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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-eighth Meeting
Montreal, 15-19 November 2021¹

PROJECT PROPOSAL: BRAZIL

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

Phase-out

- HCFC phase-out management plan (stage II, fifth tranche)

UNDP/UNIDO/
Germany/Italy

¹ Online meetings and an intersessional approval process will be held in November and December 2021 due to coronavirus disease (COVID-19)

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Brazil

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

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2020	452.81 (ODP tonnes)
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(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2020	
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22				63.14	357.77				420.90
HCFC-123					0.30				0.30
HCFC-124					0.54				0.54
HCFC-141b						31.07			31.07

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	1,327.3	Starting point for sustained aggregate reductions:	1,327.3
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	684.36	Remaining:	642.94

(V) BUSINESS PLAN		2021	2022	2023	Total
UNDP	ODS phase-out (ODP tonnes)	62.94	0.0	0.0	62.94
	Funding (US \$)	4,167,650	0	0	4,167,650
Germany	ODS phase-out (ODP tonnes)	24.24	0.0	14.10	43.58
	Funding (US \$)	1,666,941	0	969,856	2,636,797
UNIDO	ODS phase-out (ODP tonnes)	1.87	0.0	0.0	1.87
	Funding (US \$)	124,120	0	0	124,120

(VI) PROJECT DATA			2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	
Montreal Protocol consumption limits			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	
Agreed funding (US \$)*	UNDP	Project costs	3,078,900	0	2,627,704	7,168,396	0	0	1,400,000	2,495,000	0	16,770,000	
		Support costs	215,523	0	183,939	501,788	0	0	98,000	174,650	0	1,173,900	
	UNIDO	Project costs	1,950,275	0	0	**1,902,953	0	0	116,000	0	0	**3,969,228	
		Support costs	136,519	0	0	**133,207	0	0	8,120	0	0	**277,846	
	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	0	250,000
		Support costs	32,500	0	0	0	0	0	0	0	0	0	32,500
	Funds approved by ExCom (US\$)	Project costs	6,578,561	0	3,314,682	**11,434,986	0	1,004,545	0	0	0	0	**22,332,774
		Support costs	529,156	0	260,396	**898,053	0	111,800	0	0	0	0	**1,799,405
	Total funds requested for approval at this meeting (US\$)	Project costs							3,016,000				5,511,000
		Support costs							273,061				447,711

* The figures were revised at the 86th meeting (Annex XLV to document UNEP/OzL.Pro/ExCom/86/100); funding for UNDP for 2021 and 2022 as per Annex I to the present document.

** US \$744,104 plus agency support costs of US \$52,087 returned by UNIDO at the 86th meeting have been deducted from the original figure.

Secretariat's recommendation:	For individual consideration
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PROJECT DESCRIPTION

1. On behalf of the Government of Brazil, UNDP as the lead implementing agency has submitted a request for funding for the fifth tranche of stage II of the HCFC phase-out management plan (HPMP), at a total cost of US \$3,289,061, consisting of US \$1,400,000, plus agency support costs of US \$98,000 for UNDP, US \$1,500,000, plus agency support costs of US \$166,941 for the Government of Germany and US \$116,000, plus agency support costs of US \$8,120 for UNIDO.² The submission includes a progress report on the implementation of the fourth tranche, the verification report on HCFC consumption for 2020 and the tranche implementation plan for 2021 to 2023.

2. The funding associated with the fifth tranche for UNDP amounts to US \$3,895,000, as originally proposed. However, the Government of Brazil is requesting only US \$1,400,000 at the present meeting and the remaining US \$2,495,000 as part of the sixth tranche to be requested in 2022. The Government of Brazil is also requesting to revise its Agreement with the Executive Committee, accordingly.

Report on HCFC consumption

3. The Government of Brazil reported a consumption of 452.81 ODP tonnes of HCFC in 2020, which is 66 per cent below the HCFC baseline for compliance. The 2016-2020 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Brazil (2016-2020 Article 7 data)

HCFC	2016	2017	2018	2019	2020	Baseline
Metric tonnes (mt)						
HCFC-22	11,101.86	10,050.47	8,830.72	10,277.15	7,652.80	14,401.0
HCFC-123	(2.87)	14.89	8.99	14.77	14.89	14.9
HCFC-124	69.22	42.98	26.20	26.69	24.73	351.3
HCFC-141b	2,371.80	2,586.90	3,076.16	2,479.10	282.43	4,741.3
HCFC-142b	35.74	(20.50)	2.02	0.35	0	86.3
Total (mt)	11,575.75	12,674.74	11,943.94	12,798.06	7,974.85	19,594.8
ODP tonnes						
HCFC-22	610.60	552.78	485.69	565.24	420.90	792.0
HCFC-123	(0.06)	0.30	0.18	0.30	0.30	0.30
HCFC-124	1.52	0.95	0.58	0.59	0.54	7.7
HCFC-141b	260.9	284.56	338.38	272.70	31.07	521.7
HCFC-142b	2.32	(1.33)	0.13	0.02	0	5.6
Total (ODP tonnes)	875.29	837.26	824.96	838.85	452.81	1,327.3

4. The main factors that contributed to the decrease in HCFC consumption to 452.81 ODP tonnes in 2020 were the implementation of phase-out activities in the polyurethane (PU) foam and refrigeration manufacturing sectors approved under stages I and II of the HPMP; compliance with legislative measures, including the operation of the licensing and quota system; self-funded conversion of non-Article 5-owned enterprises manufacturing insulation foam used in domestic refrigeration equipment; economic slowdown over the last few years; and the introduction of non-HCFC-based refrigeration and air-conditioning equipment.

5. The largest decline in consumption was due to the ban on imports of HCFC-141b used as a foam blowing agent that went into effect on 1 January 2020. The import of 31.07 ODP tonnes of HCFC-141b in 2020 was for the solvent sector. The decline in consumption of HCFC-22 was influenced by the restrictions imposed due to COVID-19, but may not reflect the actual need for this substance. It is expected that HCFC-22 consumption between 2021 and 2024 will remain close to the maximum allowed import limit (i.e., 577.34 ODP tonnes or 10,497.09 mt) due to a still large existing base of commercial refrigeration and

² As per the letter of 16 August 2021 from the Ministry of the Environment of Brazil to UNDP.

air-conditioning equipment using HCFC-22, with an increasing need for maintenance services.

Country programme (CP) implementation report

6. The Government of Brazil reported HCFC sector consumption data under the 2020 CP implementation report consistent with the data reported under Article 7 of the Montreal Protocol.

Verification report

7. The verification report confirmed that the Government of Brazil continues to implement its licensing and quota system for HCFC imports and exports in an effective manner and that the total consumption of HCFCs reported under Article 7 of the Montreal Protocol for 2020 is consistent with the import and export data issued by the Brazilian Institute of the Environment and Renewable Natural Resources. The verification also concluded that all enterprises have met the requirements of the quota system, that the HCFC consumption levels for 2020 meet the requirements of the Agreement between the Government and the Executive Committee, and that the Government is consistently promoting the reduction of HCFC consumption in the country.

Progress report on the implementation of the fourth tranche of the HPMP

Legal framework

8. The Government continued implementing the HCFC import and export licensing and quota system, and supporting the Brazilian Association of Technical Standards (ABNT) in developing specific standards for the handling, installation and maintenance of equipment using flammable refrigerants (e.g., safety of refrigeration systems; based on the last version of standard ISO 5149). A guide entitled “Use of Flammable Blowing Agents in the Preparation of Completely Formulated Polyols and of Foams for the Polyurethane Production Chain” was developed and is being edited for electronic publication.

PU foam manufacturing sector

Conversion of 13 stand-alone PU foam enterprises (53.52 ODP tonnes)³

9. Ten enterprises have completed their conversions to water-based technology, methyl formate (MF), methylal or HFO, phasing out 42.13 ODP tonnes of HCFC-141b. The remaining three enterprises are undergoing conversion with an associated phase-out of 11.39 ODP tonnes. Table 2 summarizes the status of progress of the 13 foam enterprises.

Table 2: Status of progress for individual projects in the PU foam manufacturing sector

Status of implementation	Enterprises	HCFC phase-out (ODP tonnes)	Technology
Project completed	10 (Artico, Cold Air, F. Ibiopora, Gelopar, IBF, Isar, Niju, Refrimate, São Rafael, Termjet/Thermotelas)	42.13	CO ₂ , MF, methylal, HFO
Completed formulation development and started industrial conversions	3 (Ananda Metais, Bulltrade, Tecpur)	11.39	CO ₂ , HFO, MF
Total	13	53.52	

³ The project originally included 14 enterprises for 57.14 ODP tonnes. One enterprise (Poliumetka, 3.63 ODP tonnes) was removed and not funded from stage II as the project was completed under stage I.

Conversion of 14 systems houses with more than 700 downstream users (DSUs)⁴ (116.20 ODP tonnes)

10. Eight eligible systems houses have completed their formulations and plant conversions, where needed, and are in the process of assisting their DSUs to convert to formulations developed with low-global-warming-potential (GWP) blowing agents; 93 DSUs have already completed their conversions. The remaining systems houses and DSUs are at different stages of implementation, as presented in Table 3.

Table 3. Status of progress for group projects in the PU foam manufacturing sector

Status of progress in systems house conversions	Systems houses	Technology	DSUs*	DSUs converted	Amount phased out (ODP tonnes)	Status of progress in DSU conversions
Completed formulation development and plant conversion, converting DSUs	Amino	Methylal	46	6	1.20	Validating eligibility and ongoing conversions
	Ariston	MF, methylal	28	0	0	
	Ecoblaster	MF	31	3	0.59	
	Flexivel	HFO	33	9	2.58	
	M. Cassab	HFO	23	3	1.83	
	Polyurethane	MF	16	33	6.36	
	Purcom	MF	90	26	6.75	
Shimtek	HFO	11	0	0		
Developing formulation, completed plant conversion	U-Tech	MF, HFO	5	0	0	Validating eligibility
Developing formulation, plant conversion not started	Comfibras	HFO	12	0	0	DSU conversions not started
Ineligible systems houses developing formulations, converting plants self-funded	Univar	Methylal, HFO, CO ₂	84	13	11.59	Validating eligibility and ongoing conversions
	Basf	HFO	8	0	0	DSU conversions not started
	Dow	HFO	11	0	0	
Conversion not started	Polisystem	MF	47	0	0	DSU conversions not started
Total	14		445	93	30.90	

*Only includes those funded by the Multilateral Fund. The estimated number of DSUs in the country is over 700.

11. As reported at the 86th meeting, the constraints imposed by the COVID-19 pandemic continued to slow down the ongoing conversion of systems houses and DSUs, and reduced the demand for foam products. The delayed conversions to low-GWP foam-blowing agents led systems houses to use existing stocks of HCFC-141b in 2020 after the ban on imports of HCFC-141b entered into force on 1 January 2020.

Temporary use of high-GWP technology

12. One systems house (U-Tech), which has completed the conversion of its manufacturing plant from HCFC-141b to MF, continues to temporarily use HFC-134a to replace the use of HCFC-22 for some of its DSUs using the froth application, which requires the use of a gaseous blowing agent (i.e., the usual low-GWP technology alternatives to HCFC-141b cannot be used in this application), with the commitment to discontinue the use of HCFC-22, using its own resources, as soon as gaseous HFO is available on the market and polyol systems containing it have been developed and optimized.

⁴ Only 445 DSUs included for funding under the Multilateral Fund.

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

13. Activities undertaken within the commercial refrigeration manufacturing sector included individual projects in the supermarket sector, group projects, and a technical assistance project in small and medium-sized enterprises (SMEs). The status of implementation is presented below.

Commercial refrigeration individual projects (8.67 ODP tonnes)

14. This project includes the conversion to R-290 of two enterprises (Eletrofrio and Plotter Rack), consuming more than 35 mt of HCFC-22, and demonstration of the new technology in the supermarket sector:

- (a) Eletrofrio completed the conversion and certification of its plant to manufacture equipment with R-290 refrigerant, developed a R-290-based modular chiller prototype composed of six modules and with a capacity of 20,000 kcal/h and total refrigerant charge of 11.40 kg (1.90 kg per module), and installed it in a supermarket in Curitiba following the safety standard ABNT ISO 5149 (a translation to Portuguese of ISO 5149). Subsequently, Eletrofrio has installed two additional chillers in Curitiba and one in São Paulo;
- (b) Plotter Rack completed the conversion of its manufacturing plant to operate with R-290, developed, assembled and tested a modular chiller prototype with a capacity of 10,800 kcal/h and refrigerant charge of 1.04 kg per module, and installed it in a supermarket in Juiz de Fora in accordance with safety standards ABNT ISO 5149, EC 60355-2-89 and IEC 60079-15; and
- (c) Virtual workshops to disseminate the results of the projects took place in October 2020 and June 2021, and a technical bulletin with the results of the projects is being prepared during the second half of 2021 to be followed by a final workshop.

Commercial refrigeration group projects (3.22 ODP tonnes)

15. This project includes the conversion of three enterprises with consumption between 10 and 35 mt of HCFC-22. Two have completed their conversions and will start commercial manufacturing of R-290-based equipment in the first half of 2022 as follows:

- (a) Chopeiras Ribeirão Memo (1.24 ODP tonnes of HCFC-22) converted its manufacturing line to produce R-290-based refrigeration equipment (beverage coolers) with a capacity of 3,860 BTU/h, refrigerant charge of 150 gr and energy consumption reduction from 1.7 kW/h to 0.72 kW/h. The enterprise has installed equipment in points of sale in São Paulo that have reported a 50 per cent improvement in energy efficiency. Once restrictions related to COVID-19 are reduced, commercial production is expected to start for the Brazilian, South American and African markets; and
- (b) Aquagel Refrigeração (1.05 ODP tonnes of HCFC-22), producing beverage coolers and refrigerated displays, in 2020 completed the conversion of the charging line and three product lines to R-290 technology (beer pre-cooling; refrigerated display; and the juice dispenser). The enterprise is able to manufacture R-290-based equipment that has showed a reduction of 30 per cent in energy consumption.

16. Freart Seral (0.93 ODP tonnes of HCFC-22) withdrew from the HPMP as reported at the 84th meeting.⁵ In line with decision 84/33(a)(ii), UNIDO tried to identify a potentially eligible enterprise

⁵The Executive Committee noted that the funds associated with the enterprise would be returned to the Fund unless UNIDO identified additional enterprises eligible for funding that had not been assisted under stage I or stage II of the

with characteristics similar to Freeart Seral (medium-sized) that could replace it; however, it was not possible. Thus, at the 90th meeting UNIDO will return US \$202,100, plus agency support costs of US \$14,147.

Commercial refrigeration technical assistance project for SMEs⁶ (3.85 ODP tonnes)

17. In June 2021, UNIDO and the Government of Brazil held a virtual workshop on the experiences of the enterprises in the sector that had converted or were in the process of converting to low-GWP technologies. A total of 60 SMEs, installers and educational institutions attended the workshop.

18. Out of the 20 SMEs that manufacture commercial refrigeration equipment completely in their plants, six have already started their conversions (e.g., draft beer coolers and chillers of several capacities) to R-290; one (JJ Instalacaos) has completed its conversion; and 10 are at different stages of implementation. Three additional enterprises are assessing the cost of technical options for conversion, preparing terms of reference and identifying component suppliers. Conversions of all the SMEs are expected to be completed by the end of 2023.

19. The conversions of the remaining 13 SMEs are being prioritized based on their capacity to handle flammable refrigerants and to co-finance the conversion, and considering the constraints imposed by the COVID-19 pandemic, as many of these SMEs have slowed down or interrupted their activities. UNIDO continues to monitor the status of these SMEs in order that they start as soon as possible.

20. UNIDO has identified three SMEs that may have stopped activities, and three potentially eligible SMEs that could replace them. However, it is not yet known whether these SMEs have interest in participating in the HPMP. Once the situation is further assessed, UNIDO will report any change that may be necessary to the project.

Room air-conditioning manufacturing sector (45.31 ODP tonnes)

21. The project includes the conversion of three room air-conditioning manufacturers (Climazon, Elgin and Gree) to R-290, at a total funding of US \$7,353,365, approved in principle. At the 86th meeting, the Executive Committee noted that the three enterprises had converted with their own resources to R-410A technology, resulting in the phase-out of 823.80 mt (45.31 ODP tonnes) of HCFC-22. Accordingly, the funding balance of US \$7,147,469, plus agency support costs of US \$500,323 for UNIDO, associated with the conversion of the enterprises was deducted from stage II of the HPMP (decision 86/89(a)(iii) and (iv)).

Refrigeration servicing sector

22. The following activities were completed during the reporting period:

- (a) *Training and capacity building on HCFC-22 containment:* An additional 581 (for a total of 4,475) technicians were trained in best servicing practices for split and window-type air-conditioners, and an additional 63 (for a total of 920) technicians were trained in best commercial refrigeration practices. After a slowdown in the delivery of the training courses due to challenges associated with the pandemic, the partner technical training institutions are gradually resuming activities following public health protocols. Two additional partner technical training institutions were awarded contracts to make up for the delay and speed up the implementation of the best-practices courses;

HPMP, to which those funds could be reallocated; and that any reallocation of funds would be reported to the 86th meeting (decision 84/33(a)(ii)).

⁶ Of the 33 SMEs included in the project as approved, four SMEs that decided not to participate were replaced by four other eligible SMEs; these changes were approved at the 82nd (decision 82/62) and 84th (decision 84/33) meetings.

- (b) *Training and capacity-building on low-GWP alternatives:* Two technical training institutions located in the South East and South regions were awarded contracts to provide training on the safe use of CO₂ and R-290 in commercial refrigeration systems; and the tendering process was completed for the acquisition of two demonstration mini-cascade systems⁷ and associated tools to be installed in the two selected training institutions. The delivery and installation of the two systems are expected to take place by the end of 2021, with training activities to be initiated during the first quarter of 2022. Technical information on the safe use of HC and CO₂ refrigerants has been compiled in draft handbooks and presentations. This material will be completed by the end of 2021 with the addition of information on the two mini-supermarkets;
- (c) *Outreach and awareness campaign:* Additional activities completed included: the development and distribution of technical rules for the quick conversion of pressure and temperature; the development and distribution of stickers and seals for the dissemination of best practices for refrigeration and air-conditioning systems; the production of a video on leak reduction in the servicing sector and a video on awareness regarding contracting appropriate services for air-conditioning systems; the printing and distribution of other materials including a project folder, posters on training and capacity-building activities, and a refrigerant classification card; and the scripts for two additional videos on best practices; and
- (d) *Management, monitoring and evaluation:* Monitoring visits; preparation of reports; and support for the review, discussion and development of technical standards, including ABNT NBR-15960 Standard on Refrigerants – Recovery, recycling and reclaim – Procedure (concluded in 2020); ABNT NBR – 15976 Standard on Reduction of emissions from halogenated refrigerants in stationary refrigeration and air-conditioning equipment and installations – General requirements and procedures (concluded in 2021), and a draft Standard on Safety in the transportation, storage and handling of refrigerant packaging (ongoing), were carried out.

Project implementation and monitoring unit (PMU)

23. The PMU for stage II of the HPMP is managed by UNDP and by UNIDO with separate budgets. The PMU provides international and national technical assistance to the Government and the eligible enterprises; manages the implementation of investment projects; organizes missions, meetings and technical visits to enterprises; prepares reports and technical documentation; organizes meetings with the Ministry of the Environment (MAA) and the Brazilian Cooperation Agency; provides technical analyses of products; and monitors the schedules agreed upon in contracts. The PMU managed by UNDP was engaged in drafting, executing and monitoring service contracts; preparing annual budget reviews conforming to the agency rules and regulations; ensuring financial control of the funds approved; and organizing awareness-raising activities. The PMU costs incurred under the first four tranches are presented in Table 4.

Table 4. PMU costs under the first four tranches of stage II of the HPMP as of August 2021 (US \$)

Activity	UNDP		UNIDO	
	Approved	Disbursed	Approved	Disbursed
Personnel (staff and international/national consultants)	604,500	557,138	552,000	408,699
Travel (including monitoring costs)	185,250	133,412		29,893
Awareness (workshops/meetings/communication)	39,000	55,099		23,255
Operational costs	146,250	105,488		69,758
Total	975,000	851,137		530,605

⁷ Units designed as a CO₂ dry expansion refrigerant circuit for product freezing and conventional indirect system for product cooling and with an integrated dry cooler.

Level of fund disbursement

24. As of July 2021, of the US \$22,332,774 approved so far, US \$13,753,748 had been disbursed (US \$8,181,974 for UNDP, US \$2,244,214 for UNIDO, US \$3,077,560 for the Government of Germany, and US \$250,000 for the Government of Italy) as shown in Table 5. The balance of US \$8,579,026 will be disbursed in 2021-2023.

Table 5. Financial report of stage II of the HPMP for Brazil (US \$)

Tranche		UNDP	UNIDO	Germany	Italy	Total	Disbursement rate (%)
First tranche	Approved	3,078,900	1,950,275	1,299,386	250,000	6,578,561	91
	Disbursed	3,043,891	1,390,158	1,299,386	250,000	5,983,435	
Second tranche	Approved	2,627,704	0	686,978	0	3,314,682	100
	Disbursed	2,627,704	0	686,978	0	3,314,682	
Third tranche	Approved	7,168,396	1,902,953	2,363,637	0	11,434,986	37
	Disbursed	2,510,379	854,056	837,755	0	4,202,190	
Fourth tranche	Approved	0	0	1,004,545	0	1,004,545	25
	Disbursed	0	0	253,441	0	253,441	
Total	Approved	12,875,000	3,853,228	5,354,546	250,000	22,332,774	62
	Disbursed	8,181,974	2,244,214	3,077,560	250,000	13,753,748	

Note: Approved funding based on the updated revised Agreement for stage II of the HPMP (decision 86/89 and Annex XLV to document UNEP/OzL.Pro/ExCom/86/100).

Implementation plan for the fifth tranche of the HPMP*PU foam manufacturing (UNDP) (US \$1,400,000)*

25. With the entry into force of the ban on imports of HCFC-141b for the foam sector on 1 January 2020, it was expected that the full conversion of the foam sector would take place before the depletion of stocks of HCFC-141b. However, the drastic reduction in commercial activities due to the COVID-19 pandemic, compounded by a new financial crisis, has resulted in a strong deceleration in the conversion process of end-users since March 2020. Under these circumstances, UNDP did not request a tranche in 2020 and continued the conversion of individual PU foam enterprises, systems houses and PU foam DSUs, and project implementation and monitoring through the PMU with the balances from the first three tranches (i.e., US \$5,124,302). UNDP expects that the ongoing DSU conversion activities will continue at a slow pace in 2021, followed by a faster implementation rate from the first half of 2022 with the existing fund balances (i.e., US \$4,693,026).

26. UNDP is also requesting to redistribute the fifth tranche, in the original amount of US \$3,895,000, plus agency support costs of US \$272,650, in two installments, as follows:

- (a) The fifth tranche being requested at the present meeting in the amount of US \$1,400,000, plus agency support costs, which includes US \$1,075,000 to assist the conversion of additional DSUs mostly associated with BASF and Dow, and US \$325,000 for the PMU expenditures (i.e., US \$215,000 for personnel and consultants, US \$10,000 for travel, US \$51,250 for awareness-building activities and US \$48,750 for operational costs); and
- (b) The sixth tranche to be requested in 2022 in the amount of US \$2,495,000, plus agency support costs, to conclude the conversion of the three remaining systems houses (Comfibras, Polysystem, and U-Tech) and their DSUs, as well as the remaining DSUs still not converted from the other systems houses.

27. Accordingly, the Government of Brazil is requesting a modification in the annual tranche distribution in its Agreement with the Executive Committee.

Commercial refrigeration (UNIDO) (US \$116,000)

28. UNIDO will hold the conclusion workshop associated with the individual projects, finalize the conversion of enterprises in the group project, and continue implementing the product modification and line conversions in the remaining SMEs, with the balances from previous tranches. The US \$116,000 requested under the present tranche will be for PMU expenditures, namely for personnel in charge of maintaining the operation of the unit; implementing, recording and monitoring activities; preparing reports, providing technical assistance to beneficiary enterprises during implementation, and supporting the review of technical standards for the refrigeration and air-conditioning sector.

Refrigeration servicing sector (Germany) (US \$1,500,000)

29. The Government of Germany will implement the following activities:

- (a) *Training and capacity-building on HCFC-22 containment:* Continue training additional technicians in best practices for commercial refrigeration and for split and window-type air-conditioning systems, and conduct monitoring visits to training institutions involved in the training programme (funds from previous tranches);
- (b) *Training and capacity-building on low-GWP alternatives:* Continue developing training material on the safe use of CO₂ and flammable refrigerants in air-conditioning systems (e.g., best-practices handbooks, course agenda, evaluations, presentations); finalize procurement of demonstration units and tool kits (commercial refrigeration) and procurement of two demonstration units and associated tools for air-conditioning); conduct two train-the-trainer workshops and train 650 technicians in the safe use of CO₂ and flammable refrigerants in commercial refrigeration systems (350 technicians) and air-conditioning systems (300 technicians); and select and contract out to five partner technical training institutions for the implementation of training courses on the safe use of flammable refrigerants in air-conditioning systems (US \$1,100,000);
- (c) *Outreach and awareness campaign:* Continue developing information materials, technical publications and videos on best practices and low-GWP alternatives; operate and maintain the website; regionally broadcast the activities and results of stage II of the HPMP in the servicing sector through different media; participate in trade shows and sector events; and hold meetings and networking activities with stakeholders in the servicing sector at the regional and national levels (US \$200,000); and
- (d) *Management, monitoring and evaluation:* Continue managing and monitoring activities in the sector; engage in data processing and quality control; support experts at the ABNT in the review, discussion and development of technical standards for the servicing sector; and produce periodic reports as required (US \$200,000).

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

Legal framework

30. The Government of Brazil has allocated total HCFC import quotas of 642.92 ODP tonnes for the years 2021 to 2024, which is 51.6 per cent below the baseline.

Progress report on the implementation of the fourth tranche of the HPMP

Redistribution of the tranche associated with the PU foam sector

31. The Secretariat noted that despite challenges associated with COVID-19 and the economic situation prevailing in the country, additional progress in the implementation of the PU foam sector plan had been achieved, including the completion of the conversion of 10 individual enterprises and 86 DSUs. UNDP had expected an acceleration in implementation by mid-2021, which did not take place largely due to the extended pandemic.

32. Regarding the division of the current tranche into two parts, UNDP explained that the first part will focus on converting SMEs that are ready for conversion, while the second part will focus on the remaining enterprises that have taken longer to initiate the process. UNDP confirmed that the date of operational completion of stage II of the HPMP, including all its tranches, continues to be 2023, in line with the Agreement between the Government of Brazil and the Executive Committee. UNDP also confirmed that it expects to be able to assist the 445 DSUs for which Multilateral Fund assistance was allocated. In view of the above, the Secretariat supports the proposal from UNDP to divide the current tranche in two parts.

Availability of HFCs and HFOs in the PU foam sector

33. UNDP explained that in addition to the limitations caused by COVID-19, another factor that has delayed the conversions is the commercial availability of the HFC-365mfc/HFC-227ea blend at competitive prices in the local market, the high cost and limited availability of HFOs, combined with the absence of a legal framework to discourage the use of HFCs in the country. In the absence of ratification of the Kigali Amendment, the Government of Brazil cannot implement any control on the import and use of HFCs.

34. In explaining whether the combination of these factors would likely cause temporary use of high-GWP alternatives by some enterprises, UNDP explained that transitory conversions have not been encouraged by the project. In addition, enterprises participating in the HPMP sign an agreement where they commit not to use high-GWP alternatives after they have received the assistance. However, given the lack of availability of HFOs, many SMEs are delaying their participation in the HPMP to maintain the possibility of using HFCs. UNDP envisages that it may be necessary to consider the temporary use of high-GWP alternatives, but that it is not possible to estimate the magnitude or duration of this practice yet.

35. UNDP is making local PU foam experts available to systems houses and DSUs through virtual meetings to clarify technical issues and facilitate their participation in the project. However, external factors such as the widespread availability of the HFC blend at a competitive price and the low availability and high price of HFOs cannot be addressed at the project level.

36. The Secretariat notes that the reported consumption of the HFC-365mfc/HFC-227ea blend increased from 220 mt to 453 mt between 2019 and 2020, levels that are still low compared to historical levels of HCFC-141b (i.e. 2,356 mt in 2019 before the ban on imports for the foam sector entered into force). The Secretariat suggests that UNDP include in the progress report associated with the next tranche request, an update on the assessment of the situation of availability of HFC-365mfc/HFC-227ea and HFOs in the PU foam sector and an indication of how this issue is affecting the completion of the conversions of enterprises in the PU foam sector.

Temporary use of high-GWP technology by U-Tech

37. In light of the temporary use of HFC-134a to replace the use of HCFC-22 for the froth application by U-Tech, first reported at the 80th meeting, and in line with Executive Committee decisions 80/12(e)

and 81/9,⁸ UNDP has reported on the status of the use of interim technology at each meeting. At the present meeting, UNDP reported that U-Tech concluded the development of the formulation using gaseous HFO (Solstice GBA), but the high cost of the substance makes it commercially unfeasible at present. Additionally, a recent incident in an HFO production plant has further affected the availability of HFO in Brazil. The Secretariat enquired if any alternative way forward had been considered and, if not feasible, what was the expected timeline to replace the temporary use of HFC-134a in this application (i.e., whether the price of Solstice GBA was expected to decrease within the timeframe for the implementation of stage II). UNDP informed the Secretariat that if the price of Solstice GBA was not commercially viable in the coming years before the end of stage II, the remaining funds from U-Tech's conversion associated with the phase-out of HCFC-22 would be returned to the Fund by the end of stage II. On this basis, the Secretariat recommends, in line with previous decisions, that UNDP continue to report any progress on the matter at each meeting until it is resolved.

Reporting of incurred incremental operational costs (IOCs) in line with decision 75/43

38. In response to decision 75/43(b)(iii),⁹ UNDP reported that the IOCs incurred during the conversion to reduced HFO formulations are above US \$5.00/kg. In 2018 and 2019, the price of HCFC-141b was US \$2.36/kg and US \$2.31/kg (as reported in the CP report), while the price of HFO-1233zd(E) reduced with water at 50 per cent was US \$16.00 and the price of HFO-1336mzzm(Z) reduced with water at 50 per cent was US \$20.00/kg. The prices of formulated polyol and isocyanate were US \$3.00/kg and US \$2.88/kg, respectively. Based on these prices, the IOC to convert to HFO-1233zd(E) reduced at 50 per cent with water calculated by UNDP is at US \$8.20/kg, while the IOC for HFO-1336mzzm(Z) reduced at 50 per cent with water is US \$13.20/kg. UNDP calculated the IOC using a higher price of US \$3.00/kg for HCFC-141b and the IOC decreased to US \$7.54 for HFO-1233zd(E) and US \$12.55/kg for HFO-1336mzzm(Z). UNDP also indicated that at the downstream end-user level, the actual IOC may often be even higher, as the HFO systems require more skilled labor in the systems house, which increases the price of the new HFO-based systems.

39. Using the different prices provided by UNDP, the Secretariat calculated the IOCs taking into account the additional CO₂ generated from the reaction of the isocyanate and the HFO reduced with water, which did not appear to be considered in UNDP's calculation. In all scenarios, the values obtained by the Secretariat were above US \$5.00/kg, the lowest being US \$5.58, obtained using a price of US \$3.00 for HCFC-141b and US \$15.00/kg for HFO-1233zd(E). Given the price difference between the blowing agents, the Secretariat considers unlikely that the IOC for the conversion to HFO in Brazil at present is below US \$5.00/kg.

Potential adjustments to the commercial refrigeration project

40. Regarding the three SMEs that may have stopped activities and the three potentially eligible SMEs that could replace them, the Secretariat acknowledges that projects addressing SMEs require flexibility, and appreciates the efforts on the part of the Government of Brazil and UNIDO to report these changes in advance for consideration by the Executive Committee. As per existing practice, once it is confirmed that

⁸ At the 80th meeting, the Executive Committee requested UNDP to continue assisting U-Tech in securing the supply of the alternative technologies selected, on the understanding that incremental operational costs would not be paid until the alternative technology selected or another low-GWP-based technology had been fully introduced. UNDP was also requested to report on the status of use of the interim technology until the technology originally selected or another low-GWP-based technology had been fully introduced (decision 80/12(e)), along with an update from the suppliers on progress made toward ensuring that the selected technologies, including associated components, were available on a commercial basis in the country (decision 81/9).

⁹ The Executive Committee requested UNDP to report the IOCs incurred during the conversion to reduced HFO formulations in the foam sector when requesting the second tranche of stage II of the HPMP, on the understanding that if the IOCs were below US \$5.00/kg, the Government of Brazil would return the associated funds to the Multilateral Fund.

these enterprises will not participate in the HPMP, the associated funds must be returned to the Fund unless UNIDO identifies additional enterprises eligible for funding that have not been assisted under stage I or stage II of the HPMP, and to which the funds could be reallocated. The Secretariat suggests that any reallocation or return of funds be reported to the Executive Committee at the 90th meeting.

Refrigeration servicing sector

41. In response to a question from the Secretariat, the Government of Germany explained that in addition to the specific outputs proposed in the plan of action for the next tranche, the long-term objective of the project was to facilitate the refrigeration and air-conditioning sector's transition towards the use of low-GWP refrigerants by increasing overall awareness, providing high-quality training materials that can be used well beyond the project, and allaying existing concerns about low-GWP refrigerants. The implementation of relevant regulations and a technician certification scheme will further provide, among other benefits, reassurance that technicians exposed to equipment based on flammable refrigerants have the required knowledge, tools and experience to handle it in a safe manner.

42. The strengthening of partner training institutes with tool kits and mobile training units will allow them to continue to offer and implement the training courses after the completion of the project, ensuring its sustainability. These institutes are also expected to integrate the training materials produced by the project into other refrigeration qualification training courses offered by them on a regular basis outside of the project.

43. Regarding the capacity of the Government of Brazil to ensure that, in the long term, technicians comply with the minimum requirements for servicing refrigeration and air-conditioning equipment in a safe and environmentally sound manner, the Government of Germany explained that the ABNT was developing a standard for qualification of those who work with heating, ventilation, air-conditioning and refrigeration (HVAC) systems. The standard will define the required competencies and include qualifications and procedures for system design, installation, maintenance, control and operation, based on the text of "Draft international standard ISO/DIS 22712 – Refrigerating systems and heat pumps – Competence of personnel." Once it is published, it will be possible to develop criteria for the certification of people who work with HVAC systems. The drafting work is being carried out with the participation of the Ministry of the Environment, the Government of Germany, UNIDO and UNDP.

Revision of the Agreement

44. In view of the redistribution of funding programmed for UNDP in the fifth tranche, Appendix 2-A of the Agreement between the Government of Brazil and the Executive Committee has been updated and paragraph 16 has been modified to indicate that the updated Agreement supersedes that reached at the 86th meeting, as contained in Annex I to the present document. The full updated Agreement will be appended to the final report of the 88th meeting.

Gender policy implementation¹⁰

45. 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.

¹⁰ Decision 84/92(d) requested bilateral and implementing agencies to apply the operational policy on gender mainstreaming throughout the project cycle.

Conclusion

46. Brazil continues to be in compliance with the Montreal Protocol and the HCFC consumption targets stated in the Agreement with the Executive Committee. HCFC consumption in 2020 was 66 per cent below the HCFC consumption baseline, and 48 per cent below the limit established in the Agreement. A ban on imports of HCFC-141b pure or contained in pre-blended polyols entered into force on 1 January 2020, and project conversions to low-GWP alternatives in the PU foam sector continue progressing with the completion of 10 individual projects (42.13 ODP tonnes of HCFC-141b phased out), as well as the conversion of eight systems houses and 93 PU foam DSUs. In the commercial refrigeration sector, technical assistance continues to be provided to SMEs to adopt low-GWP alternatives. Training and capacity-building activities continue to be implemented in the refrigeration servicing sector. At the 90th meeting, UNIDO will return the funds associated with one enterprise that stopped using HCFC-22 without Multilateral Fund assistance (Freeart Seral) and will report on the status of three SMEs that may also have stopped using HCFC-22 without Multilateral Fund assistance.

47. In view of the redistribution of funding programmed for UNDP in the fifth tranche, the Agreement between the Government of Brazil and the Executive Committee has been updated. Therefore, the funding being requested under the present tranche for UNDP has been reduced from the original amount.

RECOMMENDATION

48. The Executive Committee may wish to consider:

(a) Noting:

- (i) The progress report on the implementation of the fourth tranche of stage II of the HCFC phase-out management plan (HPMP) for Brazil;
- (ii) That US \$3,895,000, plus agency support costs of US \$272,650 for UNDP, associated with the funding tranche for 2021, would be divided into two tranches: US \$1,400,000, plus agency support costs of US \$98,000, to be released in 2021, and US \$2,495,000, plus agency support costs of US \$174,650, to be released in 2022;
- (iii) That UNIDO would return to the 90th meeting US \$202,100 plus agency support costs of US \$14,147 associated with the enterprise Freeart Seral that phased out 0.93 ODP tonnes of HCFC-22 without Multilateral Fund assistance;
- (iv) 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 redistribution of funding tranches for 2021 and 2022 referred to in sub-paragraph (a)(ii) above, and paragraph 16, modified to indicate that the updated Agreement supersedes that reached at the 86th meeting;

(b) Requesting:

(i) UNDP:

- a. To continue assisting the Government of Brazil in securing the supply of alternative technologies with low global-warming potential (GWP) to the systems house U-Tech, on the understanding that any incremental operational costs related to the conversion of froth system applications

would not be paid under stage II until the technology originally selected or another technology with low GWP had been fully introduced, and to provide, at each meeting until the technology originally selected or another technology with low GWP had been fully introduced, a report on the status of the conversion, along with an update from the suppliers on the progress made towards ensuring that the selected technologies, including associated components, were available on a commercial basis in the country; and

- b. To include in the progress report associated with the request of the sixth tranche of stage II of the HPMP, an update on the availability of HFC-365mfc/HFC-227ea and HFOs in the polyurethane (PU) foam sector and an indication of how this issue is affecting the completion of the conversions of enterprises in the PU foam sector; and
- (ii) UNIDO to report at the 90th meeting the status of three small and medium-sized enterprises that may have stopped using HCFC-22 without Multilateral Fund assistance, on the understanding that the funds associated with these enterprises would be returned to the Fund unless UNIDO identified additional enterprises that are eligible for funding and have not been assisted under stage I or stage II of the HPMP, and to which those funds could be reallocated; and
- (c) Approving the fifth tranche of stage II of the HPMP for Brazil, and the corresponding 2021-2023 tranche implementation plan, at the amount of US \$3,289,061, consisting of US \$1,400,000, plus agency support costs of US \$98,000 for UNDP, US \$1,500,000, plus agency support costs of US \$166,941 for the Government of Germany and US \$116,000, plus agency support costs of US \$8,120 for UNIDO.

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 86th meeting of the Executive Committee.

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2015	2016	2017	2018	2019	2020	2021	2022	2023	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	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	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	2,495,000	0	16,770,000
2.2	Support costs for Lead IA (US \$)	215,523	0	183,939	501,788	0	0	98,000	174,650	0	1,173,900
2.3	Cooperating IA (UNIDO) agreed funding (US \$)	1,950,275	0	0	1,902,953	0	0	116,000	0	0	3,969,228
2.4	Support costs for Cooperating IA (US \$)	136,519	0	0	133,207	0	0	8,120	0	0	277,846
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	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	97,129	860,000
2.7	Cooperating IA (Italy) agreed funding (US \$)	250,000	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	32,500
3.1	Total agreed funding (US \$)	6,578,561	0	3,314,682	11,434,986	0	1,004,545	3,016,000	2,495,000	872,727	28,716,501
3.2	Total support costs (US \$)	529,156	0	260,396	898,053	0	111,800	273,061	174,650	97,129	2,344,246
3.3	Total agreed costs (US \$)	7,107,717	0	3,575,078	12,333,039	0	1,116,345	3,289,061	2,669,650	969,856	31,060,747
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)										163.16
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)										577.34
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