot project to encourage users to make use of the network of collection points; develop and test the performance of 10 refrigerant reclaim equipment prototypes with locally available materials and parts	UNDP	3,396,646
Flushing and solvent: Support the replacement of HCFC-141b as solvent: - Provide technical support to 50 RAC servicing workshops, 50 technicians and 18 training institutes and equipment and accessories to enable the recovery and recycling of the flushing cleaning agent used during maintenance operations on RAC equipment, and develop technical guidelines on the use of HCFCs as cleaning agents for electronic circuits and boards - Develop a module on flushing practices and technologies and provide training to 66 instructors and 5,000 technicians	UNDP Germany	1,037,022 550,440
Strengthening inspection: Strengthen the environmental control bodies at the federal, state and municipal levels through the provision of training courses and the procurement of refrigerant identifiers/analyzers	UNDP	170,000
Awareness and outreach: Five-year communication plan and marketing campaign, development of related technical materials; organization of workshops to support all RRR activities and demonstrate the environmental and economic benefits of using the existing refrigerant RRR infrastructure	UNDP	650,000
Subtotal II		**5,804,108**
III. Technical assistance and demonstrations for the commercial and industrial AC sectors		
Demonstration project on chillers: Support the replacement of at least 10 HCFC-22-based chillers installed in commercial (shopping malls, hospitals, hotels, supermarkets) and industrial facilities with chillers based on energy-efficient alternatives with zero ODP and low GWP (including definition of beneficiaries, technology assessment and selection; equipment replacement; monitoring of performance and energy use of the replaced equipment, independent verification, and technical support for preparing the equipment disposal plan)	UNDP	4,825,700
Demonstration project on AC equipment: Support the replacement of at least 50 HCFC-22-based AC units of different capacities (e.g., self-contained, split units) installed in commercial buildings (banks, small shopping centres, and food stores) by equipment based on energy-efficient, low-GWP alternatives (including definition of beneficiaries, technology assessment and selection; equipment replacement; monitoring of performance and energy use of the replaced equipment, independent verification, and technical support for preparing the equipment disposal plan)	UNDP	986,700
Feasibility study for the implementation of a district cooling system: Carry out a feasibility study for the implementation of district cooling systems based on	UNDP	104,500

[24] Including 12 reclaiming units, 12 collectors, 6 refrigerant identifier/analyzers, 6 kits of cylinders, pumps, scales and other equipment and accessories, laboratory equipment (2 chromatographs, 6 Karl Fischer units, and 2 kits of glassware and reagents)

[25] Including 6 reclaiming units, 12 collectors, 6 refrigerant identifier/analyzers, 3 kits of cylinders, 6 kits of pumps, scales and other equipment and accessories, laboratory equipment (3 chromatographs, 3 Karl Fischer units, and 3 kits of glassware and reagents)

[26] Including 3 sets of reclaiming units, recycling units, collectors, and refrigerant fluid identifiers/analyzers.

Activity	Implementing agency	Budget (US $)
zero-ODP and low- or medium-GWP technologies or energy-efficient absorption systems, and organize seminars and meetings to disseminate study results		
Awareness and outreach: Five-year communication plan and marketing campaign, preparation of technical materials; organization of workshops and participation in sectoral events and trade shows to disseminate the results of the demonstration projects to end users and RAC sector stakeholders	UNDP	275,000
Subtotal III		**6,191,900**
IV. Capacity building in the residential AC and industrial and commercial refrigeration sectors		
In cooperation with two technical universities, develop a practical training programme and educational materials, install demonstration AC and refrigeration units and procure tool kits for training, and provide training to 8 university instructors and 400 mechanical engineering students on zero-ODP/low-GWP technologies, best servicing practices, leak containment, and the safe handling of flammable refrigerants	UNIDO	990,000
In cooperation with a vocational training institution, develop a practical training programme and educational materials, adapt the practice laboratory with the provision of an NH_3-based refrigeration system, and provide theoretical and practical training for 4 instructors and 600 technicians in the industrial refrigeration subsector on the safe handling of NH_3-based systems	UNIDO	1,263,020
Subtotal IV		**2,253,020**
V. Technical assistance and demonstrations for the commercial and industrial refrigeration sectors		
Demonstration projects in the commercial refrigeration sector: Demonstration project to install indirect-expansion refrigeration systems (through modular air condensing chillers) based on low-GWP and zero-ODP refrigerants in 8 supermarkets across the country's 5 major regions (including technology assessment and selection, equipment replacement, monitoring of performance and energy use of the replaced equipment, dissemination of the technology and project among end users, associations, manufacturers, and refrigeration and installation safety experts)	UNIDO	2,805,000
Demonstration projects in the industrial refrigeration sector: Demonstration project at 3 industrial facilities to replace HCFC-22 refrigeration systems by low-charge NH_3 or HFO in air-condensing chillers and to improve energy efficiency (including system installation and safety adaptations, risk assessment and certification, monitoring of performance and energy use, training of beneficiaries' technical teams, and dissemination of results to associations, manufacturers, and refrigeration and installation safety experts)	UNIDO	2,068,000
Subtotal V		**4,873,000**
VI. Capacity building in the commercial refrigeration and room AC servicing sectors		
Curriculum development for the QCR scheme for technicians, updating the best-practice handbooks on HCFC, CO_2 and HC in commercial refrigeration systems, updating the best-practices handbook on alternative, low-GWP flammable refrigerants in AC systems, and development of curricula and teaching material (manuals, presentations, etc.)	Germany	125,000
Provide training on best practices in HCFC-22 containment for AC and commercial refrigeration systems to 66 instructors and 5,000 RAC technicians, and provision of tools and kits; Provide demonstration equipment (AC and commercial refrigeration), sealed-system design components, among others, and sets of tool kits for training purposes for a minimum of 5 partner training institutions[27]	Germany UNDP	2,201,760 654,562

[27] Including 40 AC and 25 commercial refrigeration mobile training units and 20 kits of tools and equipment for RAC servicing (e.g., recovery units, vacuum pumps, electronic gas detectors, manifolds, among others), tools and equipment for brazing and tubing (e.g. tube cutter, reamer, tube expander, among others) and personal protective equipment.

Activity	Implementing agency	Budget (US $)
Provide training on best practices in the safe and efficient use of zero-ODP, low-GWP refrigerants in small AC units and in commercial refrigeration systems to 75 instructors and 8,000 RAC technicians (to 5,000 technicians on flammable refrigerants for AC and 3,000 on CO_2/HC in commercial refrigeration)	Germany	4,502,250
Provide demonstration equipment (AC units) and training tool kits for a minimum of 7 partner training institutions[28] and establish 2 additional training centres to promote the safe and efficient use of CO_2 and HC in commercial refrigeration cascade systems	UNDP	1,800,000
Develop and implement a QCR pilot project for 80 RAC technicians	Germany UNDP	240,000 600,000
Build stakeholder awareness by disseminating information on HPMP activities related to best practices and zero-ODP, low-GWP refrigerants	Germany	500,000
Local monitoring and management	Germany	800,000
Contingencies	Germany	358,254
Subtotal VI		**11,781,826**
VII. Project coordination and monitoring		
UNDP	UNDP	2,000,000
UNIDO	UNIDO	712,602
Subtotal VII		**2,712,602**
Total for stage III		**33,816,456**

Project implementation and monitoring

56. The National Ozone Unit (NOU), embedded within the Ministry of the Environment and Climate Change, is responsible for the overall coordination of activities carried out under the HPMP, and the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) is responsible for controlling the imports, exports, and trade in ozone-depleting substances (ODSs).

57. The system established under stages I and II of the HPMP will continue into stage III, with the NOU, UNDP and UNIDO monitoring activities, reporting on progress, and working with stakeholders to phase out HCFCs. The cost of those activities for UNDP amounts to US $2,000,000, and includes project staff, consultants and experts (US $1,600,000), domestic travel and monitoring meetings (US $100,000), operating expenses (US $170,000), and verification and others (US $130,000). The cost of the project implementation and monitoring unit (PMU) activities to be carried out by UNIDO amounts to US $712,602, including one coordinator, one national expert, and one administrative assistant. Monitoring activities to be undertaken under the component implemented by the Government of Germany are embedded into the servicing sector activities proposed at the cost-effectiveness level of US $4.80/kg.

Gender policy implementation

58. In line with decisions 84/92(d), 90/48(c) and 92/40(b), the following actions will be taken over the course of stage III implementation: encouraging the selection of women for technical positions in private enterprises; introducing public policies regarding quotas and student financing to increase women's access to technical education; increasing women's presence among teaching staff and on councils, especially in technical areas and in management; increasing the number of female participants in training and capacity-building courses (currently at about 4.5 per cent); creating short, specialized online courses targeting women who are breadwinners and/or combine professional work with family care; and ensuring a safe and inclusive environment conducive to women's participation at all levels, including female-only groups and

[28] Including 250 AC units, two CO_2 training centres and 56 kits of tools and equipment for RAC servicing (e.g., recovery units, vacuum pumps, electronic gas detectors, manifolds, among others), tools and equipment for brazing and tubing (e.g. tube cutter, reamer, tube expander, among others) and personal protective equipment.

courses. Indicators to be monitored include number of women recruited through the project and included in the recruitment panels; disaggregation of data collected by sex; number of women engaged in the development of documents; number of events held with a focus on gender; number of women completing training; development of gender sensitive training material; number of women in leadership positions in the plan partner bodies; and evidence that perception of women' empowerment has changed, that women are more aware of their rights, and that men support gender equality and women's empowerment.

Total cost of stage III of the HCFC phase-out management plan

59. The total cost of stage III of the HPMP for Brazil has been established at US $33,816,456 (plus agency support costs), as originally submitted, for achieving a 67.5 per cent reduction from its HCFC baseline consumption by 2025 and a 100 per cent reduction by 2030. The proposed activities and cost breakdown are summarized in in table 8.

Table 8. Total cost of stage III of the HPMP for Brazil (as submitted)

Activity	Implementing agency	Cost (US $)
I. Regulatory actions	UNDP	200,000
II. Strengthening of the integrated management system of refrigerants	UNDP	5,804,108
III. Technical assistance and demonstrations for the commercial and industrial AC sectors	UNDP/Germany	6,191,900
IV. Capacity building in the residential AC and industrial and commercial refrigeration sectors	UNIDO	2,253,020
V. Technical assistance and demonstrations for the commercial and industrial refrigeration sectors	UNIDO	4,873,000
VI. Capacity building in the commercial refrigeration and room AC servicing sectors	Germany/UNDP	11,781,826
VII. PMU	UNDP/UNIDO	2,712,602
Total		**33,816,456**

Implementation plan for the first tranche of stage III of the HCFC phase-out management plan

60. The first funding tranche of stage III of the HPMP in the total amount of US $10,070,707 will be implemented between June 2024 and December 2026 and will include activities listed in table 9:

Table 9. Description and cost of activities proposed in the first tranche of stage III (as submitted)

Activity	Implementing agency	Budget (US $)
I. Regulatory actions		
Support in the review, discussion and development of technical standards for the servicing sector, with participation in the meetings of experts from the Brazilian National Standards Organization (ABNT) and other normative activities	UNDP	50,000
Subtotal I		**50,000**
II. Strengthening of the integrated management system of refrigerants		
RRR: Strengthen the 6 operating reclaim centres, establish 3 additional reclaim centres and 3 recycling and reclaim support centres; procure and deliver equipment to improve the refrigerant reclaim process, organize training courses, and develop standard operational procedures; start the local development of 10 prototypes of reclaiming units; and develop a mechanism to collect and deliver controlled substances and obsolete cylinders and equipment containing them to reclaim centres, including a network of collection points	UNDP	1,748,039
Flushing and solvent: Develop educational material, procure and deliver safety equipment kits, and initiate the training courses	UNDP	230,000

Activity	Implementing agency	Budget (US $)
Awareness and outreach: Develop a communication plan and marketing campaign including related technical material; and organize workshops to support all RRR activities	UNDP	150,000
Subtotal II		**2,128,039**
III. Technical assistance and demonstrations for the commercial and industrial AC sectors		
Demonstration project on chillers: Define criteria for selecting beneficiaries and project premises to be met by the beneficiaries, consult with chiller manufacturers; hold workshops and meetings with potential beneficiaries, organize the Expression of Interest process, publish the list of beneficiaries of demonstration projects, design the strategy for the monitoring process and the incentive mechanism programme, initiate the implementation of the demonstration projects and assess existing technology options and select technologies	UNDP	1,080,000
Demonstration project on AC equipment: hold workshops and meetings with potential beneficiaries, organize the Expression of Interest process, publish the list of beneficiaries of demonstration projects, design the strategy for the monitoring process and the incentive mechanism programme, initiate the implementation of the demonstration projects and assess existing technology options and select technologies	UNDP	150,000
Subtotal III		**1,230,000**
IV. Capacity building in the residential AC and industrial and commercial refrigeration sectors		
Best-practice training programme for commercial refrigeration and room AC for engineering students: Select two universities through public process, hold a workshop with universities to discuss all aspects of training, reporting, organizational procedures and activities, develop training handbook, adapt two laboratories to carry out practical activities, train the technical staff in charge of the laboratories, provide demonstration equipment (practical kits), tools, safety items and consumables to start the activities, and develop and disseminate information material on the project	UNIDO	750,000
Best-practice training programme in industrial refrigeration systems using low-charge NH_3: Select one vocational institute through a public process, develop training handbook, adapt the laboratory to carry out practical activities, train technical laboratory staff, provide demonstration equipment (practical kits), tools, safety items and consumables to start the activities, support the development of industrial refrigeration standards, and develop and disseminate information material on the project	UNIDO	650,000
Subtotal IV		**1,400,000**
V. Technical assistance and demonstrations for the commercial and industrial refrigeration sectors		
Demonstration projects in the commercial refrigeration sector: Hold meetings with supermarket associations, equipment manufacturers and service providers to introduce the project and the strategy for the sector, select 2 end users for demonstration projects through public process and start their equipment replacement and monitoring, develop technical materials on the 2 projects for dissemination to other end users	UNIDO	740,000
Demonstration projects in the industrial refrigeration sector: All activities will start in 2026	UNIDO	0
Subtotal V		**740,000**
VI. Capacity building in the commercial refrigeration and room AC servicing sectors		
Training on best practices in HCFC-22 containment for AC and commercial refrigeration: Develop and update of training material, train 66 trainers and 2,230 technicians	Germany	1,044,216
Training module on HCFC-141b containment: Develop training material for the module on HCFC-141 containment, and train 66 trainers and 2,625 technicians	Germany	256,666

Activity	Implementing agency	Budget (US $)
Training on best practices in the safe and efficient use of zero-ODP, low-GWP refrigerants in small AC units and in commercial refrigeration systems: Develop and update training material, train 75 trainers and 522 technicians on AC alternative flammable low-GWP refrigerants, and 520 technicians on CO_2/HC in commercial refrigeration	Germany	834,861
Procure and deliver demonstration equipment and training tool kits for partner training institutions[29]	UNDP	1,200,000
Start the development of the QCR scheme for technicians, including consultations with stakeholders, analysis of existing training programmes, creation of modular structure, and development of curricula and training material	Germany	91,430
Build stakeholder awareness by disseminating information on HPMP activities related to best practices and zero-ODP, low-GWP refrigerants	Germany	183,912
Local monitoring and management including data processing, quality control, monitoring visits, support ABNT in the review and development of technical standards for the servicing sector, and production of regular reports	Germany	297,996
Subtotal VI		**3,909,081**
VII. Project implementation and monitoring		
Project staff and consultants (US $280,000), domestic travel and monitoring meetings (US $30,000), operating expenses (US $57,000), verification and others (US $35,000)	UNDP	402,000
Project staff	UNIDO	211,587
Subtotal VII		**613,587**
Total for the first tranche of stage III		**10,070,707**

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

61. The Secretariat reviewed stage III of the HPMP in light of stages I and II, the policies and guidelines of the Multilateral Fund, including the criteria for funding HCFC phase-out in the consumption sector for stage II and subsequent stages of HPMPs (decisions 74/50 and 90/31), and the 2024–2026 business plan of the Multilateral Fund.

Overarching strategy

HCFC reductions between 2024 and 2029

62. The IBAMA Normative Instruction No. 20 of 16 December 2022 establishes maximum allowable consumption levels between 2024 and 2029 that are lower than those established by the Montreal Protocol (i.e., reductions of 63.5 per cent of the baseline in 2024, 67.5 per cent in 2025 and 2026, and 88.50 per cent between 2027 and 2029). The Secretariat notes with appreciation the commitment of the Government of Brazil to achieve these reductions, which are reflected in the Agreement between the Government and the Executive Committee.

Total HCFC phase-out and use of the servicing tail

63. In the plan as submitted, the Government of Brazil proposed to meet a 97.5 per cent reduction of its HCFC baseline consumption by 2030 and to maintain this level of consumption for the period

[29] Including tools and equipment for RAC servicing (e.g. recovery units, vacuum pumps, electronic gas detectors, manifolds, among others), tools and equipment for brazing and tubing (e.g. tube cutter, reamer, tube expander, among others) and personal protective equipment.

2030 to 2040. Noting that in line with paragraph 8 ter(e)(i) of Article 5 of the Protocol,[30] the last consumption target in the Agreement for total HCFC phase-out plans should be zero (and not 2.5 per cent of the baseline), the Government of Brazil agreed to adjust to zero the maximum annual consumption of HCFCs for the year 2030 in the Agreement between the Government and the Executive Committee. The current Normative Instruction allows imports of up to 2.5 per cent of the baseline between 2030 and 2040. The Government will make the necessary adjustments to clarify that HCFC consumption should be zero from 2030, but that there will be flexibility to consume HCFCs in compliance with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol with regard to the servicing tail for the period 2030–2040.

64. In line with decision 86/51, to allow for consideration of the final tranche of its HPMP, the Government of Brazil agreed to submit a detailed description of the regulatory and policy framework in place to implement measures to ensure that HCFC consumption is in compliance with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol for the period 2030–2040. Furthermore, as Brazil intends to have consumption during the period 2030–2040, in line with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol, the Government proposed modifications to its Agreement with the Executive Committee covering the period beyond 2030.

Legal framework

65. The Secretariat notes that during stage II, the HPMP supported ABNT and other relevant stakeholders to adopt key standards to support good servicing practices, HCFC phase-out and the proper adoption of low-GWP alternatives. In addition, several key areas of the servicing sector are already covered as part of these standards or in separate Normative Instructions, including *inter alia* requirements for leak checking and record-keeping practices for larger equipment, and a standard on the safe transport, storage, handling of refrigerant cylinders. The standards for the safe handling of NH_3 and the safe cleaning of industrial refrigeration systems proposed under component I (regulatory actions) of stage III will provide further support to the phase-out of HCFCs.

66. On the proposed development of guidelines for the proper recovery and disposal of unusable or obsolete refrigerants from old transport trucks, UNDP explained that this measure would support a programme to renew refrigerated trucks to be implemented by the Brazilian Agency for Industrial Development (noting an estimated fleet of 447,400 refrigerated cargo transport vehicles, many of them old), and to provide guidance and best practices on proper refrigerant RRR to prevent emissions throughout the decommissioning of this large fleet of trucks.

Technical and cost-related issues

Component II: Strengthening of the integrated management system of refrigerants

67. The Secretariat notes with appreciation the integrated management system of refrigerants followed by Brazil, and some of the ideas proposed to support it, such as the creation of collection centres for refrigerant and obsolete equipment and cylinders, which has been effective in another country in the region; the support to create local capacity to manufacture reclaiming units that could be sold at affordable prices to workshops nationwide; and the update and expansion of the RRR infrastructure to help maintain the local supply of HCFC-22 as import quotas continue to decrease. Brazil has a supporting Normative Instruction that prohibits the release of substances controlled by the Montreal Protocol during activities involving the handling of refrigerants and makes mandatory that controlled substances be properly collected and sent to reclaiming and/or incineration centers when removed from equipment. The Secretariat also notes that the infrastructure being supported by the project will not only help reduce emissions of HCFC-22 but of other HFC-based refrigerants.

[30] HCFC consumption may exceed zero in any year so long as the sum of its calculated levels of consumption over the ten-year period from 1 January 2030 to 1 January 2040, divided by 10, does not exceed 2.5 per cent of the HCFC baseline.

68. Regarding the pilot destruction of 17 mt of unusable refrigerant, UNDP explained that a facility in Sao Paulo, supported by the Demonstration Project for Waste Management and Final Disposal of ODSs[31] to make the necessary adaptations to ensure the safe thermal destruction of those substances, had been carrying out the destruction of unusable refrigerants. The purpose of including this element in the project at a pilot scale is to support the consolidation of new reclaiming centres as self-sustaining businesses, as this is one of the operations foreseen for these centres. However, in the initial years of operation, the costs involved in the proper disposal of liabilities stored throughout the operation may make it unfeasible. It was agreed that the allocation for the destruction of unusable refrigerant would not exceed US $110,000 (i.e., US $6.47/kg). The pilot will also help the reclaiming centres incorporate this cost into their operations and to explore ways to incorporate this step into the integrated management of refrigerants in an economically viable manner. The Secretariat notes that this pilot is consistent with decision 90/49(b)(i) that provides flexibility for Article 5 countries to include in the HPMPs activities related to the environmentally sound management of used or unwanted controlled substances, including disposal, taking into account paragraphs 19 to 24 of document UNEP/OzL.Pro/ExCom/89/9 and lessons learned from previous ODS disposal projects, including in relation to the integration with hazardous waste rules and regulation. The Secretariat also notes that the funds allocated to this activity are not additional but embedded within the refrigeration servicing sector activities, requested at an overall cost effectiveness of US $4.80/kg.

69. Regarding the technical assistance addressing the use of HCFC-141b in precision cleaning solvent, UNDP agreed with the suggestion to separate it from the flushing projects as the activities and target sector were different. The related funding amounts to US $105,600 to phase out 20 mt (2.2 ODP tonnes) of HCFC-141b at the same cost-effectiveness level as the activities in the servicing sector. The solvent project will include a diagnosis of use of HCFC-141b in the sector, assessment of alternatives including laboratory studies to test their effectiveness, technical assistance and workshops on the use of the selected alternatives for the enterprises using HCFC-141b in the sector. The solvent project is presented separately in the revised budget in table 10 below.

Component III: Technical assistance and demonstration projects in the commercial and industrial air-conditioning sectors

Demonstration project on chillers

70. This project intends to replace HCFC-based centrifugal chillers, centrifugal and screw chillers, as well as chillers with scroll and positive displacement compressors with chillers based on zero-ODP and low-GWP refrigerants (e.g., R-290, NH_3 or HFO). UNDP explained that there were an estimated 4,700 chillers based on HCFC-22 or HCFC-123 still operating in the country. Beyond the demonstration proposed, this will be an end-user incentive project aiming to encourage the maximum possible number of beneficiaries interested in replacing their HCFC-based chillers before or at the end of their lifespan. For the first systems being demonstrated, the Fund would cover 40 to 50 per cent of unit costs, while the beneficiary would co-finance all additional costs associated with the entire system.[32] The systems' performance and energy use would be monitored for a period of one year to provide information relevant to demonstrating the economic benefits of the replacement for the end-user incentive phase. A possible mechanism being considered by UNDP to engage additional users is to recover the expected energy cost savings over 10 years to co-finance additional replacements. Additional mechanisms are being considered and will be fully developed before project implementation takes place.

71. Upon discussion of the cost of installing chillers with different capacities, it was agreed to increase the number of demonstration chillers from the initially proposed 10 to 12, and to include within the proposed

[31] This project was approved at the 72nd meeting on the understanding that no further funds would be available for Brazil for any ODS disposal projects in future (decision 72/28).

[32] The chiller unit represents between 50 and 60 per cent of the total cost of the system, which could also include additional cooling towers, pumps, controls, installation and civil and electrical works.

budget the replacement of an additional 14 chillers to be partially funded based on the incentive mechanism being designed, on the understanding that this number could vary based on the size of the systems, cooling capacity and efficiency selected. While the demonstration phase could start form the first tranche, given the relevance of the incentive mechanism that needs to be in place for future tranches, the Secretariat recommends that UNDP include in the progress report to be submitted with the request of the second tranche, an explanation of the incentive mechanism designed to maximize the number of chillers replaced through this project.

72. Regarding the monitoring of performance and energy use, while large gains in energy efficiency are expected form the replacement of old HCFC-22-based chillers by chillers based on low-GWP alternatives, these gains could also be achieved with HFC-based chillers currently available in the market. Therefore, it was agreed that the performance of the new systems would be compared with the performance and energy use of equivalent HFC-based equipment, to help encourage end users to select low-GWP alternatives over HFC-based alternatives when replacing HCFC-based chillers.

73. In line with decision 84/84 applicable to end-user incentive schemes, the project is linked with other HPMP activities, including training and RRR components; includes information on the estimated number of users that could replicate the demonstration; provides information on co-financing by the beneficiaries; and includes a plan for communicating the results. Regarding the regulatory measures to ensure that no new HCFC-22-based chillers were installed in the country, UNDP explained that the Government would assess regulations and measures to prohibit HCFC use in new equipment. That being said, it is estimated that local manufacturers have not been using HCFCs for chillers since 2014, and that noting their lifespan of over 20 years, it was no longer attractive to invest in HCFC-based chillers. One of the main benefits of this project is rather to facilitate that those who use chillers avoid the adoption of HFC-based chillers once their HCFC-based chillers reach end of life.

Demonstration project on air-conditioning equipment

74. In discussing the details of this project, UNDP explained that it included the replacement of at least 50 HCFC-charged AC units, including rooftop and self-contained units with low-GWP technology (i.e., R-290) and VRF AC systems with HFC-32 units. The Fund will cover 30 per cent of project costs, while the beneficiary will contribute the remaining 70 per cent, including partial costs of the new equipment and its installation, as well as the de-installation and proper disposal of existing equipment. The performance and energy use of the installed equipment will be monitored for a period of one year and the results will be disseminated throughout all regions of the country to encourage more users to adopt the demonstrated technologies. The Government will assess possible regulations to prohibit the use of HCFC in the demonstrated applications. During the third tranche of stage III, UNDP will consider the establishment of an incentive programme to engage additional users based on the results of the demonstrations to be implemented under the first two tranches. Noting the plan to establish an incentive mechanism for future tranches, in the same manner as for the chillers project, the Secretariat recommends that UNDP include in the progress report to be submitted with the request of the second tranche, an explanation of the incentive mechanism designed to engage additional users.

75. In line with decision 92/36(g), the Secretariat requested UNDP, upon completion of the two demonstration projects discussed above, to submit a final report on their implementation, including the HCFC phase-out and energy-efficiency gains achieved.

Component IV: Capacity building in the residential air-conditioning and industrial and commercial refrigeration sectors

76. The Secretariat noted that the target of UNIDO's training on the safe handling of flammable refrigerants was 400 engineering students rather than technicians who were directly exposed to servicing practices. UNIDO explained that while there was already a comprehensive training programme for

technicians, the lack of engineers with experience in flammable refrigerants was identified as an obstacle to conversion to low-GWP refrigerants. The introduction of flammable refrigerants requires skilled engineers who will act as decision makers, defining strategies for RAC enterprises, and the universities' curricula lack practical training programmes. The proposed training is intended to mitigate the risks associated with the transition to flammable refrigerants by focusing on handling and servicing equipment using flammable refrigerants, including proper safety protocols, handling procedures, leak detection and repair, and emergency response measures.

77. Noting that the two participating universities will be strengthened with a new training programme, demonstration RAC units and tool kits, the universities will be asked to continue to train engineers after the end of the project and will be required to conduct research and publish articles on refrigeration systems with alternative low-GWP refrigerants for the duration of the contract. The universities will also look to integrate the training into their curricula on a permanent basis.

78. Regarding the training on industrial refrigeration for 600 technicians, the Secretariat noted that the project would provide support for the adoption of NH_3 in a larger set of RAC systems, including those in the demonstration proposed under component V. UNIDO explained that at least one potential vocational training centre with proper infrastructure to establish a training cold room and an adequate laboratory had already been identified. It is expected that the beneficiary institute will continue providing training to additional technicians with the programme and infrastructure established by the project.

Component V: Technical assistance and demonstrations for the commercial and industrial refrigeration sectors

Demonstration projects in the commercial refrigeration sector

79. In discussing the details of this project, UNIDO explained that it would finance the introduction of modular chillers[33] at supermarkets based on the experience gained with a demonstration of smaller units (refrigerant charge of 1 kg) during the implementation of stage II of the HPMP. The systems will be demonstrated in five regions to test their performance under different conditions.

80. The project will support the medium-temperature modular chillers (with refrigerant charge of above 3 kg each) and the beneficiaries will contribute the remaining investment, which represents 70 per cent of the total replacement cost, including *inter alia* new modules, condensing units with CO_2 (subcritical system), built-in display counters, and cold-room refrigeration systems. The supermarkets will also be responsible for providing the required infrastructure, including labour, civil and electrical work, as well as licenses and operating permits. Based on previous experience, UNIDO will monitor the energy consumption of these refrigeration systems and the ambient temperature for a period of three months before the conversion, and three to six months afterwards.

81. The project will seek out end users with medium-sized stores, as they are the most representative for the country, and produce reports and materials to show the conversion process and disseminate the results of each demonstration project, with local supermarket associations acting as implementation partners. As done in stage II, the beneficiaries will host on-site visits for representatives of other supermarket chains to expand the dissemination of technology. Regarding the replicability potential, the prevalence of R-290-based modular chillers demonstrated under stage II has increased from one installation in 2019, to three new installations in 2020, four in 2021, and more than 35 supermarkets running with R-290 equipment in 2024. As the number of installations increases, the cost of the technology tends to decrease,

[33] For a medium-sized supermarket, it is proposed to adopt a refrigeration system based on the concept of indirect expansion and through the installation of modular air-condensing chillers with a refrigerant charge greater than 3 kg per module for medium temperature and CO_2 condensing units for low temperature. The modular chillers will have the capacity of 36,000-48,000 kcal/h.

enabling its greater spread. Some supermarket chains that had one store converted to R-290 during stage II have subsequently adopted this technology in other stores, avoiding migration to HFCs.

82. The dissemination activities to support the project have also been designed to maximize the potential to reach users beyond the large supermarket chains.

Demonstration projects in the industrial refrigeration sector

83. This project includes the installation of three low-charge, air condensing chillers, thereby following the concept of modularity and enabling operational safety. It is expected to use chillers with a capacity of 52–67 tonnes of refrigeration (TR). Potential industrial sectors are beverages, pharmaceuticals, food and other industrial processes such as plastics, inks and packaging. Co-financing required from the beneficiary enterprises will be determined on a case-by-case basis, depending on the application of the refrigeration system, location, size of installation, and the required changes (such as heat exchanges, piping, electrical works, civil works, automation and monitoring). The Fund will cover partial costs of the equipment, and part of the adaptations to the plant to ensure the safety of operating with NH_3.

84. On the project's potential for replicability, UNIDO reported that there were over 50 installations operating with HCFC-22 for more than 20 years that had to be replaced, and that NH_3 R-717 would not be the first choice for replacing those systems. The three demonstrations in three different sectors will present the safe use and benefits of the technology, and encourage enterprises to select low-GWP technologies over HFCs. Although industrial refrigeration chillers based on HCFC-22 are no longer being manufactured in the country, the implementation of this project will also assist the Government in assessing the best way to establish regulations and measures to prohibit HCFC use in new equipment.

85. In line with decision 92/36(g), the Secretariat requested UNIDO, upon completion of the two demonstration projects discussed above, to submit a final report on their implementation, including the HCFC phase-out and energy-efficiency gains achieved.

Component VI: Capacity building in commercial refrigeration and room air-conditioning servicing sectors

86. The Secretariat notes that the project proposed by the Government of Germany is a continuation of the training programme implemented under stage II that covered more than 11,000 technicians. The present project will extend training to regions that have not been covered under stages I and II of the HPMP, serving an estimated additional 13,000 technicians. The training module on alternative refrigerants for cleaning RAC systems and on flushing practices/technologies proposed under component II (UNDP) will be added to the existing course and will be implemented in coordination with the training programme under the Government of Germany component.

87. Noting that there were more than 100,000 technicians in the country, the Secretariat enquired about the relatively low number of technicians (80) planned to be certified under the proposed QCR scheme in stage III. The Government of Germany explained that there were uncertainties regarding the authorities which should be involved in creating and operationalizing the QCR system. Time is required to prepare and set up the necessary infrastructure and to prepare the curricula and materials in close cooperation with national stakeholders. Hence, the activity was designed as a pilot project to be tested at a state level first, but is expected to expand under the Kigali HFC implementation plan (KIP) to other RAC sectors and to eventually become a fully operational system at a national level.

Project implementation and monitoring

88. The Secretariat noted that the total level of funds requested for project monitoring outside of the activities in the refrigeration servicing sector was US $2,712,602, including US $2,000,000 for UNDP and US $712,602 for UNIDO, representing 8 per cent of the total level of funds requested for stage III of the

HPMP. The implementing agencies provided details on the cost breakdown and annual costs for their PMUs. In discussing the activities planned for its PMU, UNDP noted that several of them were technical components related to specific elements of the servicing sector programme (i.e., international and local experts in several areas of refrigeration that would be supporting specific activities and providing technical assistance to the projects). Accordingly, UNDP reallocated US $600,000 in funds from the PMU to several of its technical components, to be funded as servicing sector activities at the cost efficiency level of US $4.80/kg. By adding these items to the servicing sector component, the HCFC reductions funded under stage III were adjusted from 378.49 ODP tonnes to 385.35 ODP tonnes. The total value of the PMU component for stage III was revised to US $2,112,602 (US $1,400,000 for UNDP and US $712,602 for UNIDO).

89. While there were no opportunities for the rationalization of PMU costs for UNIDO, the Secretariat noted that those could be further explored when considering the country's KIP, should the latter include activities in the same sectors as the HPMP. UNDP informed the Secretariat that the Government of Brazil was planning to submit stage I of the KIP to the 97th meeting of the Executive Committee, scheduled to take place in December 2025. It was not yet possible to confirm whether it would include the servicing sector, as the overall strategy would be defined based on the surveys to be conducted between 2024 and 2025. The PMU for the KIP would be considered in light of the activities and sectors included in the KIP and their relationship with activities under the HPMP.

Total project cost

90. The total cost for stage III of the HPMP amounts to US $33,816,456 to phase out 385.35 ODP tonnes (6,604.97 mt) of HCFCs; an additional 255.90 ODP tonnes (3,861.39 mt) of HCFCs will be deducted from the country's remaining HCFC consumption eligible for funding, resulting in an overall cost-effectiveness of the project of US $3.23/kg. The funds agreed are as submitted, with some reallocations of funds from the PMU component of UNDP to other UNDP components, as explained above. The budget breakdown after these reallocations is shown in table 10. The funding for the first tranche was agreed as submitted**.**

Table 10. Total cost of stage III of the HPMP for Brazil (as agreed)

Activity	Implementing agency	As submitted (US $)	Adjusted (US $)	Phase-out (mt)	CE* (US $ /kg)
I. Regulatory actions	UNDP	200,000	200,000	6,604.97	4.80
II. Strengthening of the integrated management system of refrigerants	UNDP	5,804,108	6,081,408		
Technical assistance for the solvent sector			105,600		
III. Technical assistance and demonstrations for commercial and industrial AC sectors	UNDP/ Germany	6,191,900	6,409,000		
IV. Capacity building in residential AC and industrial and commercial refrigeration	UNIDO	2,253,020	2,253,020		
V. Technical assistance and demonstrations in commercial and industrial refrigeration	UNIDO	4,873,000	4,873,000		
VI. Capacity building in commercial refrigeration and room AC servicing	Germany/ UNDP	11,781,826	11,781,826		
VII. PMU	UNDP/UNIDO	2,712,602	2,112,602	0.00	n/a
Subtotal		**33,816,456**	**33,816,456**	**6,604.97**	**5.12**
Additional reductions from the remaining consumption eligible for funding				3,861.39	n/a
Total			**33,816,456**	**10,466.36**	**3.23**

*CE = cost-effectiveness

91. The Secretariat notes that the level of funded tonnage (385.35 ODP tonnes) is lower than the 641.25 ODP tonnes of remaining HCFC consumption eligible for funding in stage III and the 491.59 ODP tonnes of HCFC consumption reported in 2023. Non-funded reductions include the

consumption being phased out without assistance from the Multilateral Fund in the AC, commercial refrigeration, solvent and XPS foam manufacturing sectors, and some consumption in the refrigeration servicing sector.

Impact on the climate

92. The activities proposed in the servicing sector, which include better containment of refrigerants through training and provision of equipment, will reduce the amount of HCFC-22 used for RAC servicing. Each kilogram of HCFC-22 not emitted due to better refrigeration practices results in the savings of approximately 1.8 CO_2-equivalent tonnes. A calculation of the impact on the climate was provided in the HPMP. The activities planned by Brazil, including its efforts to promote low-GWP alternatives, as well as refrigerant recovery and reuse, indicate that the implementation of the HPMP will reduce the emission of refrigerants into the atmosphere, resulting in climate benefits.

Sustainability of the HCFC phase-out and assessment of risks

93. The Government of Brazil has established a regulatory framework that will support the sustainability of the HCFC phase-out, including *inter alia* the ban on imports of HCFC-141b for use in the PU foam sector, the revision of the HCFC import quotas to achieve gradual reductions between 2024 and 2030, and the adoption of a comprehensive set of Normative Instructions and standards to support best practices in the RAC sectors, including RRR, as well as the safe adoption of low-GWP alternatives. As part of stage III, Brazil will establish a technicians' certification system (QCR) which will have a lasting impact on servicing standards nationwide. The newly assisted training institutions will incorporate the specifically developed training modules into their regular training programmes, and demonstration activities will familiarize users across sectors with equipment based on low-GWP technologies being used as alternatives to HCFCs and thus facilitate their transition, avoiding HFC-based technology. Most manufacturing sectors in Brazil have already phased out HCFCs or are in the process of transitioning to HCFC-free alternatives.

94. One potential risk to the sustainability of stage III results is related to the stakeholders capacity to timely implement all planned activities, given the magnitude of the plan. In this regard, UNDP assured the Secretariat that several activities proposed in the servicing sector were a continuation or an expansion of activities being implemented under stage II, with an implementation structure and partnerships already established. Implementation capacity will further increase as all three agencies will be working exclusively in the servicing sector, in contrast to only one agency covering it during stage II. The PMU team will be strengthened through the contracting of experts to assist on technically complex projects, and equipment procurement processes will be expedited by setting procurement plans with detailed timetables well in advance and having staff dedicated to coordinate and monitor these processes. A higher number of implementation partners (regional training institutes) will further ensure greater coverage and a simultaneous implementation of activities in different regions.

Co-financing

95. All projects to demonstrate low-GWP technologies at end-user sites will be co-financed by the beneficiary end users.

2024-2026 draft business plan of the Multilateral Fund

96. UNDP, UNIDO, and the Government of Germany are requesting US $33,816,456, plus agency support costs, for the implementation of stage III of the HPMP for Brazil. The total requested value of US $21,869,802, including agency support costs for the period of 2024–2026, is US $11,720,211 above the amount in the business plan.

Draft Agreement

97. A draft Agreement between the Government of Brazil and the Executive Committee for stage III of the HPMP is contained in annex II to the present document.

RECOMMENDATION

98. The Executive Committee may wish to consider:

(a) Approving, in principle, stage III of the HCFC phase-out management plan (HPMP) for Brazil for the period from 2024 to 2030 for the complete phase-out of HCFC consumption, in the amount of US $36,564,717, consisting of US $16,700,130, plus agency support costs of US $1,169,009, for UNDP, US $7,838,622, plus agency support costs of US $548,704, for UNIDO and US $9,277,704, plus agency support costs of US $1,030,548, for the Government of Germany, on the understanding that no more funding from the Multilateral Fund will be provided for the phase-out of HCFCs;

(b) Noting:

(i) The commitment of the Government of Brazil to completely phase out HCFCs and to ban the imports of HCFCs by 1 January 2030, and that HCFCs will not be imported after that date, except for those allowed for a servicing tail between 2030 and 2040, where required, consistent with the provisions of the Montreal Protocol;

(ii) That upon completion of the end-user projects on chillers, air-conditioning units, commercial refrigeration units and industrial refrigeration units included in stage III of the HPMP, UNDP and UNIDO will submit final reports on their implementation in line with decision 92/36(g), including the HCFC phase-out and energy-efficiency gains achieved;

(c) That, to allow for consideration of the final tranche of its HPMP, the Government of Brazil should submit:

(i) A detailed description of the regulatory and policy framework in place to implement measures to ensure that HCFC consumption was in compliance with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol for the period 2030-2040;

(ii) If Brazil were intending to have consumption during the period 2030–2040, in line with paragraph 8 ter(e)(i) of Article 5 of the Montreal Protocol, proposed modifications to its Agreement with the Executive Committee covering the period beyond 2030; and

(d) Deducting 641.25 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding;

(e) Requesting UNDP to include in the progress report to be submitted with the request of the second tranche of stage III, information about the end-user incentive mechanisms established within the demonstration projects on chillers and air-conditioning units;

(f) Approving:

(i) The draft Agreement between the Government of Brazil and the Executive Committee for the reduction in consumption of HCFCs, in accordance with stage III of the HPMP, contained in annex II to the present document; and

(ii) The first tranche of stage III of the HPMP for Brazil, and the corresponding tranche implementation plan, in the amount of US $10,886,940, consisting of US $5,010,039, plus agency support costs of US $350,703, for UNDP, US $2,351,587, plus agency support costs of US $164,611, for UNIDO and US $2,709,081, plus agency support costs of US $300,919, for the Government of Germany.

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Annex I

TEXT TO BE INCLUDED IN THE REVISED UPDATED AGREEMENT BETWEEN THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS IN ACCORDANCE WITH STAGE II OF THE HCFC PHASE-OUT MANAGEMENT PLAN

16. This updated Agreement supersedes the Agreement reached between the Government of Brazil and the Executive Committee at the **91st** meeting of the Executive Committee.

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.74	862.74	862.74	862.74	862.74	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.74	730.02	730.02	730.02	730.02	n/a
2.1	Lead IA (UNDP) agreed funding (US $)	3,078,900	0	2,627,704	7,168,396	0	0	1,400,000	0	0	0	14,275,000
2.2	Support costs for Lead IA (US $)	215,523	0	183,939	501,788	0	0	98,000	0	0	0	999,250
2.3	Cooperating IA (UNIDO) agreed funding (US $)	1,748,175	0	0	1,902,953	0	0	116,000	0	0	0	3,767,128
2.4	Support costs for Cooperating IA (US $)	122,372	0	0	133,207	0	0	8,120	0	0	0	263,699
2.5	Cooperating IA (Germany) agreed funding (US $)	1,299,386	0	686,978	2,363,637	0	1,004,545	1,500,000	0	0	872,727	7,727,273
2.6	Support costs for Cooperating IA (US $)	144,614	0	76,457	263,059	0	111,800	166,941	0	0	97,129	860,000
2.7	Cooperating IA (Italy) agreed funding (US $)	250,000	0	0	0	0	0	0	0	0	0	250,000
2.8	Support costs for Cooperating IA (US $)	32,500	0	0	0	0	0	0	0	0	0	32,500
3.1	Total agreed funding (US $)	6,376,461	0	3,314,682	11,434,986		1,004,545	3,016,000	0	0	872,727	26,019,401
3.2	Total support costs (US $)	515,009	0	260,396	898,053		111,800	273,061	0	0	97,129	2,155,449
3.3	Total agreed costs (US $)	6,891,470	0	3,575,078	12,333,039		1,116,345	3,289,061	0	0	969,856	28,174,850
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)											**164.85**
4.1.2	Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes)											51.50
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)											**575.65**
4.2.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)											300.90
4.2.2	Phase-out of HCFC-141b to be achieved in previously approved projects (ODP tonnes)											168.80
4.2.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)											52.00
4.3.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)											0.00
4.3.2	Phase-out of HCFC-142b to be achieved in previously approved projects (ODP tonnes)											0.00
4.3.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)											5.60
4.4.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)											0.00
4.4.2	Phase-out of HCFC-123 to be achieved in previously approved projects (ODP tonnes)											0.00
4.4.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)											0.30
4.5.1	Total phase-out of HCFC-124 agreed to be achieved under this Agreement (ODP tonnes)											0.00
4.5.2	Phase-out of HCFC-124 to be achieved in previously approved projects (ODP tonnes)											0.00
4.5.3	Remaining eligible consumption for HCFC-124 (ODP tonnes)											7.70

Annex II

DRAFT AGREEMENT BETWEEN THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS IN ACCORDANCE WITH STAGE III OF THE HCFC PHASE-OUT MANAGEMENT PLAN

Purpose

1. This Agreement represents the understanding of the Government of the Federative Republic of Brazil (the "Country") and the Executive Committee with respect to the reduction of controlled use of the ozone-depleting substances (ODS) set out in Appendix 1-A ("The Substances") to a sustained level of 0 ODP tonnes by 1 January 2030 in compliance with Montreal Protocol schedule.

2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A ("The Targets, and Funding") in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances that exceeds the level defined in rows 4.1.3, 4.2.3, 4.3.3, 4.4.3 and 4.5.3 (remaining consumption eligible for funding).

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A ("Funding Approval Schedule").

4. The Country agrees to implement this Agreement in accordance with stage III of the HCFC phase-out management plan approved ("the Plan"). In accordance with subparagraph 5(b) of this Agreement, the Country will accept independent verification of the achievement of the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A of this Agreement. The aforementioned verification will be commissioned by the relevant bilateral or implementing agency.

Conditions for funding release

5. The Executive Committee will only provide the Funding in accordance with the Funding Approval Schedule when the Country satisfies the following conditions at least eight weeks in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:

(a) That the Country has met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which there are no due country programme implementation reports at the date of the Executive Committee meeting at which the funding request is being presented are exempted;

(b) That the meeting of these Targets has been independently verified for all relevant years, unless the Executive Committee decided that such verification would not be required;

(c) That the Country had submitted a Tranche Implementation Report in the form of Appendix 4-A ("Format of Tranche Implementation Reports and Plans") covering each previous calendar year; that it had achieved a significant level of implementation of

activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and

(d) That the Country has submitted a Tranche Implementation Plan in the form of Appendix 4-A covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

Monitoring

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A ("Monitoring Institutions and Roles") will monitor and report on implementation of the activities in the previous Tranche Implementation Plans in accordance with their roles and responsibilities set out in the same Appendix.

Flexibility in the reallocation of funds

7. The Executive Committee agrees that the Country may have the flexibility to reallocate part or all of the approved funds, according to the evolving circumstances to achieve the smoothest reduction of consumption and phase-out of the Substances specified in Appendix 1-A:

(a) Reallocations categorized as major changes must be documented in advance either in a Tranche Implementation Plan as foreseen in subparagraph 5(d) above, or as a revision to an existing Tranche Implementation Plan to be submitted eight weeks prior to any meeting of the Executive Committee, for its approval. Major changes would relate to:

(i) Issues potentially concerning the rules and policies of the Multilateral Fund;

(ii) Changes which would modify any clause of this Agreement;

(iii) Changes in the annual levels of funding allocated to individual bilateral or implementing agencies for the different tranches;

(iv) Provision of funding for activities not included in the current endorsed Tranche Implementation Plan, or removal of an activity in the Tranche Implementation Plan, with a cost greater than 30 per cent of the total cost of the last approved tranche;

(v) Changes in alternative technologies, on the understanding that any submission for such a request would identify the associated incremental costs, the potential impact to the climate, and any differences in ODP tonnes to be phased out if applicable, as well as confirm that the Country agrees that potential savings related to the change of technology would decrease the overall funding level under this Agreement accordingly;

(b) Reallocations not categorized as major changes may be incorporated in the approved Tranche Implementation Plan, under implementation at the time, and reported to the Executive Committee in the subsequent Tranche Implementation Report;

(c) The Country agrees, in cases where HFC technologies have been chosen as an alternative to HCFCs, and taking into account national circumstances related to health and safety: to monitor the availability of substitutes and alternatives that further minimize impacts on the climate; to consider, in the review of regulations standards and incentives adequate provisions that encourage introduction of such alternatives; and to consider the potential

for adoption of cost-effective alternatives that minimize the climate impact in the implementation of the Plan, as appropriate, and inform the Executive Committee on the progress accordingly in tranche implementation reports; and

(d) Any remaining funds held by the bilateral or implementing agencies or the Country under the Plan will be returned to the Multilateral Fund upon completion of the last tranche foreseen under this Agreement.

Considerations for the refrigeration servicing sector

8. Specific attention will be paid to the execution of the activities in the refrigeration servicing sector included in the Plan, in particular:

(a) The Country would use the flexibility available under this Agreement to address specific needs that might arise during project implementation; and

(b) The Country and relevant bilateral and/or implementing agencies would take into consideration relevant decisions on the refrigeration servicing sector during the implementation of the Plan.

Bilateral and implementing agencies

9. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNDP has agreed to be the lead implementing agency (the "Lead IA") and UNIDO and the Government of Germany have agreed to be the cooperating implementing agencies (the "Cooperating IAs") under the lead of the Lead IA in respect of the Country's activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of the Lead IA and/or Cooperating IAs taking part in this Agreement.

10. The Lead IA will be responsible for ensuring coordinated planning, implementation and reporting of all activities under this Agreement, including but not limited to independent verification as per subparagraph 5(b). The Cooperating IAs will support the Lead IA by implementing the Plan under the overall coordination of the Lead IA. The roles of the Lead IA and Cooperating IAs are contained in Appendix 6-A and Appendix 6-B, respectively. The Executive Committee agrees, in principle, to provide the Lead IA and the Cooperating IAs with the fees set out in rows 2.2, 2.4 and 2.6 of Appendix 2-A.

Non-compliance with the Agreement

11. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A ("Reductions in Funding for Failure to Comply") in respect of each ODP kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this Agreement, and

take related decisions. Once decisions are taken, the specific case of non-compliance with this Agreement will not be an impediment for the provision of funding for future tranches as per paragraph 5 above.

12. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decisions that may affect the funding of any other consumption sector projects or any other related activities in the Country.

13. The Country will comply with any reasonable request of the Executive Committee, the Lead IA and the Cooperating IAs to facilitate implementation of this Agreement. In particular, it will provide the Lead IA and the Cooperating IAs with access to the information necessary to verify compliance with this Agreement.

Date of completion

14. The completion of the Plan and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption level has been specified in Appendix 2-A. Should at that time there still be activities that are outstanding, and which were foreseen in the last Tranche Implementation Plan and its subsequent revisions as per subparagraph 5(d) and paragraph 7, the completion of the Plan will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per subparagraphs 1(a), 1(b), 1(d), and 1(e) of Appendix 4-A will continue until the time of the completion of the Plan unless otherwise specified by the Executive Committee.

Validity

15. All of the conditions set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

16. This Agreement may be modified or terminated only by mutual written agreement between the Government of the Country and the Executive Committee of the Multilateral Fund.

APPENDICES

APPENDIX 1-A: THE SUBSTANCES

Substance	Annex	Group	Starting point for aggregate reductions in consumption (ODP tonnes)
HCFC-22	C	I	792.0
HCFC-123	C	I	0.3
HCFC-124	C	I	7.7
HCFC-141b	C	I	521.7
HCFC-142b	C	I	5.6
Total			**1,327.3**

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2024	2025	2026	2027	2028	2029	2030	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	862.74	431.37	431.37	431.37	431.37	431.37	0.00	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	484.46	431.37	431.37	152.64	152.64	152.64	0.00	n/a
2.1	Lead IA (UNDP) agreed funding (US $)	5,010,039	0	5,010,039	0	5,010,039	0	1,670,013	16,700,130
2.2	Support costs for Lead IA (US $)	350,703	0	350,703	0	350,703	0	116,900	1,169,009
2.3	Cooperating IA (UNIDO) agreed funding (US $)	2,351,587	0	2,351,587	0	2,351,587	0	783,861	7,838,622
2.4	Support costs for Cooperating IA (US $)	164,611	0	164,611	0	164,611	0	54,871	548,704
2.5	Cooperating IA (Germany) agreed funding (US $)	2,709,081	0	2,795,415	0	2,845,438	0	927,770	9,277,704
2.6	Support costs for Cooperating IA (US $)	300,919	0	310,509	0	316,065	0	103,055	1,030,548
3.1	Total agreed funding (US $)	10,070,707	0	10,157,041	0	10,207,064	0	3,381,644	33,816,456
3.2	Total support costs (US $)	816,233	0	825,823	0	831,379	0	274,826	2,748,261
3.3	Total agreed costs (US $)	10,886,940	0	10,982,864	0	11,038,443	0	3,656,470	36,564,717
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)								575.65
4.1.2	Phase-out of HCFC-22 to be achieved in the previous stage (ODP tonnes)								216.35
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)								0
4.2.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)								0.30
4.2.2	Phase-out of HCFC-123 to be achieved in the previous stage (ODP tonnes)								0
4.2.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)								0
4.3.1	Total phase-out of HCFC-124 agreed to be achieved under this Agreement (ODP tonnes)								7.70
4.3.2	Phase-out of HCFC-124 to be achieved in the previous stage (ODP tonnes)								0
4.3.3	Remaining eligible consumption for HCFC-124 (ODP tonnes)								0
4.4.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)								52.00
4.4.2	Phase-out of HCFC-141b to be achieved in the previous stage (ODP tonnes)								469.70
4.4.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)								0
4.5.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)								5.60
4.5.2	Phase-out of HCFC-142b to be achieved in the previous stage (ODP tonnes)								0
4.5.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)								0

*Date of completion of stage II as per decision 91/26(b)(ii): 31 December 2025

APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

1. Funding for the future tranches will be considered for approval at the second meeting of the year specified in Appendix 2-A.

APPENDIX 4-A: FORMAT OF TRANCHE IMPLEMENTATION REPORTS AND PLANS

1. The submission of the Tranche Implementation Report and Plans for each tranche request will consist of five parts:

(a) A narrative report, with data provided by tranche, describing the progress achieved since the previous report, reflecting the situation of the Country in regard to phase-out of the

Substances, how the different activities contribute to it, and how they relate to each other. The report should include the amount of ODS phased out as a direct result from the implementation of activities, by substance, and the alternative technology used and the related phase-in of alternatives, to allow the Secretariat to provide to the Executive Committee information about the resulting change in climate relevant emissions. The report should further highlight successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Tranche Implementation Plan(s), such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this Agreement, or other changes;

(b) An independent verification report of the Plan results and the consumption of the Substances, as per subparagraph 5(b) of the Agreement. If not decided otherwise by the Executive Committee, such a verification has to be provided together with each tranche request and will have to provide verification of the consumption for all relevant years as specified in subparagraph 5(a) of the Agreement for which a verification report has not yet been acknowledged by the Committee;

(c) A written description of the activities to be undertaken during the period covered by the requested tranche, highlighting implementation milestones, the time of completion and the interdependence of the activities, and taking into account experiences made and progress achieved in the implementation of earlier tranches; the data in the plan will be provided by calendar year. The description should also include a reference to the overall Plan and progress achieved, as well as any possible changes to the overall Plan that are foreseen. The description should also specify and explain in detail such changes to the overall plan. This description of future activities can be submitted as a part of the same document as the narrative report under subparagraph (b) above;

(d) A set of quantitative information for all Tranche Implementation Reports and Plans, submitted through an online database; and

(e) An Executive Summary of about five paragraphs, summarizing the information of the above subparagraphs 1(a) to 1(d).

2. In the event that in a particular year two stages of the Plan are being implemented in parallel, the following considerations should be taken in preparing the Tranche Implementation Reports and Plans:

(a) The Tranche Implementation Reports and Plans referred to as part of this Agreement, will exclusively refer to activities and funds covered by this Agreement; and

(b) If the stages under implementation have different HCFC consumption targets under Appendix 2-A of each Agreement in a particular year, the lower HCFC consumption target will be used as reference for compliance with these Agreements and will be the basis for the independent verification.

APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES

1. The Ministry of the Environment and Climate Change (MMA) is responsible for the overall coordination of activities to be undertaken in the Plan and acts as the National Ozone Unit (NOU). The Brazilian Institute of the Environment and Natural Renewable Resources (IBAMA) is the enforcement

institution linked to the MMA, responsible for carrying out national policies and legislation regarding ODS control. The NOU (under the MMA) monitors at the managerial level all ODS consumption. IBAMA controls through the licensing system the ODS consumption (import and export) at the end-user level through the licensing system. The Lead IA and Cooperating IAs will be responsible for implementing and monitoring the activities under their responsibility.

2. The Government has offered and intends to offer continuity of activities and endorsement for the projects over the next years as specified in the "Regulatory actions" component and the list of activities of the institutional strengthening project. This will guarantee the success of any activity approved for the Country.

3. Close monitoring of all activities and coordination between stakeholders is an essential element of the Plan and is key to reach compliance. There will be regular coordination meetings with industry stakeholders, HCFC importers, relevant Government stakeholders, various industrial associations, and all sectors involved, in order to enact the necessary agreements and measures to carry out the investment and non-investment activities on time and in a coordinated manner. In the manufacturing sector, the implementation process and the achievement of the phase-out will be monitored through site visits at enterprise level. Yearly monitoring will be carried out through the ODS licensing and quota system. Verification site visits will be undertaken by independent international experts and a verifier.

APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY

1. The Lead IA will be responsible for a range of activities, including at least the following:

(a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's Plan;

(b) Assisting the Country in preparation of the Tranche Implementation Reports and Plans as per Appendix 4-A;

(c) Providing independent verification to the Executive Committee that the Targets have been met and associated tranche activities have been completed as indicated in the Tranche Implementation Plan consistent with Appendix 4-A;

(d) Ensuring that the experiences and progress is reflected in updates of the overall plan and in future Tranche Implementation Plans consistent with subparagraphs 1(c) and 1(d) of Appendix 4-A;

(e) Fulfilling the reporting requirements for the Tranche Implementation Reports and Plans and the overall Plan as specified in Appendix 4-A for submission to the Executive Committee, including the activities implemented by the Cooperating IAs;

(f) In the event that the last funding tranche is requested one or more years prior to the last year for which a consumption target had been established, annual tranche implementation reports and, where applicable, verification reports on the current stage of the Plan should be submitted until all activities foreseen had been completed and HCFC consumption targets had been met;

(g) Ensuring that appropriate independent technical experts carry out the technical reviews;

(h) Carrying out required supervision missions;

(i) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Tranche Implementation Plan and accurate data reporting;

(j) Coordinating the activities of the Cooperating IAs and ensuring an appropriate sequence of activities;

(k) In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country and the Cooperating IAs, the allocation of the reductions to the different budget items and to the funding of the Lead IA and each Cooperating IA;

(l) Ensuring that disbursements made to the Country are based on the use of the indicators;

(m) Providing assistance with policy, management and technical support when required;

(n) Reaching consensus with the Cooperating IAs on any planning, coordination and reporting arrangements required to facilitate the implementation of the Plan; and

(o) Timely releasing funds to the Country/participating enterprises for completing the activities related to the project.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent entity to carry out the verification of the Plan's results and the consumption of the Substances mentioned in Appendix 1-A, as per subparagraph 5(b) of the Agreement and subparagraph 1(b) of Appendix 4-A.

APPENDIX 6-B: ROLE OF THE COOPERATING IMPLEMENTING AGENCIES

1. The Cooperating IAs will be responsible for a range of activities. These activities are specified in the Plan, including at least the following:

(a) Providing assistance for policy development when required;

(b) Assisting the Country in the implementation and assessment of the activities funded by the Cooperating IAs, referring to the Lead IA to ensure a coordinated sequence of activities;

(c) Providing reports to the Lead IA on these activities, for inclusion in the consolidated reports as per Appendix 4-A; and

(d) Reaching consensus with the Lead IA on any planning, coordination and reporting arrangements required to facilitate the implementation of the Plan.

APPENDIX 7-A: REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US $105.47 per ODP kg of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met, on the understanding that the maximum funding reduction would not exceed the funding level of the tranche being requested. Additional measures might be considered in cases where non-compliance extends for two consecutive years.

2. In the event that the penalty needs to be applied for a year in which there are two Agreements in force (two stages of the Plan being implemented in parallel) with different penalty levels, the application of the penalty will be determined on a case-by-case basis taking into consideration the specific sectors that lead to the non-compliance. If it is not possible to determine a sector, or both stages are addressing the same sector, the penalty level to be applied would be the largest.