UNITED NATIONS

EP

United Nations Environment Programme

Distr.
GENERAL

UNEP/OzL.Pro/ExCom/75/40
31 October 2015

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Seventy-fifth Meeting
Montreal, 16-20 November 2015

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 I, fifth tranche) — UNDP/Germany

- HCFC phase-out management plan (stage II, first tranche) — UNDP/UNIDO/Germany/Italy

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Brazil

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase out plan (Stage I)	Germany, UNDP (lead)	64th	10% by 2015

(II) LATEST ARTICLE 7 DATA (Annex C Group l)	Year: 2014	1,164.74 (ODP tonnes)

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2014	
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-123				0.01	0.05				0.06
HCFC-124				0.45	2.04				2.49
HCFC-141b		371.30							371.30
HCFC-141b in Imported Pre-blended Polyol									
HCFC-142b				0.64	2.88				3.49
HCFC-22				118.15	669.50				787.65

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	1,327.30	Starting point for sustained aggregate reductions:	1,327.3
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	220.3	Remaining:	1,107.2

(V) BUSINESS PLAN		2015	Total
UNDP	ODS phase-out (ODP tonnes)	52.3	52.3
	Funding (US $)	4,998,750	4,998,750
Germany	ODS phase-out (ODP tonnes)	4.6	4.6
	Funding (US $)	454,091	454,091

(VI) PROJECT DATA			2011	2012	2013	2014	2015	Total
Montreal Protocol consumption limits			n/a	n/a	1,327.3	1,327.3	1,194.8	n/a
Maximum allowable consumption (ODP tonnes)			n/a	n/a	1,327.3	1,327.3	1,194.8	n/a
Agreed funding (US$)	UNDP	Project costs	4,456,257	3,400,000	3,000,000	3,000,000	1,470,700	15,326,957
		Support costs	334,219	255,000	225,000	225,000	110,303	1,149,522
	Germany	Project costs	1,209,091	2,472,727	0	0	409,091	4,090,909
		Support costs	153,000	262,000	0	0	45,000	460,000
Funds approved by ExCom (US$)		Project costs	5,665,348	5,872,727	3,000,000	3,000,000	0	17,538,075
		Support costs	487,219	517,000	225,000	225,000	0	1,454,219
Total funds requested for approval at this meeting (US$)		Project costs	0	0	0	0	1,879,791	1,879,791
		Support costs	0	0	0	0	155,303	155,303

Secretariat's recommendation:	Individual consideration

PROJECT DESCRIPTION

1. On behalf of the Government of Brazil, UNDP as the lead implementing agency, has submitted to the 75th meeting a request for funding for the fifth and final tranche of stage I of the HCFC phase-out management plan (HPMP), at a total cost of US $2,227,841, consisting of US $1,650,000, plus agency support costs of US $123,750 for UNDP, and US $409,091, plus agency support costs of US $45,000 for the Government of Germany. The submission includes a progress report on the implementation of the fourth tranche and the tranche implementation plan for 2015 to 2016.

Report on HCFC consumption

HCFC consumption

2. The Government of Brazil reported a consumption of 1,164.74 ODP tonnes of HCFC in 2014. The 2010-2014 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Brazil (2010-2014 Article 7 data)

HCFC	2010	2011	2012	2013	2014	Baseline
Metric tonnes						
HCFC-22	15,109.3	11,408.80	17,020.03	14,256.44	14,320.78	14,401.0
HCFC-123	19.8	44.31	170.79	0.00	3.00	14.9
HCFC-124	316.9	246.94	204.83	164.59	113.20	351.3
HCFC-141b	3,579.6	3,710.25	4,027.82	3,641.42	3,373.04	4,741.3
HCFC-142b	105.3	68.69	12.02	14.88	54.06	86.3
Total (metric tonnes)	**19,130.9**	**15,478.99**	**21,435.47**	**18,077.27**	**14,491.04**	**19,594.8**
ODP tonnes						
HCFC-22	831.0	627.48	936.10	784.10	787.64	792.10
HCFC-123	0.4	0.89	3.42	0.00	0.06	0.30
HCFC-124	7.0	5.43	4.51	3.62	2.49	7.70
HCFC-141b	393.8	408.13	443.06	400.56	371.03	521.60
HCFC-142b	6.8	4.47	0.78	0.97	3.51	5.60
Total (ODP tonnes)	**1,239.0**	**1,046.40**	**1,387.87**	**1,189.25**	**1,164.74**	**1,327.30**

3. The peak in HCFC consumption in 2012 was attributed to a combination of a recovering economy and market expectations due to the entry into force of the quota system. The reduction in 2013 to a level below ten per cent of the consumption baseline was explained by the overall phase-out efforts made under the HPMP, and the partial conversion of multinational domestic refrigeration enterprises operating in Brazil. It is expected that HCFC-22 consumption will continue to decrease due to an increase in market prices as a result of the control measures.

Verification report

4. The verification report related to the 2014 consumption was presented with the fourth tranche request at the 74th meeting. The verification confirmed that Brazil is implementing a licensing and quota system for imports and exports of HCFC and that consumption of HCFC in 2014 was in compliance with the Montreal Protocol and the consumption targets established under stage I.

Country programme (CP) implementation report

5. The Government of Brazil reported HCFC sector consumption data under the 2014 CP implementation report which is consistent with the data reported under Article 7.

Progress report on the implementation of the fourth tranche

Legal framework

6. The process of finalizing and updating several standards by the Brazilian Association for Technical Standards (ABNT) continue to progress. The Government is considering establishing specific national technical standards to assure the standardization of handling, installing and maintaining equipment using flammable refrigerants. For foam enterprises that opt for flammable alternatives in their conversions under the HPMP, a safety certificate is required for approval of the conversion and the subsequent release of funds.

7. The Ministry of the Environment (MMA) and the Ministry of Development, Industry and Trade (MDIC) have also been discussing the control on imports of refrigeration and air-conditioning (RAC) equipment containing HCFCs; however, regulatory actions can only take effect after the private sector submits an official request to the MDIC.

Polyurethane (PU) foam manufacturing sector

Conversion of 12 individual PU foam enterprises (79.71 ODP tonnes)

8. This component includes four continuous panel enterprises converting to hydrocarbon (HC) technology and eight integral skin enterprises converting to methyl formate or methylal technologies. Ten enterprises (64.76 ODP tonnes) have completed their conversions and the remaining two (14.95 ODP tonnes) are expected to complete their conversions in 2016. A summary on the status of progress of individual conversions is presented in Table 2 below.

Table 2. Conversion of PU foam enterprises

Enterprises	ODP tonnes*	Status of implementation	Expected date of completion
10 (Isoeste, Cairu, Cantegrill, Danica, Duoflex, Frisokar**, Isoblock, Kalf, Luguez, Spandy)	64.76	Completed	-
2 (Espumatec***, Panisol****)	14.95	Signed contracts and started implementation	End of 2016
12	**79.71**		-

* Baseline consumption in the approved HPMP.
** As Frisokar completed its conversion two months before the planning date, it still has a residual stock of HCFC-141b.
*** Espumatec is facing economic difficulties and could withdraw from the project. This will be confirmed by December 2015.
****Panisol is facing difficulties due to its location in a populated urban area, which may preclude the use of flammable technology.

Conversion of 11 systems houses with close to 380 downstream users (89.1 ODP tonnes)

9. Five systems houses (47.4 ODP tonnes) completed conversion of their plants, developed their formulations based on methyl formate and methylal and are currently assisting downstream users in their adoption. Four additional systems houses (4.3 ODP tonnes) will complete their conversion to low-global-warming (GWP) alternatives (e.g., methyl formate, methylal) during the second quarter of 2015. The remaining two systems houses have not yet started the conversion process. Table 3 summarizes the status of progress.

Table 3. Implementation status of systems houses and downstream-users

Approved HPMP					HPMP implementation									
Systems house (SH)	Downstream users (DSU)				DSU identified								Status	
	FMF/ISF**		PUR ***		Eligible FMF/ISF		Eligible PUR		DSU validated				SH	DSU
	No	ODP t	No.	ODP t	Yes	No	Yes	No	Total	Eligible	ODP t	Started		
Amino	49	6.9			27	3	20	1	51	47	11.9	10	COM	ONG
Arinos	85	10.8			6	-	25	-	31	31	3.8	30	ONG	ONG
Ariston	7	1.4			9	-	5	-	14	14	4.6	6	COM	ONG
Ecoblaster	17	5.7			24	2	5	3	34	29	14.5	-	COM	ONG
Purcom	101	11.8			78	-	22	6	106	100	14.9	50	COM	ONG
Shimtek	14	2.9	98	49.6	2	-	-	-	2	2	0.5	-	ONG	N.S.
Ecopur	-	-			-	-	-	-	-	-	-	-	WTH	N.S.
M.Cassab	-	-			-	-	-	-	-	-	-	-	N.S.	N.S.
Polisystem	-	-			-	-	-	-	-	-	-	-	ONG	N.S.
Polyurethane	-	-			-	-	-	-	-	-	-	-	ONG	N.S.
U-Tech	-	-			-	-	14	1	15	14	1.5	-	COM	ONG
Grant total	**273**	**39.5**	**98**	**49.6**	**146**	**5**	**91**	**11**	**253**	**237**	**51.7**	**96**	-	-

* COM: Completed; ONG: Ongoing; N.S.: Not started; WTH: Withdrawn from the HPMP.
** Flexible moulded foam and integral skin foam.
***Rigid PU foam applications (water heater, thermoware, packaging, pipe-in-pipe).

10. With regard to the two systems houses that have not started their conversion, M.Cassab has only recently made a decision to convert to water-based technology and Ecopur has not yet agreed to participate in the HPMP.

Refrigeration servicing sector

11. The following activities were undertaken:

(a) Training and capacity building: So far, training has been provided to a total of 1,853 technicians in best practices for commercial refrigeration and to 76 technicians in best practices for split air-conditioning systems;

(b) Demonstration projects on the improvement of containment practices for existing HCFC systems: Technical diagnoses were carried out in two supermarkets for the identification and solution of problems that cause leakages and efficiency loss in refrigeration systems; two intervention plans to correct the identified problems were prepared and technical specifications for the associated equipment were completed;

(c) Revision and development of technical standards: The standard on safety requirements for refrigeration systems defines the maximum charge sizes for A2[1] and A3 class refrigerants; the revised standard on refrigerants describes designation and safety classification of refrigerants; and the standard on split and window type units prioritized safe installation practices focusing on fixing the external units of domestic air-conditioners on split and window type systems. It is envisaged to propose a discussion of a complementary standard addressing procedures and recommendations for safe installation, operation and maintenance of room air-conditioners with a cooling capacity up to 60,000 Btu[2], with special focus on systems using flammable refrigerants.

(d) Awareness: A user manual for the website has been prepared and published; and an introductory workshop is being organized to be held during the last quarter of 2015; guidelines for the safe use of hydrocarbons were translated and published; three best

[1] Class A refrigerants: Toxicity not identified at concentrations less than or equal to 400 ppm. Class 2 refrigerants: Lower flammability limit of more than 0.10 kg/m^3 at 21°C and 101 kPa, and heat of combustion of less than 19 kJ/kg. Class 3 refrigerants: Highly flammable as defined by a lower flammability limit of less than or equal to 0.10 kg/m^3 at 21°C and 101 kPa or a heat of combustion greater than or equal to 19 kJ/kg.
[2] British thermal units

practice guides on leak control, sealed system design and systems maintenance are being prepared; and several articles were published in regional sector journals.

Project implementation and monitoring unit (PMU)

12. The PMU continued to support the NOU in implementing the HPMP activities by providing technical analysis of the products presented; visiting enterprises to review projects; developing technical specifications; facilitating the preparation of service agreements; and ensuring financial control of the funds according to UNDP rules and regulations.

Level of fund disbursement

13. As of October 2015, of the US $17,538,075 so far approved, US $8,749,778 (49.9 per cent) had been disbursed (US $6,546,125 for UNDP and US $2,203,653 for the Government of Germany). The balance of US $8,778,297 will be disbursed in 2016 (Table 2).

Table 2. Financial report of stage I of the HPMP for Brazil (US $)

Tranche		UNDP	Germany	Total	Disbursement (%)
First tranche	Approved	4,456,257	1,209,091	5,665,348	59.6
	Disbursed	2,169,924	1,209,091	3,379,015	
Second tranche	Approved	3,400,000	2,472,727	5,872,727	45.0
	Disbursed	1,648,220	994,562	2,642,782	
Third Tranche	Approved	3,000,000	0	3,000,000	53.4
	Disbursed	1,601,496	0	1,601,496	
Fourth Tranche	Approved	3,000,000	0	3,000,000	37.5
	Disbursed	1,126,485	0	1,126,485	
Total approved	Approved	13,856,257	3,681,818	17,538,075	49.9
	Disbursed	6,546,125	2,203,653	8,749,778	

Implementation plan for the fifth and final tranche

14. The Government of Brazil will undertake the following activities:

(a) *PU foam manufacturing sector (UNDP) (US $1,530,000):* Finalize conversion of two enterprises, five systems houses and their associated downstream users;

(b) *Refrigeration servicing sector (Government of Germany) (US $409,091):*

(i) Training and capacity building: Training of 2,947 refrigeration technicians in commercial refrigeration and 24 technicians in split air-conditioning systems; one additional ‘train the trainer’ workshop; and evaluation of the training programme;

(ii) Demonstration projects: Additional technical diagnosis in three supermarkets to identify problems causing leakages and efficiency loss in their refrigeration system; preparation of three intervention plans to correct the identified problems; and purchase of associated equipment and components;

(iii) Implementation adjustments to the online documentation system; printing information materials and technical publications; regional outreach programs; technical assistance provided to users; and monitoring of activities in the refrigeration servicing sector; and

(c) *PMU (UNDP) (US $120,000):* Continuous implementation and monitoring of phase-out activities; and verification of consumption data.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

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

Legal framework

15. The Government of Brazil has already issued HCFC import quotas for 2015 at 16.6 per cent below the HCFC consumption baseline based on a reduction of the quotas established for 2013 as follows: 6.51 per cent reduction in HCFC-22, 32.37 per cent in HCFC-141b, and no reduction in HCFC-123, HCFC-124, HCFC-142b and HCFC-225.

Manufacturing sector

16. The systems house Arinos became ineligible for funding as it was purchased by non-Article 5 capital in September 2011. UNDP clarified that Arinos was not paid for conversion of equipment but only for services provided to the downstream foam users. The Secretariat reminded UNDP that under these circumstances the capital cost of US $179,300 associated with Arinos should be returned to the Multilateral Fund and this would require a modification of the Agreement. The downstream users working with Arinos continue to be eligible and will be converted with the assistance of Arinos.

17. With regard to the enterprise Ecopur that has not decided yet to participate in the HPMP, it was agreed not to return yet the funding of US $135,500 associated with this enterprise as UNDP informed that the enterprise could decide to participate in the plan. UNDP will report on the status of Ecopur at the next annual tranche implementation report to be submitted to the 77th meeting.

18. In line with paragraph 7(c)[3] of the Agreement, the Secretariat followed up on the list of downstream users for which eligibility has been validated in the field, including their level of HCFC-141b consumption, subsector, baseline equipment and technology adopted. UNDP explained that the process of validating the eligibility of enterprises continues as implementation progresses, but it is not possible to have a final list at this meeting. It noted that some of the downstream users assisted in stage I under one application, could also be assisted in stage II under a different application. The Secretariat and UNDP agreed that this information will be included in the next annual tranche implementation report to be submitted to the 77th meeting.

Plan of action

19. UNDP informed the Secretariat that it will be necessary to have some flexibility in extending the implementation of stage I of the HPMP to 2017, although all the activities are expected to be finalized by the end of 2016, Accordingly, UNDP and the Government of Germany are requested, in line with decision 74/19[4], to submit annual tranche implementation reports on the current stage until activities foreseen had been completed and HCFC consumption targets had been met, and verification reports until approval of stage II. The Government of Brazil has submitted stage II of the HPMP to the 75th meeting.

[3] Any enterprise to be converted to non-HCFC technology included in the approved HPMP and that would be found to be ineligible under the guidelines of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), will not receive assistance. This information would be reported to the Executive Committee as part of the Annual Implementation Plan;

[4] For HPMPs for which the last funding tranche was requested one or more years prior to the last year for which a consumption target had been established, to request the lead implementing agency and relevant cooperating agencies to submit annual tranche implementation reports and, where applicable, verification reports on the current stage of the HPMPs until all activities foreseen had been completed and HCFC consumption targets had been met, on the understanding that, when consecutive stages of HPMPs were implemented concurrently, the verification reports should be based on the lower HCFC consumption target committed to by the country concerned.

Conclusion

20. The Secretariat noted that Brazil continues to be in compliance with HCFC consumption targets, has an effective licensing and quota system, and continues to progress in the implementation of the activities approved under stage I. The Secretariat recommends blanket approval for the fifth and final tranche of stage I, on the understanding that UNDP and the Government of Brazil will continue providing annual tranche implementation reports until the completion of the stage as per decision 74/19.

RECOMMENDATION

21. The Fund Secretariat recommends that the Executive Committee:

(a) Takes note of the progress report on the implementation of the fourth tranche of stage I of the HCFC phase-out management plan of (HPMP) for Brazil;

(b) Notes that the Fund Secretariat had updated Appendix 2-A of the Agreement between the Government of Brazil and the Executive Committee, based on the deduction of US $179,300, plus agency support costs of US $13,448 for UNDP, associated with the conversion of the foam enterprise Arinos, which had been identified as non-eligible for funding under the Multilateral Fund after the HPMP had been approved, and that a new paragraph 16 had been added to indicate that the updated Agreement superseded that reached at the 64th meeting as contained in Annex I to the present document;

(c) Requests the Government of Brazil, UNDP and the Government of Germany to submit progress reports on a yearly basis on the implementation of the work programme associated with the fifth and final tranche until the completion of the project, verification reports until approval of stage II of the HPMP, and the project completion report to the second meeting of the Executive Committee in 2018;

(d) Requests UNDP to include in the next progress report to be submitted to the 77th meeting, the complete list of downstream foam enterprises assisted by the Multilateral Fund under stage I, including their HCFC-141b consumption phased out, subsector, baseline equipment and technology adopted; and

(e) Approving the fifth and final tranche of stage I of the HPMP for Brazil, and the corresponding 2016 tranche implementation plan, at the amount of US $2,035,094, consisting of US $1,470,700, plus agency support costs of US $110,303 for UNDP and US $409,091, plus agency support cost of US $45,000 for Germany.

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS
Brazil

(I) PROJECT TITLE	AGENCY
HCFC phase out plan (Stage II)	UNDP (lead), UNIDO, Germany, Italy

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2014	1,164.74 (ODP tonnes)

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2014	
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab Use	Total sector consumption
				Manufacturing	Servicing				
HCFC-123				0.01	0.05				0.06
HCFC-124				0.45	2.04				2.49
HCFC-141b		371.30							371.30
HCFC-142b				0.64	2.88				3.49
HCFC-22				118.15	669.50				787.65

(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:	220.3	Remaining:	1,107.2

(V) BUSINESS PLAN		2015	2016	2017	2018	2019	2020	Total
UNDP	ODS phase-out (ODP tonnes)	40.39	40.4	40.4	40.4	40.4	40.4	242.39
	Funding (US $)	1,880,362	1,880,362	1,880,362	3,398,171	3,398,171	3,398,171	15,835,599
UNIDO	ODS phase-out (ODP tonnes)	15.00	0.0	15.0	25.0	5.0	5.0	65.0
	Funding (US $)	1,211,071	0	1,211,071	3,939,545	437,727	437,727	7,237,141
Germany	ODS phase-out (ODP tonnes)	0.00	3.0	3.0	4.0	6.1	0.0	16.1
	Funding (US $)	0	153,478	153,478	369,818	563,973	0	1,240,747
Italy	ODS phase-out (ODP tonnes)	3.00	0.0	0.0	0.0	0.0	0.0	3.00
	Funding (US $)	147,509	0	0	0	0	0	147,509

(VI) PROJECT DATA			2015	2016	2017	2018	2019	2020	Total
Montreal Protocol consumption limits (*)			1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.7	n/a
Maximum allowable consumption (ODP tonnes) (*)			1,194.60	1,194.60	1,194.60	1,194.60	1,194.60	862.7	n/a
Project costs requested in principle (US$)	UNDP	Project costs	4,326,355	0	6,220,590	6,669,550	0	1,730,218	18,946,712
		Support costs	244,519	0	310,801	467,325	0	140,000	1,162,646
	UNIDO	Project costs	2,055,167	0	0	6,765,329	0	2,999,471	11,819,967
		Support costs	143,862	0	0	473,573	0	209,963	827,398
	Germany	Project costs	2,427,273	0	1,500,000	2,863,637	0	1,936,364	8,727,274
		Support costs	315,545	0	195,000	372,273	0	251,727	1,134,545
	Italy	Project costs	425,820	0	0	0	0	0	425,820
		Support costs	55,357	0	0	0	0	0	55,357
Total project costs requested in principle (US $)			9,234,615	0	7,720,590	16,298,516	0	6,666,053	39,919,773
Total support costs requested in principle (US $)			759,283	0	505,801	1,313,171	0	601,690	3,179,945
Total funds requested in principle (US $)			9,993,897	0	8,226,391	17,611,687	0	7,267,743	43,099,718

(*) Consumption limits for 2017 are the same as in 2016, for 2019 are the same as in 2018, and for 2021 are the same as in 2020.

(VII) Request for funding for the first tranche (2015)		
Agency	**Funds requested (US $)**	**Support costs (US $)**
UNDP	4,326,355	244,519
UNIDO	2,055,167	143,862
Germany	2,427,273	315,545
Italy	425,820	55,357

Funding request:	Approval of funding for the first tranche (2015) as indicated above
Secretariat's recommendation:	For individual consideration

PROJECT DESCRIPTION

22. On behalf of the Government of Brazil, UNDP, as the lead implementing agency, has submitted to the 75th meeting of the Executive Committee stage II of the HCFC phase-out management plan (HPMP) at a total cost of US $43,227,198, consisting of US $19,066,712, plus agency support costs of US $1,334,669 for UNDP, US $11,819,967, plus agency support costs of US $827,398 for UNIDO, US $8,727,276 plus agency support costs of US $969,999 for Germany, and US $425,820 plus agency support costs of US $55,357 for Italy, as originally submitted. The implementation of stage II of the HPMP will phase out 375.26 ODP tonnes of HCFCs and assist Brazil in meeting the Montreal Protocol compliance target of 35 per cent reduction by 2020.

23. The first tranche for stage II of the HPMP being requested at this meeting amounts to US $10,006,460, consisting of US $4,326,355, plus agency support costs of US $302,845 for UNDP, US $2,055,167, plus agency support costs of US $143,862 for UNIDO, US $2,427,273 plus agency support costs of US $269,781 for Germany, and US $425,820 plus agency support costs of US $55,357 for Italy, as originally submitted.

Status of stage I

24. Stage I of the HPMP for Brazil was approved by the Executive Committee at its 64th meeting and included 34 projects at a total cost of over US $18 million, to phase out of 220.3 ODP tonnes, of which 168.8 ODP tonnes of HCFC-141b were from polyurethane (PU) foam conversion projects, 50.0 ODP tonnes of HCFC-22 from the refrigeration servicing sector and 1.5 ODP tonnes of HCFC-22 were through regulatory actions during the 2011-2015 period. An overview of the results achieved so far is included below.

Status of progress

25. *Conversion of 12 individual PU foam enterprises (79.71 ODP tonnes):* Ten enterprises (64.76 ODP tonnes) have completed their conversions and the remaining two (14.95 ODP tonnes) are at an early stage of implementation and are expected to complete their conversions in 2016.

26. *Conversion of 11 systems houses with over 380 downstream users (89.1 ODP tonnes):* Five systems houses (47.4 ODP tonnes) completed conversion of their plants, developed polyol formulations based on methyl formate and methylal and are currently assisting PU foam downstream users in their adoption. Four additional systems houses (4.3 ODP tonnes) will complete their conversion to methyl formate and methylal during the second quarter of 2015. The remaining two systems houses have not as yet started the conversion process. With regard to downstream users assisted, currently the eligibility of 237 has been verified and 96 have started conversions, leaving approximately 200 still to start the implementation of their projects.

27. *Refrigeration servicing sector (50.0 ODP tonnes):* Training has been provided to 1,853 technicians in best practices for commercial refrigeration and to 76 technicians in best practices for split AC systems; demonstration projects on the improvement of containment practices for existing HCFC systems are taking place in five supermarkets; several technical standards are being developed or reviewed; an internet-based documentation system has been created; and awareness-raising campaigns are taking place including the dissemination of guidelines for the safe use of hydrocarbons (HC), best practices on leak control, sealed system design and system maintenance.

28. *Project implementation and monitoring unit (PMU):* The PMU has provided support to the National Ozone Unit (NOU) in implementing the HPMP activities; visiting enterprises to review projects; developing technical specifications; organizing meetings for evaluation and recommendation to issue

service agreements; awareness campaigns; and ensuring financial control of the funds according to UNDP rules and regulations.

29. Through the last tranche of stage I of the HPMP, submitted to the 75th meeting, conversion of the foam sector will be completed and activities in the refrigeration servicing sector will continue to be implemented. Given the current status of implementation, stage I is being extended to December 2017 to allow completion of conversions in all PU foam downstream users.

Status of disbursements

30. A of October 2015, of the total funds of US $17,538,075 so far approved, US $8,749,778 have been disbursed. The remaining US $ 8,788,297 will be disbursed between 2016 and 2017.

Stage II of the HPMP

ODS policy and regulatory framework

31. The Government of Brazil has established a comprehensive legal framework for the control of ODS, including an enforceable national licensing and quota system for imports and exports of HCFCs.

32. In 2008 the Brazilian Institute of the Environment and Natural Renewable Resources[5] (IBAMA) issued a normative instruction establishing the HCFC import limits per enterprise between 2009 and 2012. For 2013 and subsequent years, IBAMA established HCFC import quotas per enterprise based on the average imports made of each substance during the years 2009-2010. The normative instruction also prohibits the release of ODS into the atmosphere, *inter alia* requiring their collection and disposal to recycling and reclaim centres.

33. IBAMA is responsible for defining and controlling the ODS quotas, and authorizing imports and inspections of enterprises working with ODS. HCFCs can only be shipped after approval of the import license. After arrival, the import declaration report is registered at the Integrated Foreign Trade System (SISCOMEX) and the data is reported to the NOU. The ODS export process follows a similar methodology to the one used for imports.

HCFC consumption and sector distribution

34. HCFC-22 and HCFC-141b consumption corresponds to 99 per cent of the HCFC consumption baseline in ODP tonnes. HCFC-141b was prioritized in stage I and therefore has decreased from 39 per cent in the baseline years to 31 per cent in 2014. HCFC-22 imports had a peak in 2012 and since then have been maintained at the same level, as shown in Table 1.

Table 1. HCFC consumption in Brazil (2010-2014 Article 7 data)

HCFC	2010	2011	2012	2013	2014	Baseline
Metric tonnes						
HCFC-22	15,109.3	11,408.80	17,020.03	14,256.44	14,320.78	14,401.0
HCFC-123	19.8	44.31	170.79	0.00	3.00	14.9
HCFC-124	316.9	246.94	204.83	164.59	113.20	351.3
HCFC-141b	3,579.6	3,710.25	4,027.82	3,641.42	3,373.04	4,741.3
HCFC-142b	105.3	68.69	12.02	14.88	54.06	86.3
Total (metric tonnes)	**19,130.9**	**15,478.99**	**21,435.47**	**18,077.27**	**17,864.08**	**19,594.8**

[5] IBAMA is the entity in charge of enforcing federal environmental policies, implementing environmental licensing, quality control, authorizing the use of natural resources, undertaking environmental surveillance, and implementing additional federal actions pursuant to current environmental law.

HCFC	2010	2011	2012	2013	2014	Baseline
ODP tonnes						
HCFC-22	831.0	627.48	936.10	784.10	787.64	792.10
HCFC-123	0.4	0.89	3.42	0.00	0.06	0.30
HCFC-124	7.0	5.43	4.51	3.62	2.49	7.70
HCFC-141b	393.8	408.13	443.06	400.56	371.03	521.60
HCFC-142b	6.8	4.47	0.78	0.97	3.51	5.60
Total (ODP tonnes)	**1,239.0**	**1,046.40**	**1,387.87**	**1,189.25**	**1,164.74**	**1,327.30**

35. The consumption of HCFC-22 in the refrigeration servicing sector represents over 54 per cent of the total consumption of HCFCs, followed by HCFC-141b in the foam manufacturing sector (approximately 29 per cent) and the remaining consumption of HCFC-22 and HCFC-141b (17 per cent) is for manufacturing RAC equipment, extruded polystyrene (XPS) foam and solvents uses. Table 2 presents the consumption of HCFCs in Brazil by sector and substance for the year 2013.

Table 2. Distribution of HCFCs by sector and substance in 2013*

Description	HCFC	Sector	Metric tonnes (mt)	mt (%)	ODP tonnes	ODP tonnes (%)
Manufacturing	HCFC-22	RAC**	2,423.59	13.5	133.30	11.3
	HCFC-22	XPS*** and PU foam	106.00	0.6	5.83	0.5
	HCFC-141b	PU foam	3,089.60	17.3	339.85	28.7
	HCFC-141b	Solvents/flushing	472.67	2.6	51.99	4.4
	HCFC-141b	Formulated polyol	79.15	0.4	8.71	0.7
	Subtotal		6,171.01	34.5	539.68	45.6
Servicing	HCFC-22	RAC	11,726.85	65.5	644.98	54.4
Total			**17,897.86**	**100.0**	**1,184.66**	**100.0**

* The survey undertaken for the preparation of stage II was based on 2013 data
** Refrigeration and AC.
***Extruded polystyrene.

36. HCFC-141b is predominantly used as a blowing agent in the PU foam sector (85 per cent), followed by solvent and cleaning (aerosol) uses (8 per cent), flushing of refrigeration circuits (5 per cent) and as blowing agent in the formulation of polyols for export (2 per cent). Table 3 shows the distribution of the use of HCFC-141b.

Table 3. Distribution of HCFC-141b consumption by sector in 2013

Sector	mt	ODP tonnes	Percentage (%)
PU foam manufacturing	3,089.60	339.86	84.8
Solvents	292.05	32.13	8.0
Flushing refrigeration circuits	180.62	19.87	5.0
Formulated polyols for export	79.15	8.71	2.2
Total	**3,641.42**	**400.57**	**100.0**

37. HCFC-22 is mostly consumed in the RAC sector, with a small amount used for XPS foam manufacturing and less than 0.1 per cent used in the PU foam sector in New Froth systems[6]. Table 4 shows the distribution of the use of HCFC-22.

[6] New Froth systems are a process used in the production of rigid polyurethane foams, with registered trademark by a Brazilian enterprise. In the Froth process the components A (isocyanate) and B (polyol) are injected in its pre-expanded form into molds or cavities to be filled, whereby, subsequently, the polymerization and foam expansion take place. The system is supplied in pressurized steel drums to be applied with low pressure dispensers. This system is used in applications that require thermal insulation, mechanical structuring and floatability.

Table 4. Distribution of HCFC-22 by sector in 2013

Sector		mt	ODP tonnes	Percentage (%)
Manufacturing	Refrigeration	484.74	26.66	3.40
	Air-conditioning	1,938.85	106.64	13.60
	XPS and PU foam	106.00	5.83	0.74
	Subtotal	**2,529.59**	**139.13**	**17.74**
Servicing	Refrigeration	5,903.85	324.71	41.41
	Air-conditioning	5,823.00	320.26	40.84
	Subtotal	**11,726.85**	**644.97**	**82.26**
Total		**14,256.44**	**784.10**	**100**

HCFC consumption in manufacturing sectors

PU foam manufacturing

38. Stage I of the HPMP addressed the use of HCFC-141b in integral skin and flexible moulded applications, a portion of the continuous panels sector and several rigid PU foam applications. In addition, two enterprises from the domestic refrigeration sector with non-Article-5 ownership have decreased their consumption from 1,829.35 mt to 350 mt between 2009 and 2013.

39. HCFC-141b continues to be used in the manufacturing of rigid PU foam applications, including insulation in domestic and commercial and industrial refrigeration, continuous and discontinuous sandwich panels, blocks, refrigerated trucks buses and containers, insulation for solar energy equipment, pipe linings, thermoware, refrigerated milk tanks, products for civil construction, cabinets for equipment and boats.

40. The survey completed during the preparation of stage II identified, in addition to the enterprises already assisted in stage I, approximately 1,547 enterprises, including 1,524 small and medium-sized enterprises (SMEs), out of which 521 consume less than 100 kg per year. All enterprises except those manufacturing continuous panels, purchase formulated blends from approximately 26 systems houses, six owned by non-Article 5 capital, 17 owned by Article 5 capital, and three for which information could not be validated.

41. Brazil imports, exports and produces polyols locally and is the largest Latin American producer of polyester polyols and the only producer of methyldiphenyl isocyanate (component used in foam formulation). In 2013, 79.15 mt (8.71 ODP tonnes) of HCFC-141b contained in locally blended polyols were exported.

42. Table 5 presents an estimate of the distribution of enterprises and the consumption of HCFC-141b in the foam sector for rigid PU foam applications for the year 2013.

Table 5. Estimated distribution of HCFC-141b consumption for 2013 in the foam sector for applications in rigid PU foam

Sector	Application	Enterprises	Import 2013 *"Top down" based on ODS imports reported by IBAMA*		Use by end-user 2013 *"Bottom up" validation verified in the field by UNDP*	
			mt	ODP tonnes	mt	ODP tonnes
Stage I - Integral skin, flexible and rigid PU foam (pipe in pipe, packaging, water heater, thermoware, continuous panel)		***461**	**928.03**	**102.08**	**928.03**	**102.08**
Stage II: rigid PU foam	Domestic refrigeration	4	350.00	38.50		
	Discontinuous panels	110	402.50	44.28	249.87	27.4857
	Remaining small rigid foams applications not covered in stage*	16	521.77	57.40	190.25	20.93
	Blocks	83	238.90	26.28	270.70	29.78
	Commercial refrigeration	472	137.90	15.17	557.00	61.27

Sector	Application	Enterprises	Import 2013 *"Top down" based on ODS imports reported by IBAMA*		Use by end-user 2013 *"Bottom up" validation verified in the field by UNDP*	
			mt	**ODP tonnes**	**mt**	**ODP tonnes**
	Spray	24	226.90	24.96	73.10	8.04
	Refrigerated transport	169	122.60	13.49	168.40	18.52
	Technical pieces and similar	86	32.90	3.62	8.42	0.93
	Resale and maintenance	96	49.00	5.39	30.60	3.37
	Ineligible	278			522.31	57.45
	Sector not identified	209			11.80	1.30
	Exported polyol		79.10	8.70	79.10	8.70
	Sector Sub-total	**1,547**	**2,161.55**	**237.77**	**2161.55**	**237.77**
Total		**2,008**	**3,089.58**	**339.85**	**3089.58**	**339.85**

* Includes some non-eligible integral skin enterprises converted during stage I
**Pipe in pipe, packaging, water heater, thermoware, continuous panel

43. HCFC-22 and HCFC-142b are used by two non-eligible enterprises in manufacturing XPS foam mainly used as insulation in civil construction.

Solvents

44. HCFC-141b is also used in the pharmaceutical industry for the manufacturing of surgical equipment, syringes and sprays, in the electronic and mechanical industry (cleaner in the form of sprays), and for the cleaning of refrigeration circuits (flushing). A detailed study on the use of HCFC-141b for solvents will be conducted during the preparation of stage III of the HPMP.

RAC manufacturing sector

45. *Domestic refrigeration:* Out of four enterprises in this sector, so far three have converted with their own funds to isobutane (R-600a) or HFC-134a for the refrigeration circuit and to cyclopentane for the insulation panels.

46. *Commercial refrigeration manufacturing:* It is composed by a large number of SMEs each with consumption below 10 mt/year of HCFC-22; some medium-sized enterprises consuming between 10 and 35 mt/year, and a limited number of supermarket equipment suppliers consuming each up to 130 mt/year. These enterprises also consume HCFC-141b as blowing agent for foam production. Many SMEs assemble the equipment and purchase the refrigeration condensation units from component suppliers, while others build their own optimized systems.

47. A large portion of the commercial refrigeration devices produced in Brazil are stand-alone units manufactured and charged with refrigerants in-house. This sector already uses HCFC-22 alternatives, mostly HFC-404A, HFC-507A and HFC-134a. Other commercial refrigeration devices consist of centralized units, displays, islands and cold chambers mainly for use in supermarkets. The refrigeration fluid charge for start-ups is performed *"in-situ*." About 90 per cent of this market uses HCFC-22 as a refrigerant. Some enterprises are investing in systems based on HC-290, ammonia or CO_2 (R-744), already available in the local market. Main barriers for a wider use of subcritical cascade CO_2 are the startup costs, lack of qualified labour and unavailability of components in the local market.

48. *Air-conditioning (AC) manufacturing:* Brazil has industrial facilities for manufacturing AC equipment, including local production of window units, split, medium and large units and chillers. Enterprises manufacturing window and split AC equipment are mostly multinationals and joint ventures, with partial non-Article 5 ownership. The consumption of HCFC-22 by non-eligible enterprises in 2013 in the RAC manufacturing sector was 1,557 mt, almost all in AC manufacturing. Approximately 90 per cent of the imported or national units use HCFC-22 as a refrigerant, and the rest use HFC-410A. However, there is a growing trend toward the use of the latter, primarily in split type devices. There are

also a small number of local enterprises that manufacture small and medium-sized chillers for industrial applications.

HCFC consumption in the refrigeration servicing sector

49. The refrigeration servicing sector corresponds to 82 per cent of HCFC-22 consumption in Brazil. Of that amount, 41.41 per cent is for servicing refrigeration equipment and 40.84 per cent is for the maintenance of AC equipment.

50. Supermarkets and the self-service segment correspond to 96.7 per cent of the HCFC-22 consumed in refrigeration services. The annual average leakage at the 38,752 supermarkets in the country is similar to the installed gas charge. It is estimated that at least 90 per cent of Brazilian supermarkets operate with HCFC-22-based systems.

51. AC services consume approximately 5,800 mt of HCFC-22, with the leakage rates in residential AC systems calculated at 31 per cent. Maintenance in chillers corresponds to 3 per cent of the HCFC-22 consumption in the servicing sector. Of the 57 million homes in Brazil, 13 per cent have at least one AC device, with more than 4 million AC devices sold in 2013.

HCFC phase-out strategy

52. In line with the overarching strategy, the HPMP for Brazil will be implemented in three stages following the Montreal Protocol HCFC phase-out schedules. Stage II is proposed to achieve the 35 per cent reduction by 2020.

Proposed phase-out activities

53. The main activities to be implemented during stage II are regulatory actions, conversion of the PU foam manufacturing sector, conversion of enterprises in the RAC manufacturing sector, assistance to the refrigeration servicing sector and implementation and monitoring.

Regulatory actions and monitoring

54. The regulatory component aims to support the conversion of the PU foam sector and facilitate the introduction of potentially flammable or toxic alternatives in the RAC sectors. It will include the ban on import and use of HCFC-141b for the PU foam sector as of 1 January 2020, support the HCFC import quotas, the standard on small ACs (installation, operation maintenance and safety), the standard on the use of ammonia as refrigerant, and HCFC trade controls (improvement of control mechanisms for the use, recycling, reclaiming, destruction, purchase, sale, import and export of HCFCs). It will also include a standard for the safe handling of flammable alternatives in the PU foam sector.

PU foam manufacturing sector

55. Stage II includes the complete phase-out of the consumption of HCFC-141b in the PU foam manufacturing sector. A total of 176.26 ODP tonnes of HCFC-141b and 0.61 ODP tonnes of HCFC-22 will be phased out through:

(a) Fourteen projects to convert 15 PU foam enterprises to cyclopentane, HFO, water blown and methyl formate. These projects will phase-out 519.40 mt (57.13 ODP tonnes) of HCFC-141b;

(b) Fourteen umbrella projects implemented through 14 systems houses to convert more than 700 PU foam downstream users to methyl formate, water-based technology, methylal and

reduced HFO formulations. These projects will phase out 1,040.73 mt (114.48 ODP tonnes) of HCFC-141b and 11.1 mt (0.61 ODP tonnes) of HCFC-22;

(c) A project to demonstrate optimization of thermal insulation properties of PU foam panels through vacuum assisted injection using water as blowing agent. The project will phase out 20.45 mt (2.25 ODP tonnes) of HCFC-141b; and

(d) An information-dissemination project on the safe handling of flammable alternatives. The project will phase out 21.82 mt (2.40 ODP tonnes) of HCFC-141b.

Technology selection and incremental cost

56. The technologies selected for the conversion of the remaining PU foam sector are cyclopentane, methyl formate, methylal and formulations based on HFOs reduced with water. Incremental cost has been calculated based on the requirements to convert to each one of these technologies. The incremental capital cost has been largely based on the approved costs for stage I. Systems houses will be supported to develop foam formulations for use by their 700 downstream SMEs. Assistance includes: level blending tanks and pumps (US $30,000 each); nitrogen dispensers (US $8,000); emission monitors (US $2,500 each); safety related systems (US $10,000 each); testing equipment (US $35,000); formulation development (US $20,000). An additional US $1,000 per downstream user is included for project management. At the downstream user level capital cost includes retrofitting of existing equipment (US $10,000 for each low pressure dispenser, US $15,000 for each high pressure dispenser; US $15,000 for a new dispenser); testing and trials (US $3,000 when consumption is above 500 kg and US $1,300 when consumption is below); safety packages for flammable alternatives (US $20,000 each). Contingencies are calculated at 10 per cent of the capital cost.

57. Incremental capital cost for the conversion of individual enterprises (with HCFC consumption varying between 22.71 mt and 64.80 mt) depends on the technology selected. For two enterprises converting to cyclopentane it includes the installation of HC storage and mixing stations, replacement of foam dispensers where applicable; safety related equipment; training, trials and safety audit. For enterprises being converted to water or HFO they include mould heating systems to avoid friability; k-factor testers; and training, trials and tests. For enterprises being converted to methyl formate or methylal, they include retrofit packages for the dispensers, safety equipment; and training, trials and tests.

58. The incremental operating cost (IOC) has been calculated depending on the technology introduced, cost of baseline formulation and alternative formulations, increases of density where required. IOCs are estimated between US $1.39 and US $2.69/kg for cyclopentane, US $6.41/kg for methyl formate, US $6.00/kg for methylal, US $8.94 for HFOs reduced formulations, and between US $6.00 and US $7.00/kg for water. For non-SMEs, funds requested for IOCs are equal or below than US $5.00/kg.

59. A summary of the PU foam sector plan is presented in Table 6.

Table 6. Total cost for the conversion of the PU foam sector

Enterprise	Applications/ No enterprise	Technology	mt	ODP	ICC	IOC	Total cost (US $)
Ananda Metais	Disc. panels	HC	63.00	6.93	401,559	87,824	489,383
Artico	Disc. panels	CO_2	23.83	2.62	148,500	119,133	267,633
Bulltrade	Disc. panels	HFC-1233zd	27.50	3.03	132,000	137,500	269,500
Cold-Air	Disc. panels	Methyl formate	25.54	2.81	66,000	127,684	193,680
IBF	Disc. panels	Methyl formate	22.90	2.52	66,000	114,340	180,340
Furgoes Ibipora	Disc. panels	HFO	48.00	5.28	132,000	240,000	372,000
Isar	Disc. panels	Methyl formate	45.18	4.97	132,000	204,864	336,864
Niju	Truck bodies	HFO	28.13	3.09	121,000	140,660	261,660
Poliumetka	Disc. panels	Methyl formate	32.96	3.63	105,600	164,815	270,415
Refrimate	Disc. panels	CO_2	38.40	4.22	313,500	192,000	505,500

Enterprise	Applications/ No enterprise	Technology	mt	ODP	ICC	IOC	Total cost (US $)
Sao Rafael	Disc. panels	CO_2	22.71	2.50	203,500	113,533	317,033
Tecpur	Block	Methyl formate	13.00	1.43	80,300	72,846	153,146
Therm Jet and Thermotelas	Disc. panels, spray foam (2)	CO_2	63.50	6.99	132,000	317,463	449,463
Gelopar	Comm. ref.	HC	64.80	7.13	1,063,339	174,270	1,237,608
Total	**15**		**519.41**	**57.14**	**3,097,299**	**2,206,932**	**5,304,231**
Umbrella projects through systems houses							
Amino		Methyl formate	112.42	12.37	445,300		445,300
Downstream users	46				925,870	636,416	1,562,286
Ariston		Methyl formate	29.71	3.27	168,800		168,800
Downstream users	32				504,240	190,460	694,700
Basf		HFO	27.45	3.02	41,000		41,000
Downstream users	8				59,400	245,319	304,719
Comfibras		HFO	7.60	0.84	159,300		159,300
Downstream users	12				256,630	67,553	324,183
Dow		HFO	117.12	12.88	44,000		44,000
Downstream users	11				102,300	1,046,848	1,149,148
Ecoblaster		Methyl formate	81.00	8.91	324,700		324,700
Downstream users	40				721,490	519,377	1,240,867
Flexivel		HFO	74.83	8.23	168,300		168,300
Downstream users	260				466,500	668,833	1,135,333
Mcassab		Carbon dioxide	64.50	7.10	159,300		159,300
Downstream users	24				223,630	500,065	723,695
Polysystem		Methyl formate	119.00	13.09	335,200		335,200
Downstream users	47				762,300	763,036	1,525,336
Polyrethane project		Carbon dioxide	36.88	4.06	140,300		140,300
Downstream users	16				70,840	285,918	356,758
Purcom		Methyl formate	136.60	15.03	206,600		206,600
Downstream users	90				1,730,960	839,382	2,570,342
Shimtek		HFO	16.67	1.83	146,300		146,300
Downstream users	13				72,710	149,013	221,723
Univar		Methylal	223.90	24.63	117,000		117,000
Downstream users	84				1,726,230	1,342,658	3,068,888
Utech		Methyl formate +HFO	14.20	0.95	140,300		140,300
Downstream users	22				76,890	184,344	261,234
Total	**705**		**1,061.88**	**116.20**	**10,296,090**	**7,439,224**	**17,735,314**
Others							
Demonstration project on vacuum assisted injection							325,820
Dissemination and information							100,000
Grand total							**23,465,364**
Funds requested to the Multilateral Fund							**16,767,533**

60. The estimated incremental cost of the investment projects in the PU foam sector is above US $23 million; however, pursuant to the criteria established by decision 74/50, UNDP is requesting US $16,767,533 at a cost-effectiveness of US $10.39/kg.

61. In addition, 57.45 ODP tonnes of HCFC-141b used by ineligible enterprises will be phased out without assistance from the Multilateral Fund, given that practically all of them depend on the systems houses.

Refrigeration and AC manufacturing sector

62. Stage II also includes assistance to convert eligible AC manufacturing enterprises and commercial refrigeration manufacturing enterprises to prevent growth in the future demand for HCFC-22 and the risk of converting to alternatives with high GWP.

63. The proposal will phase out 802.04 mt (44.11 ODP tonnes) of HCFC-22 as follows:

Commercial refrigeration manufacturing sector

(a) *Technical support project with SMSs enterprises and component suppliers (3.85 ODP tonnes):* Out of the 33 SMEs consuming less than 10 mt per year, 20 enterprises that manufacture the complete commercial refrigeration equipment and charge the refrigerant in their own factories will be supported with the minimum equipment necessary and technical assistance to operate with low-GWP alternatives (HC-290, R-600a, CO2, HFOs or mixtures of HFOs and HFCs);

(b) *Group project for medium-sized enterprises (3.22 ODP tonnes):* Conversion of three enterprises (Industria e Commercio Chopeiras Riberao Memo Ltda, Freeart Seral Brasil Metalurgica Ltda, and Aquagel Refrigeracao Ltds) with consumption between 10 and 35 mt of HCFC-22 to low-GWP alternatives (HC-290, R-600a, CO2, HFOs or mixtures of HFOs and HFCs); and

(c) *Individual projects with commercial refrigeration manufacturers designed for the supermarket sector (8.67 ODP tonnes)*: Conversion of two enterprises (Eletrofrio and Plotter Rack) consuming more than 35 mt of HCFC-22 to HC-290 including demonstration of new technology introduced in the supermarket sector.

64. Conversion to flammable refrigerants include the technical assistance for product development (US $50,000 to US $100,000 per enterprise); refrigerant handling packages (US $50,000 to US $75,000 per enterprise), and safety measures (US $10,000 to US $25,000 per enterprise). Two individual projects also included a demonstration of the application of HC-290 in one supermarket each (US $200,000), a high capacity recovery and reclaiming unit (US $25,000) and technical assistance (US $100,000). The incremental operational cost has been calculated only in the case of the group project at US $3.80/kg and the cost-effectiveness of the project is US $11.15 /kg. A summary of the sector activities is presented in Table 7

Table 7. Activities in the commercial refrigeration manufacturing sector

Project	No. of enterprises	HCFC-22 Consumption		Funds requested (US $)
		mt	ODP tonnes	
Technical support SMEs	33	70.00	3.85	1,520,000
Group project medium size enterprises	3	58.64	3.22	635,332
Individual project	2	157.60	8.67	1,035,000
Total	**38**	**286.24**	**15.74**	3,190,332

AC manufacturing sector

65. Stage II includes the conversion of the following three AC manufacturing enterprises in 2018 to replace the use of 28.37 ODP tonnes of HCFC-22 by a low-GWP alternative to be determined (HC-290, HFC-32, or blends of HFC and HFO):

(a) *Elguin:* Brazilian owned enterprise. The project will convert two lines manufacturing 167,735 split and window ACs to operate with flammable refrigerants, including the heat exchanger production line;

(b) *Gree:* Chinese owned enterprise. The project will convert one line manufacturing 150,000 split ACs (7,000 to 28,000 Btu/h) to operate with flammable refrigerants; it does not have heat exchanger production line;

(c) *Climazon:* 51 per cent Chinese owned (Midea) and 49 per cent North American (Carrier). The project will convert one line manufacturing 270,000 window ACs to operate with flammable refrigerants, including the heat exchanger production line. The enterprise has five additional production lines that are not eligible for funding as they were established after the cut-off date (21 September 2007).

66. Conversion to flammable refrigerants include the technical assistance for the modification of the products and factory layouts (US $50,000 each), modification of the heat exchanger production line (US $1,500,000); refrigerant handling packages (US $200,000 per line), safety measures (between US $75,000 and US $200,000 per line); assembly modifications (US $25,000 per line); refrigeration tanks and pipes (US $75,000 per enterprise); modification of the performance testing area (US $4,000 to US $100,000) and certification (US $50,000). The incremental operational cost has been calculated at US $6.30/kg and the cost-effectiveness of the project is US $14.74/kg. A summary of the sector activities is presented in Table 8.

Table 8. Investment projects in the AC manufacturing sector

Enterprise	HCFC-22 consumption		Capital cost (US $)	Operating cost (US $)	Funds requested (US $)
	mt	ODP tonnes			
Climazon *	192.00	10.56	2,343,000	1,209,600	1,811,826
Elguin	169.09	9.30	2,809,400	1,065,330	3,874,699
Gree	154.70	8.51	940,500	974,610	1,915,110
Total	**515.79**	**28.37**	**6,092,900**	**3,249,540**	**7,601,635**

*51 per cent Article 5 owned.

67. In addition to the activities in the RAC manufacturing sector, a total of US $1,028,000 is requested for project monitoring, including a local project manager, a national expert, international experts, one assistant, local traveling and annual coordination meetings.

68. As a result of the large portion of HCFC-22 consumed by non-Article 5-owned enterprises, the Government of Brazil believes that a reduction in HCFC-22 consumption may also be obtained through voluntary conversion of these enterprises, which will be feasible once more restrictive import quotas for HCFC-22 are established.

Activities in the refrigeration servicing sector

69. The objective of this component is to create and improve the servicing sector capacity to conserve installed HCFC by reducing refrigerant leakages during installation, maintenance and operation of commercial refrigeration and AC equipment, and to introduce safe and efficient use of low-GWP alternative refrigerants. It will address the domestic AC sector (small-sized AC) and the commercial refrigeration sector (large-sized air conditioning and refrigeration systems for commercial establishments). HCFC-22 phase out is expected from reducing the average leakage rate by 70 per cent. Specific goals of the activities in the servicing sector are as follows:

(a) Create and improve the institutional capacity to train 9,000 refrigeration technicians in best practices to better contain HCFC-22 in AC and commercial refrigeration equipment;

(b) Increase the awareness of the servicing sector by promoting best practices and use of alternative technologies with zero ODP tonne and a low-GWP;

(c) Strengthen the collection, recycling and reuse of HCFC-22 to reduce the demand for virgin HCFC-22 and allow the existing HCFC-based equipment to be used until the end of its useful economic life, thereby preventing an anticipated replacement; and

(d) Create institutional capacity to train 1,000 refrigeration technicians and mechanics in best practices related to the safe and efficient use of alternatives with zero ODP, low-GWP and flammability (HCs), toxicity (ammonia) or supercritical pressures (CO_2) in AC and commercial refrigeration equipment, including the installation of two pilot training centers for the use of cascade CO_2/HC in commercial refrigeration installations.

70. The refrigeration servicing sector component will phase out 100 ODP tonnes of HCFC-22 at a total cost of US $8,727,264, and cost-effectiveness of US $4.8/kg.

Implementation and monitoring

71. The Ministry of Environment and IBAMA will coordinate the activities proposed in stage II of the HPMP. The implementation and monitoring unit established for the CFC phase-out plan and stage I of the HPMP will continue assisting the Government with technical expertise, administrative and managerial and operational activities, and undertake required field work to implement the activities under stage II. The total amount requested for PMU is US $2,605,000.

Total cost of stage II of the HPMP

72. The total cost of the activities proposed in stage II of the HPMP to be funded through the Multilateral Fund amounts to US $40,039,764 (excluding agency support costs). These activities will result in the phase-out of 375.28 ODP tonnes of HCFC with an overall cost-effectiveness of US $8.45 per kg. Detailed activities and cost breakdown are shown in Table 9.

Table 9. Overall cost of stage II of the HPMP for Brazil

Sector	Application	Substance	mt	ODP tonnes	CE	Funds requested (US $)
All	Regulatory actions	HCFC-22	26.70	1.50	4.49	120,000
		HCFC-141b	480.04	52.80	-	-
Subtotal regulatory actions			**506.74**	**54.30**		**120,000**
PU foam	Conversion of 14 individual enterprises and 705 downstream users	HCFC-141b	1,560.13	171.61	10.40	16,341,713
		HCFC-22	11.09	0.61		
	Demonstration project	HCFC-141b	20.45	2.25	15.93	325,820
	Dissemination of information		21.82	2.40	4.58	100,000
Subtotal PU foam			**1,613.49**	**176.87**	**10.39**	**16,767,533**
RAC manuf.	Commercial refrigeration	HCFC-22	286.24	15.74	11.15	3,190,332
	AC manufacturing	HCFC-22	515.79	28.37	14.74	7,601,635
	Monitoring	HCFC-22				1,028,000
Subtotal RAC manufacturing			**802.04**	**44.11**	**14.74**	**11,819,967**
RAC servicing		HCFC-22	1,818.18	100.00	4.80	8,727,264
Subtotal RAC servicing			**1,818.18**	**100.00**	**4.80**	**8,727,264**
All	Implementation and monitoring	All	-	-	-	2,605,000
Total stage II			**4,740.45**	**375.28**	**8.45**	**40,039,764**

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

73. The Secretariat reviewed stage II of the HPMP for Brazil in light of stage I, the policies and the guidelines of the Multilateral Fund, including the criteria for funding HCFC phase-out in the consumption sector for stage II of HPMPs (decision 74/50), and the 2015-2017 business plan of the Multilateral Fund.

Strategy for stage II

74. The Government of Brazil is committing in stage II to reduce HCFC consumption by 35 per cent of the baseline by 2020. To achieve the 35 per cent reduction, stage II would need to reduce either 331.8 ODP tonnes of HCFC (25 per cent of the baseline) based on the 10 per cent reduction commitment acquired under stage I, or 244.2 ODP tonnes (18.4 per cent of the baseline) based on the HCFC reductions funded under stage I (220.3 ODP tonnes or 16.6 per cent of the baseline).

75. Stage II proposes activities to phase out 375.28 ODP tonnes of HCFC in PU foam, commercial refrigeration and AC manufacturing sectors, and the refrigeration servicing sector. Upon review of the submission and discussions with UNDP on the need to include each sector, the Secretariat suggested the following alternative approach for stage II in light of the activities included in stage I of the HPMP, the impact to the environment including climate associated with the phase-out activities and the policies and guidelines of the Multilateral Fund.

Sectors using HCFC-141b

76. The complete phase-out of HCFC-141b, currently used in the production of PU foam, in flushing refrigeration circuits (estimated at 19.82 ODP tonnes), and as a solvent (estimated at 32.13 ODP tonnes). Given the emissive nature of HCFC-141b during flushing practices, phase out activities to address this consumption should be implemented immediately after stage II of the HPMP is approved. As HCFC-141b consumption used in the foam sector is being reduced due to the successful implementation of the foam sector plan included in stage I, annual import quotas for HCFC-141b could be established in line with the amounts of HCFC-141b being reduced. Activities for the phase-out of HCFC-141b in the solvent sector could be implemented towards the end of stage II, i.e., 2018. At the end of stage II, the Government of Brazil would be able to issue bans on imports of HCFC-141b bulk and on imports and exports of pre-blended polyols containing HCFC-141b.

77. In considering the above alternative approach, UNDP indicated that the Government of Brazil was currently not in a position to commit to phase-out HCFC-141b for flushing refrigeration circuits nor to include any additional tonnage reduction in stage II, as this approach has not been discussed and agreed with the key stakeholders in the country. However, training activities for technicians, including flushing and alternative systems, had been included under the servicing sector component of stage II of the HPMP. UNDP also indicated that the phase-out of HCFC-141b in the solvent sector was not included in stage II because there were not suitable cost-effective alternatives for these applications in the local market. Therefore, the phase-out of HCFC-141b used for flushing and for solvents would be addressed during stage III of the HPMP.

AC manufacturing sector

78. With regard to the AC manufacturing component, the Secretariat expressed concern with the fact that the three local manufacturers (one third of the consumption) would be committing to convert to a low-GWP technology that has not yet been selected (either HFC-32 or HC-290a), nor tested in the country, while non-eligible enterprises (two thirds of the consumption) would be able to convert at their

own convenience (e.g., after 2020 if they wish to do so), to any technology. Furthermore, given that the alternative technologies being considered are based on flammable refrigerants, this will require the introduction of standards, codes of practice and training for service technicians. Such a scenario may potentially put the local enterprises in a difficult competitive situation.

79. Accordingly, the Secretariat suggested that a strategy for the entire sector could be further elaborated, considering the alternative technologies proposed by the local enterprises vis-à-vis those that might be introduced by non-Article 5 owned enterprises; establishing a mandatory date when all enterprises would be required to stop both using HCFC-22 for manufacturing equipment and importing HCFC-22-based equipment; and identifying the regulatory and training requirements to allow for the introduction of flammable-refrigerant-based air conditioners into the local market. This approach would allow for a more sustainable conversion of the local enterprises.

80. It was also suggested considering gradual reduction of HCFC-22 import quotas according to the expected reductions in consumption of HCFC-22 in the AC manufacturing sector by eligible and non-eligible enterprises. This would result in the phase-out of 133.3 ODP tonnes consumed by the AC manufacturing sector by eligible and non-eligible enterprises. Reducing the HCFC-22 import quota in combination with the activities proposed in the servicing sector would help control growth in that sector.

81. In considering the above alternative approach, UNDP indicated that the non-eligible manufacturers have already started to convert to high-GWP technologies (HFC-410A) due to rising prices of HCFC-22, and will be converted before 2020. Conversion of eligible AC manufacturers will only start in 2018, and they are fully aware that HFCs are a temporary solution and are willing to leapfrog to low-GWP, especially because they have the potential to market these alternatives as more energy-efficient compared to HCFC-22 or HFC-410A technologies. Even though the proposed alternative technologies have not been tested in the country, the headquarters located in China of two out of the three eligible enterprises (with partial/total Chinese ownership) already have the technology available. The third enterprise is also importing part of its components from a supplier in China that also has the technology available. While the Government of Brazil prefers to keep the activities for the RAC manufacturing sector in stage II, it is not in a position to reduce additional tonnages, as it has not been discussed and agreed with the stakeholders.

Refrigeration servicing sector

82. Given the large number of activities in manufacturing sectors included in stage II with the associated phase-out of HCFCs, the Secretariat suggested to consider reducing the refrigeration servicing sector component and to include the phase-out of HCFC-141b used for flushing systems as part of it.

83. UNDP explained that the servicing sector strategy contains training activities for the safe and efficient use of alternative low-GWP refrigerants, which are critical for the introduction of new technologies into the local market, especially flammable refrigerant-based air conditioners from the converted enterprises. Minimizing this component would interfere with the timely introduction and adoption of new technologies by the local market. Discussions with the national standards committee are also required to allow for the introduction of standards currently being used in Europe and the United States of America.

Conclusion of the alternative approach

84. Given the position by the Government of Brazil, as explained by UNDP, the Secretariat reviewed the proposal as submitted. The Secretariat’s comments are below.

Potential dates in implementation of stage I

85. Given that two enterprises, one systems house and close to 300 PU downstream enterprises are still under conversion in stage I, the Secretariat expressed concern that adding the large set of activities proposed for stage II at this point may create further delays in the completion of stage I. UNDP explained that the time for submission of stage II was carefully evaluated. As most SMEs operate simultaneously in various PU foam applications, the additional funding from stage II will allow them to finalize their conversions started under stage I. The implementation arrangements for stage II will be based on the structure built during stage I, which will ensure an immediate start of activities. The first two years will focus on the individual enterprises, while the bulk of downstream-user conversions under stage II would take place mostly in 2018 when conversions under stage I will have been completed.

Technical and cost issues related to the PU foam sector plan

Enterprises in the PU foam sector

86. The Secretariat noted that the number of PU foam enterprises identified changed between 2009 (stage I) and 2013 (stage II), as shown in Table 10. UNDP explained that this is because stage I only included a detailed bottom-up survey for the applications addressed (integral skin, flexible moulded and some rigid foam), while for stage II a detailed bottom-up survey was done for all remaining applications not covered under stage I (e.g., discontinuous panels, commercial refrigeration, box foam, and other rigid PU uses). UNDP reiterated that the current data provides a more comprehensive picture of the foam sector and indicated that while more enterprises were identified overall HCFC consumption has decreased.

Table 10. PU foam enterprises identified in 2009 and 2013

PU foam sector in Brazil		HCFC consumption in 2009		HCFC consumption ion 2013	
		No enterprises	**ODP tonnes**	**No enterprises**	**ODP tonnes**
Equal or larger than 20 mt	Eligible	59	298.70	19	71.39
	Non-eligible	2	201.20	4	38.50
Subtotal non-SMEs		**61**	**499.90**	**23**	**109.89**
Lower than 20 mt	Eligible	674	120.20	1,246	116.81
	Non-eligible			278	18.95
Subtotal SMEs		**674**	**120.20**	**1,524**	**135.76**
Total		**735**	**620.10**	***1,547**	**245.65**

*This value does not include the around 400 already assisted under stage I.

87. The Secretariat noted that consumption has decreased in non-SMEs enterprises and slightly increased in SMEs. In particular, 1,829.40 mt of HCFC-141b (201.2 ODP tonnes) consumed in 2009 by two non-eligible enterprises in the domestic refrigeration sector have been largely phased out during stage I. As that consumption was not planned for phase out during stage I, it was not deducted from the remaining eligible consumption. UNDP stressed that the reconversion of non-eligible enterprises via legal requirement (a ban on the use of HCFC-141b in the foam sector by certain date) is part of stage II and that no capacity established after the cut-off date will be funded, as per existing guidelines.

Eligibility of downstream users

88. UNDP submitted detailed project proposals including names, baseline equipment and consumption of downstream users being assisted under stage II through systems houses. The Secretariat noted that some downstream users for which assistance is being requested were already assisted under stage I, or were repeated in more than one systems house project. UNDP explained that a downstream user can be served by more than one systems house, but Multilateral Fund assistance is provided through only one systems house. In some cases although several enterprises share similar names, they are effectively different enterprises, which can be seen from their Registration of Corporate Taxpayers

number. In some other cases end-users can produce different types of foam in different subsectors and could be part of stage I and stage II. UNDP emphasized that only equipment and HCFC-141b consumption that was not included in stage I have been included in the stage II proposal.

89. While acknowledging the difficulty to collect data from very small enterprises at the preparatory stage, the Secretariat considers important to have a clear inventory of enterprises that are receiving Multilateral Fund assistance, especially when there are enterprises assisted in stage I and stage II and enterprises with very similar names. In order to address this concern, the Secretariat proposed, as done during stage I and reflected in paragraph 7(c) of the Agreement between the Government of Brazil and the Executive Committee, that UNDP submits to each tranche a report on the validation of eligibility of downstream users receiving assistance from the Multilateral Fund in Brazil, as they are incorporated in the implementation of the HPMP. This information would be reported to the Executive Committee. UNDP agreed to continue updating the list ensuring that funding will only be provided to eligible enterprises and lines. Funding associated to enterprises found non-eligible for funding would be returned to the Fund.

Supply of alternatives selected (decision 74/20)

90. In line with decision 74/20, the Secretariat requested, for the technologies selected and not already introduced during stage I (i.e., HFO-1233zd), detailed information from the suppliers on how and when an adequate supply of the technology would be made available to the country. UNDP explained that most downstream users will be converted in 2018, when it is expected that commercial quantities of HFOs should be fully available in Brazil. Representatives of supplier companies that develop and produce HFOs have been consulted and all of them reported that samples have been provided to potential users for testing, including systems houses. One of the suppliers also stated that, considering their projected Brazilian market, they would already be in a position to supply 50 per cent of this market on a commercial scale in 2015.

Second-stage conversions

91. Given that it is clearly demonstrated that all eligible enterprises included in stage II of the HPMP are converting to low-GWP technologies, in accordance to decision 74/50(b)(i) they are eligible for full funding of eligible incremental costs.

Demonstration project in the PU foam sector

92. Stage II included a demonstration project on vacuum-assisted injection in sandwich panel production. At the 74th meeting, the Executive Committee approved preparatory funds for a similar demonstration project in South Africa, which is being considered at the 75th meeting as part of decision 72/40. It was therefore agreed with UNDP that the demonstration project should be removed from the HPMP of Brazil.

Incremental costs

93. The incremental capital costs in the PU foam proposal submitted under stage II were in general consistent in terms of costs with the activities approved for the sector under stage I. The Secretariat and UNDP discussed in detail specific items where there were differences, and used precedent approvals as reference where needed.

94. At the time of finalization of this document, discussions between the Secretariat and UNDP on incremental costs were still ongoing. The capital costs which were still under discussion included: for the systems houses, the development of formulations, the need for explosion proof tanks and safety equipment in cases where the selected technology is not flammable, the cost of laboratory testing equipment. For downstream users, purchase of low-pressure dispensers for users with no baseline

equipment, and costs of tests and trials. For individual projects, HC storage and premixing stations, the need for k-factor testing equipment, the request for mould heating systems in the case of HFO reduced formulations, and operating costs for enterprises converting to methyl formate, HFOs and cyclopentane. The Secretariat will report the outcome of the discussion prior to the 75th meeting.

Technical and cost issues related to the refrigeration and AC manufacturing sectors

Technology selection

95. The Secretariat raised the issue that the technology had not been selected yet for the majority of the investment projects included. Furthermore, the potential technologies proposed (R-290, R-600, CO_2, HFO, blends containing HFCs and HFOs) have different performance, flammability level, incremental costs, local use regulations, and required components, among other things. The commercial availability and existence of proper conditions in the country to introduce these technologies today seem unclear.

96. UNIDO clarified that HC-290 is the preferred technology in the case of the AC manufacturing enterprises, and HFC-32 would be the second option in case some products face difficulties in terms of charge size. As both options considered are mildly flammable or flammable, all safety measures in the production plant and the necessary equipment will be very similar. The project will be implemented starting 2018, which will give the enterprises time to decide on the technology, and give the Government time to prepare for the introduction of the technologies. With the AC market growing, leaving the eligible manufacturers unattended would pose the risk that they would convert to HFC-410A.

Incremental cost

97. At the time of finalization of this document, discussions between the Secretariat and UNDP on incremental costs were still ongoing, *inter alia*, heat exchanger manufacturing line, refrigerant handling packages, technical assistance for modification of the products and the monitoring component. The Secretariat will report the outcome of the discussion prior to the 75th meeting.

PMU

98. The Secretariat requested a rationalization of the project monitoring components, noting that in addition to the US $2,605,000 requested for the PMU (UNDP), US $1,028,000 was requested for project management in the refrigeration and air-conditioning manufacturing component (UNIDO). At the time of finalization of this document, discussions between the Secretariat and UNDP on the PMU cost were still ongoing. The Secretariat will report the outcome of the discussion prior to the 75th meeting.

Revised overall cost of the HPMP stage II

99. Pending

Table 11. Agreed cost for stage II of the HPMP for Brazil

Sector	Application	Substance	mt	ODP tonnes	CE	Funds requested (US $)
All	Regulatory actions	HCFC-22				
		HCFC-141b				
Subtotal regulatory actions						
PU foam	Conversion of 14 individual enterprises and 705 downstream users	HCFC-141b				
		HCFC-22				
	Demonstration project	HCFC-141b				
	Dissemination of information					

Subtotal PU foam						
RAC manuf.	Commercial refrigeration	HCFC-22				
	AC manufcturing	HCFC-22				
	Monitoring	HCFC-22				
Subtotal RAC manufacturing						
RAC servicing		HCFC-22				
Subtotal RAC servicing						
All	Implementation and monitoring	All				
Total stage II						

100. Activities included in stage II of the HPMP for Brazil will result in the phase-out of [xxx] ODP tonnes of HCFCs with an overall cost-effectiveness of US $[xxx]/kg. In addition, 8.7 ODP tonnes of HCFC-141b exported contained in pre-blended polyols will be phased out, achieving a total reduction of [xxx] ODP tonnes at a cost-effectiveness of US $[xxx]/kg.

101. With approval of stage II of the HPMP, the Government of Brazil commits to achieving a reduction of 35 per cent the baseline for compliance in 2020. The Government of Brazil also commits to introducing a ban for imports and use of HCFC-141b in the PU foam sector including imports and exports of HCFC contained in pre-blended polyols by 1 January 2020.

Verification

102. The verification report related to the 2014 consumption was presented with the fourth tranche request at the 74th meeting. The verification confirmed that Brazil is implementing a licensing and quota system for imports and exports of HCFC and that consumption of HCFC in 2014 was in compliance with the Montreal Protocol and the consumption targets established under stage I.

Impact on the climate

103. The conversion of the remaining PU foam manufacturing enterprises in Brazil would avoid the emission into the atmosphere of some 1,132 thousand tonnes of CO_2 equivalent per year, as shown in Table 12.

Table 12. Impact on the climate PU foam projects

Substance	**GWP**	**Tonnes/year**	**CO_2-eq (tonnes/year)**
Before conversion			
HCFC-141b	725	1,560.13	1,131,094
HCFC-22	1,810	11.09	20,073
Total before conversion			**1,151,167**
After conversion			
Cyclopentane, HFO, methyl formate, methylal, water	~20	942.6	18,852
Impact			**(1,132,315)**

104. The conversion of the three AC manufacturing enterprises to HC-290 would avoid the emission to the atmosphere of some 946,400 tonnes of CO_2 equivalent per year. Table 13 presents the climate impact in the air conditioning sector using the Multilateral Fund Climate Impact Indicator.

Table 13. Impact on the climate AC manufacturing projects

Input			
	Generic		
	Country	[-]	**Brazil**
	Company data (name, location)	[-]	**Elgin, Gree, Climazon**
	Select system type	[list]	Air conditioning (window and split type)
	General refrigeration information		
	HCFC to be replaced	[-]	HCFC-22
	Amount of refrigerant per unit	[kg]	between 0.7 and 1 (av. 0.88)
	No. of units	[-]	587000
	Refrigeration capacity	[kW]	Estimated average 2 kW
	Selection of alternative with minimum environmental impact		
	Share of exports (all countries)	[%]	0
	Calculation of the climate impact		
	Alternative refrigerant (more than one possible)	[list]	HFC-410A; HFC-32;HC-290
All data displayed is specific to the case investigated and is not generic information about the performance of one alternative; performance can differ significantly depending on the case.			
Output	*Note: The output is calculated as the climate impact of the refrigerant systems in their lifetime as compared to HCFC-22, on the basis of the amount produced within one year. Additional/different outputs are possible*		
	Country		**Brazil**
	Identification of the alternative technology with minimum climate impact		
	List of alternatives for identification of the one with minimum climate impact	[Sorted list, best = top (% deviation from HCFC)]	HC-290 (-71%)
			HC-600a (-70%)
			HFC-1234yf (-68%)
			HFC-32 (-49%)
			HCFC-22
			HFC-410A (4%)
	Calculation of the climate impact		
	Per unit, over lifetime (for information only):		
	Energy consumption	[kWh]	11,900
	Direct climate impact (substance)	[kg CO_2 equiv]	1,590
	Indirect climate impact (energy): In country	[kg CO_2 equiv]	680
	Indirect climate impact (energy): Global average	[kg CO_2 equiv]	0
	Calculation of the climate impact of the conversion		
	Alternative refrigerant 1		**HFC-410A**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*+47,200*
	*Indirect impact (country)***	*[t CO_2 equiv]*	*+4,800*
	*Indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	Total direct and indirect impact	*[t CO_2 equiv]*	*+52,000*
	Total impact	**[t CO_2 equiv]**	**1,390,700**
	Alternative refrigerant 2		**HFC-32**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*-626,300*
	*Indirect impact (country)***	*[t CO_2 equiv]*	*-23,100*
	*Indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	Total direct and indirect impact	*[t CO_2 equiv]*	*-649,400*
	Total impact	**[t CO_2 equiv]**	**689,300**

	Alternative refrigerant 3		**HC-290**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*-936,700*
	*Total indirect impact (country)***	*[t CO_2 equiv]*	*-9,700*
	*Total indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	*Total direct and indirect impact***	*[t CO_2 equiv]*	*-946,400*
	Total impact	**[t CO_2 equiv]**	**392,300**
* Direct impact: Different impact between alternative technology and HCFC technology for the substance-related emissions.			
**Indirect impact: Difference in impact between alternative technology and HCFC technology for the energy-consumption-related emissions of CO_2 when generating electricity.			

105. The total impact of the refrigerant selection on the climate calculated with the Multilateral Fund climate impact indicator (MCII) is a decrease in climate relevant emissions by 946,400 tonnes of CO_2 equivalent (i.e., 71 per cent), resulting in a climate impact of 392,300 tonnes of CO_2 equivalent (from the baseline of 1,338,700 tonnes of CO_2 equivalent with the use of HCFC-22).

Table 14. Impact on the commercial refrigeration manufacturing group project for medium-sized enterprises

Input			
	Generic		
	Country	[-]	**Brazil**
	Company data (name, location)	[-]	**Comércio de Chopeiras Ribeirão Memo, Freeart Seral Brasil, Metalúrgica Aquagel Refrigferação Ltda**
	Select system type	[list]	Commercial cooling (factory assembled)
	General refrigeration information		
	HCFC to be replaced	[-]	HCFC-22
	Amount of refrigerant per unit	[kg]	between 4.5 and 22 (av. 7.2)
	No. of units	[-]	5021
	Refrigeration capacity	[kW]	Estimated average 2 kW
	Selection of alternative with minimum environmental impact		
	Share of exports (all countries)	[%]	0
	Calculation of the climate impact		
	Alternative refrigerant (more than one possible)	[list]	HFC-134a;HC-600a;HC-290
All data displayed is specific to the case investigated and is not generic information about the performance of one alternative; performance can differ significantly depending on the case.			
Output	*Note: The output is calculated as the climate impact of the refrigerant systems in their lifetime as compared to HCFC-22, on the basis of the amount produced within one year. Additional/different outputs are possible*		
	Country		**Brazil**
	Identification of the alternative technology with minimum climate impact		
	List of alternatives for identification of the one with minimum climate impact	[Sorted list, best = top (% deviation from HCFC)]	HC-290 (-87%)
			HC-600a (-86%)
			HFC-1234yf (-86%)
			HFC-32 (-58%)
			HFC-134a (-20%)
			HCFC-22
	Calculation of the climate impact		
	Per unit, over lifetime (for information only):		12 years
	Energy consumption	[kWh]	35,200
	Direct climate impact (substance)	[kg CO_2 equiv]	13,100
	Indirect climate impact (energy): In country	[kg CO_2 equiv]	2,010
	Indirect climate impact (energy): Global average	[kg CO_2 equiv]	0

	Calculation of the climate impact of the conversion		
	Alternative refrigerant 1		**HFC-134a**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*-14,800*
	*Indirect impact (country)***	*[t CO_2 equiv]*	*-50*
	*Indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	Total direct and indirect impact	*[t CO_2 equiv]*	*-14,850*
	Total impact	**[t CO_2 equiv]**	**60,800**
	Alternative refrigerant 2		**HC-600a**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*-65,300*
	*Indirect impact (country)***	*[t CO_2 equiv]*	*-100*
	*Indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	Total direct and indirect impact	*[t CO_2 equiv]*	*-65,400*
	Total impact	**[t CO_2 equiv]**	**10,300**
	Alternative refrigerant 3		**HC-290**
	*Total direct impact (post conversion – baseline)**	*[t CO_2 equiv]*	*-65,600*
	*Total indirect impact (country)***	*[t CO_2 equiv]*	*-400*
	*Total indirect impact (outside country)***	*[t CO_2 equiv]*	*0*
	*Total direct and indirect impact***	*[t CO_2 equiv]*	*-66,000*
	Total impact	**[t CO_2 equiv]**	**9,800**

* Direct impact: Different impact between alternative technology and HCFC technology for the substance-related emissions.
**Indirect impact: Difference in impact between alternative technology and HCFC technology for the energy-consumption-related emissions of CO_2 when generating electricity.

106. The total impact of the refrigerant selection on the climate calculated with the Multilateral Fund climate impact indicator (MCII) is a decrease in climate relevant emissions by 66,000 tonnes of CO_2 equivalent (i.e., 87 per cent), resulting in a climate impact of 9,800 tonnes of CO_2 equivalent (from the baseline of 75,800 tonnes of CO_2 equivalent with the use of HCFC-22)

107. The calculation of climate impact for the projects at Eletrofrio, Plotter Rack and 20 SMEs would depend on the specific systems being replaced by each enterprise as all of them serve different products specifically made for their clients (e.g., cold rooms, air dryers, commercial refrigerators, or assembly of systems in-situ) for which detailed information is not available. In addition, given the variety of products there may not be a single valid alternative refrigerant solution for all enterprises.

108. In addition, the proposed technical assistance activities in the HPMP for the servicing sector, which include training and assistance to reduce leakage rates and to facilitate the adoption of low-GWP alternatives in Brazil, would also reduce the amount of HCFC-22 used for refrigeration 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.

Co-financing

109. The level of co-financing would be known once the discussion on the incremental costs of the conversion of the foam and RAC sectors are concluded. Based on the project as submitted, the cost of the foam sector was estimated at US $23.4 million, of which US $16.3 million was requested from the Multilateral Fund, with the difference of US $7.1 million provided by the systems houses and enterprises. The Secretariat will update the information prior to the 75th meeting.

2015-2017 draft business plan of the Multilateral Fund

110. Table 15 shows the level of funding and amounts of HCFCs to be phased out according to the 2015-2017 business plan of the Multilateral Fund. The level of funding requested for the implementation of stage II of the HPMP of US $43,227,198, (including support cost) as originally submitted, is US $18,766,202 and 48.79 ODP tonnes above the amount in the business plan between 2015 and 2020.

Table 15. 2015-2017 business plan of the Multilateral Fund

Business plan	2015	2016	2017	2018	2019	2020	Total
UNDP	40.39	40.4	40.4	40.4	40.4	40.4	242.39
UNIDO	15.00	0.0	15.0	25.0	5.0	5.0	65.0
Germany	0.00	3.0	3.0	4.0	6.1	0.0	16.1
Italy	3.00	0.0	0.0	0.0	0.0	0.0	3.00
Total	**58.39**	**43.40**	**58.40**	**69.40**	**51.50**	**45.40**	**326.49**
UNDP	1,880,362	1,880,362	1,880,362	3,398,171	3,398,171	3,398,171	15,835,599
UNIDO	1,211,071	0	1,211,071	3,939,545	437,727	437,727	7,237,141
Germany	0	153,478	153,478	369,818	563,973	0	1,240,747
Italy	147,509	0	0	0	0	0	147,509
Total	**3,238,942**	**2,033,840**	**3,244,911**	**7,707,534**	**4,399,871**	**3,835,898**	**24,460,996**

Draft Agreement

111. A draft Agreement between the Government of Brazil and the Executive Committee for stage II of the HPMP is being prepared.

RECOMMENDATION

112. Pending

Annex I

AGREEMENT BETWEEN THE GOVERNMENT OF BRAZIL AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS

(Relevant changes are in bold font for ease of reference)

16. The updated Agreement supersedes the Agreement reached between the Government of Brazil and the Executive Committee at the 64th meeting of the Executive Committee.

APPENDIX 2-A: THE TARGETS, AND FUNDING

		2011	2012	2013	2014	2015	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	n/a	n/a	1,327.30	1,327.30	1,194.80	n/a
1.2	Maximum allowable total consumption of Annex C Group I substances (ODP tonnes)	n/a	n/a	1,327.30	1,327.30	1,194.80	n/a
2.1	Lead IA (UNDP) agreed funding (US $)	4,456,257	3,400,000	3,000,000	3,000,000	***1,470,700**	**15,326,957**
2.2	Support costs for Lead IA (US $)	334,219	255,000	225,000	225,000	**110,303**	**1,149,522**
2.3	Cooperating IA (Germany) agreed funding (US $)	1,209,091	2,472,727	0	0	409,091	4,090,909
2.4	Support costs for Cooperating IA (US $)	153,000	262,000	0	0	45,000	460,000
3.1	Total agreed funding (US $)	5,665,348	5,872,727	3,000,000	3,000,000	**1,879,791**	**19,417,866**
3.2	Total support costs (US $)	487,219	517,000	225,000	225,000	**155,303**	**1,609,522**
3.3	Total agreed costs (US $)	6,152,567	6,389,727	3,225,000	3,225,000	**2,035,094**	**21,027,388**
4.1.1	Total phase-out of HCFC–22 agreed to be achieved under this Agreement (ODP tonnes)						51.5
4.1.2	Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes)						0
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)						740.6
4.2.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)						168.8
4.2.2	Phase-out of HCFC-141b to be achieved in previously approved projects (ODP tonnes)						0
4.2.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)						353
4.3.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)						0
4.3.2	Phase-out of HCFC-142b to be achieved in previously approved projects (ODP tonnes)						0
4.3.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)						5.6
4.4.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)						0
4.4.2	Phase-out of HCFC-123 to be achieved in previously approved projects (ODP tonnes)						0
4.4.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)						0.3
4.5.1	Total phase-out of HCFC-124 agreed to be achieved under this Agreement (ODP tonnes)						0
4.5.2	Phase-out of HCFC-124 to be achieved in previously approved projects (ODP tonnes)						0
4.5.3	Remaining eligible consumption for HCFC-124 (ODP tonnes)						7.7

*US $179,300 and agency support cost of US $13,448 for UNDP were deducted from the fifth tranche as the enterprise Arinos is not eligible for funding under the Multilateral Fund and is converting with its own resources.