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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Seventy-sixth Meeting
Montreal, 9-13 May 2016

PROJECT PROPOSALS: VIET NAM

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

Phase-out

- HCFC phase-out management plan (stage I, third tranche) — World Bank
- HCFC phase-out management plan (stage II, first tranche) — World Bank and Japan

*Re-issued for technical reasons on 22 April 2016

Pre-session documents of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol are without prejudice to any decision that the Executive Committee might take following issuance of the document.

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS
Viet Nam

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase out plan (Stage I)	World Bank (lead)	63rd	10% by 2015

(II) LATEST ARTICLE 7 DATA (Annex C Group l)	Year: 2014	210.82 (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-22				77.4	116.0				193.4
HCFC-123					0.4				0.4
HCFC-141b		16.0							16.0
HCFC-225							1.1		1.1
HCFC-141b in imported pre-blended polyol		263.4							263.4

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	221.2	Starting point for sustained aggregate reductions:	385.77
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	140.1	Remaining:	245.67

(V) BUSINESS PLAN		2015	Total
World Bank	ODS phase-out (ODP tonnes)	15.0	15.0
	Funding (US $)	1,124,860	1,124,860

(VI) PROJECT DATA			2011	2012	2013	2014	2015	Total
Montreal Protocol consumption limits			n/a	n/a	221.2	221.2	199.1	n/a
Maximum allowable consumption (ODP tonnes)			n/a	n/a	221.2	221.2	199.1	n/a
Agreed funding (US $)	World Bank	Project costs	3,054,423	0	5,663,016	0	1,046,381	9,763,820
		Support costs	229,082	0	424,726	0	78,479	732,287
Funds approved by ExCom (US $)		Project costs	3,054,423	0	5,663,016	0		8,717,439
		Support costs	229,082	0	424,726	0		653,808
Total funds requested for approval at this meeting (US $)		Project costs					1,046,381	1,046,381
		Support costs					78,479	78,479

Secretariat's recommendation:	For individual consideration

PROJECT DESCRIPTION

Background

1. On behalf of the Government of Viet Nam, the World Bank as the designated implementing agency, submitted to the 75th meeting a request for funding for the third and final tranche of stage I of the HCFC phase-out management plan (HPMP), at the total cost of US $1,124,860, including agency support costs.

2. During the discussion, the Secretariat informed the Executive Committee that two options were proposed for dealing with the fact that one of the foam enterprises to be converted in stage I had gone out of business. The first option, preferred by the country, was to substitute another foam enterprise previously overlooked at the time of preparation of the HPMP and to calculate that enterprise's HCFC consumption as though it had been part of project preparation from the original submission of the HPMP; however, the Secretariat considered that the consumption of the enterprise should be calculated on the basis of either the last year, or the average of the three years immediately preceding project preparation, in line with the decision adopted by the Committee. As the Government did not wish to follow this approach, the second option involved returning the funds associated with the enterprise that had gone out of business to the Multilateral Fund.

3. Following discussions in plenary and in an informal group on the two options, the Secretariat reported that the World Bank had consulted with the Government of Viet Nam, which had decided to withdraw its request.

4. On behalf of the Government of Viet Nam, the World Bank as the designated implementing agency, has submitted to the 76th meeting a request for funding for the third and final tranche of stage I of the HCFC phase-out management plan (HPMP), at the amount of US $1,046,381, plus agency support costs of US $78,479. The submission includes a progress report on the implementation of the second tranche, the verification report on HCFC consumption in 2015[1], and the tranche implementation plan for 2016.

Report on HCFC consumption

HCFC consumption

5. The Government of Viet Nam reported a consumption of 210.82 ODP tonnes of HCFC in 2014 under Article 7 of the Montreal Protocol, and 263.4 ODP tonnes of HCFC-141b contained in imported pre-blended polyols under the country programme (CP) report. The 2012-2015 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Viet Nam (2012-2014 Article 7 data, 2015 verified consumption)

HCFC	2012	2013	2014	2015*	Baseline
Metric tonnes					
HCFC-22	2,933	3,254	3,516.7	3,431	3,039.0
HCFC-123	2.7	53.8	19.3	93.1	8.0
HCFC-141b	342	206.5	145	0	490.0
HCFC-225	13.4	1.3	15.3	30.5	0
Sub-total (mt)	**3,291.1**	**3,515.6**	**3,696.3**	**3,555**	**3,537**
HCFC-141b in imported pre-blended polyols**	1,972	1,976	2,395		1,496.36***
Total (mt)	**5,263.1**	**5,491.6**	**6,091.3**		
ODP tonnes					
HCFC-22	161.3	179	193.4	188.7	167.15
HCFC-123	0.1	1.1	0.4	1.9	0.16

[1] Verification reports on HCFC consumption in 2013 and 2014 were submitted to the 75th meeting.

HCFC	2012	2013	2014	2015*	Baseline
HCFC-141b	37.6	22.7	16	0	53.90
HCFC-225	0.9	0.1	1.1	2.1	0
Sub-total (ODP tonnes)	**199.9**	**202.9**	**210.8**	**192.7**	**221.21**
HCFC-141b in imported pre-blended polyols**	216.9	217.4	263.5		164.56***
Total (ODP tonnes)	**416.8**	**420.2**	**474.3**		

* Verification report for 2015.
** County programme data.
*** Average consumption between 2007 and 2009.

6. HCFC consumption in Viet Nam consists predominately of HCFC-22 with small amounts of HCFC-123 and HCFC-225. The slight increase in consumption between 2013 and 2014 (4 per cent) was due to a higher demand for HCFC-22 in the servicing of the RAC sector. The total estimated HCFC consumption of 192.7 ODP tonnes in 2015 was 3.2 per cent below the limits established in the Agreement between the Government and the Executive Committee. However, there has been substantial growth in the reported use of HCFC-141b contained in imported pre-blended polyol due to an increased production of wood imitation products (which had not been tracked in previous years), and for production of polyurethane rigid (PU) foam panels due to a recent Government rule that prevents construction bricks to be made out of clay.

Verification report

7. The verification report confirmed that the Government is implementing an effective licensing and quota system for HCFC imports and exports, and the total consumption of HCFCs was 192.7 ODP tonnes in 2015 and, thus, the country was in compliance with the Montreal Protocol targets. The import quotas were issued individually for each HCFC.

Country programme (CP) implementation report

8. The Government of Viet Nam reported HCFC sector consumption data under 2014 CP implementation reports which is consistent with the data reported under Article 7. The 2015 CP report is expected to be submitted by 1 May 2016.

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

Legal framework

9. An HCFC licensing and quota system became operational in January 2012. A ban on import and export of pure HCFC-141b is effective from 1 January 2015. A policy recommendation was made in January 2014 that prevents new installation of HCFC-22 based refrigeration equipment in cold storage.

Foam manufacturing sector

10. Of the 12 foam enterprises covered in stage I of the HPMP, five have completed their conversion; three are carrying out equipment installation and will complete the conversion by April 2016; three will be converted in 2016; and one (Glory) has gone out of the foaming business. Conversion of all enterprises will result in the phase-out of 462.00 mt (50.82 ODP tonnes) of HCFC-141b in bulk and 813.00 mt (89.43 ODP tonnes) of HCFC-141b contained in imported pre-blended polyols. Out of the 11 enterprises in operation, one has converted to water-blown technology and the rest have (or will be) converted to cyclopentane. Table 2 below shows details on the 12 enterprises included in stage I of the HPMP.

Table 2. Overview of foam enterprises conversion (US $)

Enterprise	Budget (US $)	Disbursement (US $)	HCFC-141b phase-out (mt)	HCFC-141b in polyols phase-out (mt)	Contract signature	Completion date
Midico	356,100	332,654	40	51	Feb. 2012, Apr. 2013	May 2013
6M	668,300	656,945	35	30	Aug. 2013	Sep 2014
Thanh Canh	503,900	476,201	40	28.8	Sep. 2013	Aug 2014
Huu Nghi	479,900	392,868	30	20.4	Feb. 2014	Mar 2015
Hoa Phat	954,100	763,280	12	69.4	Mar. 2014	Nov 2014
Vietrust	1,386,100	901,600	50	151.5	Apr. 2014	Apr 2016*
TST	896,400	329,316	56	100	Jun. 2014	Apr 2016*
Arico	1,027,000	547,826	55	162	Jan. 2015	Jun 2016*
Tabi Trading	487,300	145,740	25	30	Dec. 2014	Apr 2016*
Searee	635,600	166,920	40	24.5	Feb. 2015	Jun 2016*
Saigon Insulation	566,800	102,900	60	0	Feb. 2015	Sep 2016*
Glory	914,700	n/a	19	145	Cancelled	
Total	**8,876,200**	**4,816,251**	**462**	**813**		

* Estimated date of completion.

11. Shortly after the Government began to implement its HCFC licensing and quota system in 2012, it noted that a locally-owned enterprise (Sanaky) manufacturing domestic and commercial refrigeration equipment (including insulation foam), established in 2004 was not included in the survey undertaken during preparation of the HPMP. In 2009, Sanaky consumed 62.00 mt (6.82 ODP tonnes) of HCFC-141b in bulk; from 2010, the enterprise switched over to HCFC-141b contained in imported pre-blended polyols, with a use of 186.80 mt (20.55 ODP tonnes) of HCFC-141b in 2014, as shown in Table 3.

Table 3. HCFC-141b consumption at Sanaky

Year	HCFC-141b bulk		HCFC-141b in pre-blended polyol	
	(mt)	(ODP tonnes)	(mt)	(ODP tonnes)
2009	62.00	6.82	-	-
2010	-	-	74.26	8.17
2011	-	-	103.30	11.36
2012	-	-	54.04	5.94
2013	-	-	84.45	9.29
2014	-	-	186.80	20.55
Average	-	-	**108.43**	**11.93**

Technical assistance (TA) component

12. The following activities were implemented: 174 customs officers were trained (in addition to 80 trained in 2013); a workshop for 70 representatives of RAC associations to discuss the activities associated with stage II and future stages of the HPMP was organized; owners and technicians from servicing shops were trained at a workshop on good practices in managing HCFCs; two safety training workshops on cyclopentane technology for technicians in foam manufacturing took place; three workshops on HCFC-22 reduction in the cold storage sector with 108 participants from Government agencies, enterprises; and training centres were organized.

Project implementation and monitoring unit (PMU)

13. The PMU supported the implementation of the HPMP by providing assistance to the Ministry of Natural Resources and Environment (MONRE) and foam enterprises undergoing conversion as well as organization of workshops and trainings under the technical assistance component.

Level of fund disbursement

14. As of March 2016 of the US $8,717,439 so far approved, US $5,352,552 had been disbursed as shown in Table 4. The balance of US $3,364,887 will be disbursed in 2016.

Table 4. Financial report of stage I of the HPMP for Viet Nam (US $)

Agency	First tranche		Second tranche		Total approved	
	Approved	Disbursed	Approved	Disbursed	Approved	Disbursed
World Bank	3,054,423	3,054,423	5,663,016	2,298,129	8,717,439	5,352,552
Disbursement rate (%)		100.0		40.6		61.4

Implementation plan for the third tranche of the HPMP

15. The third funding tranche of the HPMP will be implemented in 2016 and will include:

(a) Finalize the conversion at the six remaining foam enterprises;

(b) Organize eight workshops for staff at the remaining foam enterprises to safely operate foaming facilities and manage cyclopentane use;

(c) Organize one workshop to train customs officers; two workshops to raise awareness on alternative refrigerants available for use in the AC sector, while also discussing energy efficiency issues, three workshops to raise awareness on reduction of HCFC use and HCFC-based equipment focused on owners and technicians in the cold storage sector; and five workshops to train technicians in good practices;

(d) Regulatory activities including issuing quotas and import permits, enforcing and implementing policies, and developing foam safety and product standards, and awareness raising activities; and

(e) Implement PMU activities.

16. In addition, the Government of Viet Nam has proposed to include the conversion of Sanaky as part of the foam sector plan approved in stage I of the HPMP. The baseline equipment at Sanaky includes storage tanks, pre-mixers, three high-pressure foaming machines (one purchased in 2012) and ancillary equipment. The incremental capital cost for the conversion to cyclopentane blowing agent has been estimated at US $1.13 million. However, the Government is requesting US $914,000 for the conversion of the enterprise, which represents the amount of funding allocated for the conversion of Glory (as this enterprise ceased foam operations). The Government is also requesting not to deduct the HCFC consumption of Sanaky from the remaining consumption eligible for funding.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

HCFC consumption

17. The Secretariat noted the substantial increase in use of HCFC-141b contained in imported pre-blended polyols, partly related to an increased demand of new foam-based products, and partly to an increase in its use by foam enterprises not yet converted, most of which are small- and medium-sized enterprises which will be addressed under stage II. The World Bank confirmed that the five converted enterprises do not use HCFC-141b, in bulk or contained in imported pre-blended polyols, and that the ban on new or expansion of existing foam production facilities using HCFC-141b in bulk has been issued.

However, a similar ban for foam production facilities that use HCFC-141b contained in imported pre-blended polyol, as originally intended when stage I was agreed, will only be established by 1 January 2021.

Issues related to the foam sector plan

18. The Secretariat reviewed the request to substitute Glory with Sanaky under the foam sector plan approved under stage I of the HPMP, taking into consideration that all HCFC-141b currently used in the foam sector is imported in pre-blended polyols; the ban on import of HCFC-141b in bulk effectively implemented since 1 January 2015 (which may have contributed to Sanaky's decision to switch from HCFC-141b in bulk to HCFC-141b contained in imported pre-blended polyols); challenges in distinguishing between use of HCFC-141b in bulk versus contained in imported pre-blended polyols; the proposal to completely phase-out HCFC-141b contained in imported pre-blended polyols and ban its import and use by 2021 contained in stage II of the HPMP for Viet Nam submitted to the 76th meeting.

19. Given the intrinsic relation between the proposed modification to the foam sector plan approved in stage I (i.e., the substitution of Glory with Sanaky) and the proposed sector plan contained in stage II of the HPMP, the Secretariat recommends to consider jointly the requests to approve the foam sector plan in stage I as modified (i.e., the substitution of Glory with Sanaky) and the foam sector plan for the complete phase-out of HCFC-141b contained in stage II. If the Executive Committee wishes to proceed on this basis, it could consider on an exceptional basis the substitution of Glory with Sanaky based on its HCFC-141b consumption in 2009, which was the basis of consumption used by the other 12 foam enterprises that were included in stage I, at a cost of US $275,900. With this funding, the Government would commit to completely phase-out the consumption of HCFC-141b in Sanaky on the understanding that the remaining 28.18 mt (3.1 ODP tonnes) of HCFC-141b would be deducted from the starting point.

20. The cost for the conversion of Glory was approved at US $914,700, plus agency support costs of US $68,603. As the cost for the conversion of Sanaky has been agreed at US $275,900, plus agency support costs of US $20,693, the third and final tranche of the HPMP would be correspondingly adjusted to US $407,581, plus agency support costs of US $30,569 for the World Bank.

Revision to the HPMP Agreement

21. A draft amended Agreement between the Government of Viet Nam and the Executive Committee has been prepared to reflect the revised fourth tranche of US $407,581, plus agency support costs of US $30,569, as a result of the substitution of the new enterprise in stage I of the HPMP and the additional deductions from the remaining eligible consumption of HCFC-141b that would be associated with this conversion. The relevant appendix of the Agreement between the Government and the Executive Committee has been updated and paragraph 15 was updated to indicate that the updated Agreement supersedes that reached at the 71st meeting, as shown in Annex I to the present document.

Conclusion

22. Implementation of the second tranche of the HPMP is progressing. The import licensing and quota system is operational and will enable the country in achieving compliance with the Montreal Protocol's phase-out schedule. The verification report confirms that the 2015 HCFC consumption was below that specified in its Agreement with the Executive Committee. The conversion in the foam sector is progressing well, and a ban on import and export of pure HCFC-141b is effective from 1 January 2015. The converted foam enterprises no longer consume HCFC-141b in bulk nor in imported pre-blended polyols; the conversion of all foam enterprises (expected no later than September 2016), will result in the phase-out of 1,275 mt (140.25 ODP tonnes) of HCFC-141b (in bulk and contained in imported pre-blended polyols). A ban on new or expansion of existing foam production facilities using bulk HCFC-141b has been implemented; a ban for foam enterprises that use HCFC-141b in imported pre-blended polyol will only be issued by 1 January 2021.

23. The Secretariat recommends that the proposal to modify the foam sector plan (i.e., to substitute Glory, which ceased foam operation, with Sanaky) approved under stage I should be considered jointly with the foam sector plan contained under stage II of the HPMP submitted to the 76th meeting.

RECOMMENDATION

24. Subject to the approval of stage II of the HPMP for Viet Nam submitted to the 76th meeting, the Executive Committee may wish to consider:

(a) Noting the progress report on the implementation of the second tranche of stage I of the HCFC phase-out management plan (HPMP) in Viet Nam;

(b) Noting:

(i) That a new foam enterprise Sanaky had been included in the foam sector plan replacing the enterprise Glory that had gone out of business;

(ii) That the costs of the conversion and consumption of Sanaky was calculated based on its 2009 consumption on an exceptional basis so that the enterprise could be treated the same as the other enterprises included in the foam sector plan under stage I;

(iii) That the Fund Secretariat had updated Appendix 2-A of the Agreement between the Government of Viet Nam and the Executive Committee, based on the addition of an enterprise, the additional amount of HCFC-141b to be phased-out and the revised funding level, and that paragraph 15 was updated to indicate that the Agreement superseded that reached at the 71st meeting; as contained in Annex I to the present document;

(c) Deducting 3.1 ODP tonnes of HCFC-141b from the remaining eligible consumption;

(d) Approving the third tranche of stage I of the HPMP for Viet Nam, and the corresponding 2016 tranche implementation plan, at the amount of US $407,581, plus agency support costs of US $30,569 for the World Bank; and

(e) Requesting the Government of Viet Nam and the World Bank to submit the project completion report of stage I of the HPMP by the second meeting of the Executive Committee in 2017.

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS
Viet Nam

(I) PROJECT TITLE	AGENCY
HCFC phase out plan (Stage II)	World Bank (lead), Japan

(II) LATEST ARTICLE 7 DATA (Annex C Group l)	Year: 2014	210.82 (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-22				77.4	116.0				193.4
HCFC-123					0.4				0.4
HCFC-141b		16.0							16.0
HCFC-225							1.1		1.1
HCFC-141b in imported pre-blended polyol		263.4							263.4

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	221.2	Starting point for sustained aggregate reductions:	385.77
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	140.1	Remaining:	245.67

(V) BUSINESS PLAN		2016	2017	2018	2019	2020	After 2020	Total
World Bank	ODS phase-out (ODP tonnes)	34.2	2.1	34.2	36.3	11.4	4.2	0.00
	Funding (US $)	4,339,000	196,000	3,215,000	3,411,000	1,071,000	392,000	0
Japan	ODS phase-out (ODP tonnes)	0	0	0	0	0	0	0
	Funding (US $)	0	0	0	0	0	0	0

(VI) PROJECT DATA			2016	2017	2018	2019	2020	Total
Montreal Protocol consumption limits								n/a
Maximum allowable consumption (ODP tonnes)								n/a
Project costs requested in principle (US $)	World Bank	Project costs						TBD
		Support costs						TBD
	Japan	Project costs						TBD
		Support costs						TBD
Total project costs requested in principle (US $)								TBD
Total support costs requested in principle (US $)								TBD
Total funds requested in principle (US $)								TBD

(VII) Request for funding for the first tranche (2016)		
Agency	**Funds requested (US $)**	**Support costs (US $)**
World Bank	TBD	TBD
Japan	TBD	TBD

Funding request:	TBD
Secretariat's recommendation:	Pending

PROJECT DESCRIPTION

25. On behalf of the Government of Viet Nam, the World Bank, as the lead implementing agency, has submitted to the 76th meeting stage II of the HCFC phase-out management plan (HPMP) at a total cost of US $22,123,459, consisting of US $20,429,399, plus agency support costs of US $1,430,058 for the World Bank, and US $233,630 plus agency support costs of US $30,372 for the Government of Japan, as originally submitted. The implementation of stage II of the HPMP will phase out 55.3 ODP tonnes of HCFC-22 and 223.9 ODP tonnes of HCFC-141b in imported pre-blended polyols and assist Viet Nam in meeting the Montreal Protocol compliance target of 35 per cent reduction by 2020.

26. The first tranche for stage II of the HPMP being requested at this meeting amounts to US $2,074,495, plus agency support costs of US $145,215 ODP tonnes for the World Bank only, as originally submitted.

Status of implementation of stage I of the HPMP

27. Stage I of the HPMP for Viet Nam was approved at the 63rd meeting to meet 10 per cent reduction from the baseline by 2015 at a total cost of US $10,496,107, to phase out a total of 140.1 ODP tonnes (consisting of 50.8 ODP tones of HCFC-141b and 89.3 ODP tonnes of HCFC-141b contained in imported pre-blended polyols).[2]

Progress in implementation of stage I activities

28. The progress in implementation of stage I activities, including status of conversion projects, a report on the ODS policy and regulation framework, programme management unit and status of disbursement, is described in paragraphs 9 to 16 of the present document.

Stage II of the HPMP

29. The Government of Viet Nam is committing in stage II to reduce HCFC consumption by 35 per cent of the baseline by 2020, with an associated phase-out of 55.3 ODP tonnes of HCFCs (i.e., 25 per cent of the baseline).

Remaining eligible consumption in Viet Nam

30. After stage I, the HCFC consumption associated with the remaining consumption eligible for funding in Viet Nam consists of 3.10 ODP tonnes of HCFC-141b; 167.15 ODP tonnes of HCFC-22; 0.16 ODP tonnes of HCFC-123, and 75.26 ODP tonnes of HCFC-141b contained in imported pre-blended polyols. Table 1 presents an overview of the remaining consumption in Viet Nam.

Table 1. Overview of the remaining HCFC consumption eligible for funding in Viet Nam

Description	HCFC-22		HCFC-141b		HCFC-123		HCFC 141b in imported pre-blended polyols	
	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes
Starting point	3,039.1	167.15	490.0	53.90	8.0	0.16	1,496.0	164.56
Reduction in stage I	0.0	0.00	461.8	50.80	0.0	0.00	811.8	89.30
Remaining after stage I	3,039.1	167.15	28.2	3.10	8.0	0.16	684.2	75.26

[2] UNEP/OzL.Pro/ExCom/63/55 and Add.1

Description	HCFC-22		HCFC-141b		HCFC-123		HCFC 141b in imported pre-blended polyols	
	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes	mt	ODP tonnes
Reduction proposed in stage II	1,006.0	55.33	28.2	3.10	0.0	0	684.2	75.26*
Remaining for future stages	2,033.1	111.82	0.0	0.00	8.0	0.16	0.0	0.00

* Implementation of stage II will result in the complete phase-out of HCFC-141b contained in imported pre-blended polyols. Of this amount, only 75.26 ODP tonnes are eligible for funding.

HCFC consumption and sector distribution

31. Viet Nam's HCFC consumption is described in paragraphs 5 to 6 of the present document. Table 2 presents the consumption of HCFCs by sector as reported in the country programme (CP) data for 2014.

Table 2. Distribution of HCFCs by sector and substance in Viet Nam (2014)

Description	HCFC	Sector	Metric tonnes (mt)	mt (%)	ODP tonnes	ODP tonnes (%)
Manufacturing	HCFC-22	RAC*	1,407	23.1	77.4	16.3
	HCFC-141b	PU foam	145	2.4	16	3.4
	HCFC-225	Solvents/flushing	15.3	0.3	1.1	0.2
	HCFC-141b	Formulated polyol	2,395	39.3	263.5	55.5
Servicing	HCFC-22	RAC	2,109.7	34.6	116	24.5
	HCFC-123	RAC	19.3	0.3	0.4	0.1
Total			**6,091.3**	**100.0**	**474.4**	**100.0**

*Refrigeration and air-conditioning

HCFC consumption in manufacturing sectors

Foam manufacturing

32. During implementation of stage I, consumption of HCFC-141b in bulk steadily decreased with a total phase-out by 1 January 2015, when a ban on the import of this substance was issued. However, there has been a substantial growth in the use of HCFC-141b in imported pre-blended polyol due to an increased production of wood imitation products (which had not been tracked in previous years); an increased production of PU foam panels, due to a recent Government rule that prevents construction bricks to be made out of clay; increased registration of importers; and the introduction of the ban of import of HCFC-141b in bulk. During preparation of stage II the sector survey estimated a consumption of 319.9 ODP tonnes of HCFC-141b in imported pre-blended polyols in 2014 (which is higher than the 263.5 ODP tonnes reported in CP data), used by 106 foam enterprises for different applications as show in Table 3.

Table 3. Distribution of HCFC-141b in imported pre-blended polyols in the foam sector (2014)

	Application	Number of Enterprises	Consumption	
			mt	ODP tonnes
	Insulated roofing panels	29	1,118	123
	Sandwich panels	14	146	16.1
	Insulation refrigeration	4	211	23.2
	Blocks, spray and in situ	14	381	41.9
	Electrical and solar water heaters	4	103	11.3
	Thermoware	6	76	8.4
	Sector Sub-total	**71**	**2,035**	**223.9**

	Application	Number of Enterprises	Consumption	
			mt	ODP tonnes
Other	Wood imitation	25	450	49.5
	Stage I enterprises*	10	423	46.5
Total		**106**	**2,908**	**319.9**

*In 2014 ten enterprises to be converted under stage I had not yet completed their conversion. As of March 2016, four of those enterprises have completed their conversions and the remaining 6 are expected to complete their conversion by September 2016.

33. In addition, one enterprise manufacturing extruded polystyrene (XPS) foam (Phu Vuong Corporation) was identified for the first time with a consumption of 5.5 ODP tonnes of HCFC-22 in 2014. (HCFC consumption of the enterprise has to date not been included in the CP data reports).

RAC manufacturing sector

34. The commercial refrigeration manufacturing sector consists of 71 enterprises. Of these, 59 responded to the sector survey, indicating a consumption of 27.8 ODP tonnes of HCFC-22 used for manufacturing equipment, and (for 32 enterprises) also for servicing equipment for customers on site. However, based on the survey and current trend analysis by the World Bank, the consumption of HCFC-22 used in the refrigeration manufacturing sector is estimated at 38.8 ODP tonnes.

35. The air-conditioning (AC) manufacturing sector consists of five AC enterprises with a total consumption of 13.8 ODP tonnes of HCFC-22 in 2014, as shown in Table 4.

Table 4. Distribution of HCFC-22 consumption in the AC manufacturing sector (2014)

Enterprise	Consumption	
	mt	ODP tonnes
Hoa Phat Refrigeration Engineering Co., Ltd	47	2.6
Midea	90	5
Nagakawa	28	1.5
Refrigeration Electrical Engineering (REE) JSC	10	0.6
LG*	76	4.2
Total	**251**	**13.8**

* 100 per cent non-Article 5-owned

HCFC consumption in the refrigeration servicing sector

36. The HCFC-22 consumption in the servicing sector as reported in CP data is 116 ODP tonnes. However, the sector survey conducted during preparation of stage II and further trend analysis by the World Bank indicated the current consumption of HCFC-22 used in the refrigeration servicing sector amounts to 159 ODP tonnes. In addition, HCFC-123 is used to service chillers (1.1 ODP tonnes in 2013 and 0.4 ODP tonnes in 2014).

Proposed activities in stage II of the HPMP

37. The main activities to be implemented during stage II include regulatory actions; conversion of the PU and XPS foam manufacturing sectors; conversion of enterprises in the RAC manufacturing sector; technical assistance (TA) to all manufacturing sectors; assistance to the servicing sector; and implementation and monitoring.

Regulatory actions and monitoring

38. The regulatory component aims to support the conversion of the PU foam sector and facilitate the phase-out of HCFCs in the RAC sector. It will include a ban on import of HCFC-141b contained in pre-blended polyols for the PU foam sector by 1 January 2022; a ban on manufacturing of AC units with HCFC-22 and a ban on import of AC equipment with HCFC-22 by 1 January 2022, safety management

requirements for PU foam enterprises using hydrocarbons; and HCFC import quota support. In addition, the development of technical standards for the safe handling of flammable alternatives (HFC-32, R-290, and cyclopentane) is also proposed.

Activities in the manufacturing sector

PU foam manufacturing sector

39. Viet Nam only consumes HCFC-141b contained in imported pre-blended polyols. The Government of Viet Nam had requested that its eligible funding be considered at 78.36 ODP tonnes, which would include 3.1 ODP tonnes of remaining consumption of (bulk) HCFC-141b eligible for funding. Stage II includes the complete phase-out of the consumption (223.9 ODP tonnes) of HCFC-141b contained in imported pre-blended polyols in the PU foam manufacturing sector, of which 75.26 ODP tonnes are eligible for funding. Forty-four enterprises eligible for funding were identified with a total consumption of 177.3 ODP tonnes that will be converted to cyclopentane (27 enterprises) and reduced HFOs (17 enterprises). The following phase-out activities will be implemented:

(a) Establishment of four blending houses that will assist all enterprises producing continuous roofing panels to convert to pre-blended cyclopentane and training to enterprises;

(b) Conversion to cyclopentane of enterprises producing foam for discontinuous sandwich panels and insulation foam for refrigeration equipment; and

(c) Conversion to HFO-blown technology of remaining enterprises producing foam for sandwich panels, refrigeration and other products.

40. Conversion costs were estimated based on a standard manufacturing line with typical baseline equipment, and based on similar projects funded under the Multilateral Fund and similar enterprises converted under stage I.

41. Table 5 below presents the incremental costs for the conversion of the PU foam manufacturing sector in Viet Nam. Enterprises non-eligible for funding from the Multilateral Fund will be addressed through TA and systems houses support.

Table 5. Total cost for the conversion of the PU foam sector

Application	No. of enter-prises	Technology	mt	ODP tonnes	ICC (US $)	IOC (US $)	Total cost (US $)	CE
Insulated roofing panels	23	c-pentane	1,031.5	113.5	8,547,000	1,650,363	10,197,363	9.89
Sandwich panels	5	c-pentane (above 20 mt) /HFO (below 20 mt)	83.4	9.2	779,195	238,674	1,017,869	12.20
Refrigeration	3*	c-pentane	209.4	23	2,359,500	335,104	2,694,604	12.87
Blocks, spray and in situ	6	HFO	174	19.1	132,114	972,800	1,104,914	6.35
Electrical and solar water heaters	3	HFO	94.1	10.4	519,352	526,209	1,045,561	11.11
Thermoware	4	HFO	19.4	2.1	88,076	108,232	196,308	10.12
Sub-total	**44**	**c-pentane/HFO**	**1,611.8**	**177.3**	**12,425,237**	**3,831,382**	**16,256,619**	10.09

Application	No. of enter-prises	Technology	mt	ODP tonnes	ICC (US $)	IOC (US $)	Total cost (US $)	CE
Ineligible enterprises	27	c-pentane/HFO	423.5	46.6	-	-	-	-
Total cost	**71**	**c-pentane/HFO**	**2,035.0**	**223.9**	**12,425,237**	**3,831,382**	**16,256,619**	**7.99****
Funds requested							**7,112,054**	**9.95*****

* Includes Sanaky, not included in the survey undertaken during preparation of stage I of the HPMP and now proposed to be included in stage I to replace Glory that had gone out of business.
** Includes the phase-out of 46.6 ODP tonnes from ineligible enterprises.
***Based on the request that eligible funding be considered at 78.36 ODP tonnes.

XPS foam manufacturing sector

42. Stage II includes the phase-out of 5.5 ODP tonnes of HCFC-22 used in the manufacturing of XPS foam products at Phu Vuong Corporation, by converting to CO_2 with alcohol/DME/HFO technology. The enterprise has one production line equipped with tandem extrusion; the production process is automated starting from the dosing of the raw materials (polystyrene and additives from bins and blowing agent from cylinders); a twin screw extruder is used for the first extrusion and a single screw for cooling the homogenized plastic, after which, the boards are stacked, packed and transported to the storage area or a warehouse. Incremental costs have been requested at US $822,000 (US $764,170, capital; US $135,007, operating), based on the cost-effectiveness threshold of US $8.22/kg.

Commercial refrigeration manufacturing

43. Given the limitations with the choice of alternative refrigerants (high-GWP, flammability and toxicity) to use in urban areas where end-users are located, stage II proposes to partially address the sector and phase out 16.7 ODP tonnes of HCFC-22 by a combination of conversion at 34 enterprises and TA to all enterprises. HC-290 and, when possible, HFC-32 are proposed as alternatives with an option to select new low-GWP refrigerants when commercially available (possibly R-448A and R-449A).

44. The ICC were calculated based on the proposed standard cost of conversion (as shown in Table 6) and by dividing the 34 enterprises into two groups based on their production (i.e., seven larger enterprises manufacturing a full range of industrial refrigeration equipment and systems, both standardized and made-to-order, and 27 enterprises mainly focused on manufacturing standardized equipment).

Table 6. Proposed standard ICC for conversion of commercial refrigeration manufacturing enterprises

Components	Cost (US$)	
	Group 1	**Group 2**
System, component and process redesign, prototype manufacturing and testing, software for system design for different new refrigerants	70,000	30,000
Sheet metal processing, changes of standard modules	20,000	10,000
Assembly line and area modifications	35,000	30,000
-Charging area modifications to allow use of flammable refrigerants		
-Pressure testing equipment		
-Refrigerant charging equipment		
-Leak detectors		
-Vacuum pumps		
Storage of flammable refrigerants, piping and transfer pumps	30,000	15,000
Prototype manufacturing, trials and testing	30,000	15,000
Quality specification and inspection, verification of performance etc.	15,000	10,000
Process, operation, maintenance and safety training	25,000	10,000
Technical assistance	30,000	20,000
Sub-total	**255,000**	**140,000**

Components	Cost (US$)	
	Group 1	Group 2
Contingency (10%)	25,500	14,000
Total ICC	**280,500**	**154,000**
Number of enterprises	**7**	**27**
Grand total	**1,963,500**	**4,158,000**

45. Actual IOCs are expected to be higher than US $3.80/kg specified in decision 74/50 given the cost of HC-290 and HFC-32 (estimated at US $6.00/kg) and the cost for compressors and other components. In accordance with decision 74/50, an IOC of US$3.80/kg was proposed with the total IOC of US $440,800 for the first group of enterprises and US $760,000 for the second group. The total cost of the conversion of commercial refrigeration manufacturing sector is presented in Table 7.

Table 7. Proposed cost for conversion of commercial refrigeration manufacturing enterprises

Enterprises	HCFC consumption (mt)	ICC	IOC	Total cost (US $)	CE (US $/kg)	Adjusted CE (US $/kg)	Adjusted cost (US $)
Group 1	30	1,963,500	440,800	2,404,300	20.7	19.01	570,375
Group 1 (enterprises with consumption below 20 mt)	86					21.29	1,831,284
Group 2	196	4,158,000	760,000	4,918,000	25.1	21.29	4,172,840
Total	**312**	**6,121,500**	**1,200,800**	**7,322,300**	**23.7**	**21.07**	**6,574,499**
Total funds requested from the MLF	**303***	**n/a**	**n/a**	**n/a**	**n/a**	**21.07**	**6,384,850****

* Given the limitations with the choice of alternative refrigerants it was estimated that only 60 per cent of the identified consumption of 505 mt (27.8 ODP tonnes) could be phased out, i.e., 303 mt.
**Calculated based on the ratio of consumption to be phased out (303 mt) to the total consumption of the enterprises (312 mt), i.e. 97.11 per cent.

AC manufacturing sector

46. Stage II requests funding to convert the four locally-owned enterprises; the fifth, non-eligible enterprise would phase out with its own resources. The alternatives chosen are HFC-32 for REE, Noa Phat and Nagakawa. Midea has four manufacturing lines, two of which manufacture both HCFC-22 and HFC-410A units and are therefore not eligible. Midea will convert its two eligible lines to HC-290, while the other two lines will switch to only manufacturing HFC-410A units (at no cost to the Multilateral Fund). In addition, Midea manufactures some larger AC units for which HC-290 cannot be used; R-410A might be the choice instead, with no funding requested for the conversion associated with the larger units.

47. Table 8 presents the incremental costs for the conversion of the AC manufacturing sector.

Table 8. Investment projects in the AC manufacturing sector

Enterprise	HCFC-22 consumption		ICC (US $)	IOC (US $)	Funds requested (US $)	CE (US $/ kg)
	mt	ODP tonnes				
Hoa Phat Refrigeration Engineering Co., Ltd	47	2.6	410,080	296,100	706,180	15.03
Midea	74.71*	4.1	624,800	470,717	1,095,517	14.66
Nagakawa	28	1.5	373,450	176,400	549,850	19.64
Refrigeration Electrical Engineering (REE) JSC	10	0.6	388,080	63,000	451,080	45.11
LG (non-eligible)**	76	4.2	-	-	-	-
Total	**235.71**	**13**	**1,796,410**	**1,006,217**	**2,802,627**	**11.89**

* The actual consumption is 90 mt, funding is requested only for the lines converting to low-GWP.
** To be converted with its own resources.

Activities in the refrigeration servicing sector

48. Stage II of the HPMP proposes to phase out 352 mt (19.4 ODP tonnes) of HCFC-22 used in the refrigeration servicing sector with a total cost of US $1,659,230 through the following activities:

(a) Training of 50 trainers and 6,000 refrigeration technicians in good practices and on alternatives, and their certification (US $698,400);

(b) Provision of servicing tools to 20 training centres (US $600,000);

(c) HCFC leakage management demonstration for ten selected industrial refrigeration end-users (US $37,800);

(d) Monitoring and evaluation of refrigeration technicians training (US $20,000); and

(e) TA to support effective adoption of HFC-32 technology in the AC sector (Japan, US $233,630).

TA activities

49. Stage II of the HPMP includes TA component with the following activities: workshops for the foam, AC and refrigeration manufacturing enterprises to inform about HPMP objectives; technical consultations to the enterprises; development of technical standards on alternatives; training on safe use of alternatives for technicians of foam and refrigeration manufacturing enterprises; training for between 490 and 630 customs officers; training on licensing system and ODS control to officers from the Ministry of Industry and Trade; and public awareness activities.

Implementation and monitoring activities

50. The PMU will support the NOU, established under the Ministry of Natural Resources and Environment (MONRE), to implement stage II of the HPMP through assistance in establishment of regulations and policies, support to eligible enterprises, update and maintenance of the management information system, monitoring of HCFC import, preparation of reports, organization of awareness trainings for regional government offices and information dissemination on government policies to phase out HCFCs.

Total cost of stage II of the HPMP

51. The total cost of stage II of the HPMP for Viet Nam to be funded through the Multilateral Fund has been estimated at US $20,663,029, as originally submitted (excluding support costs). The proposed phase-out activities will result in the phase-out of 55.3 ODP tonnes of HCFCs representing 25 per cent of the HCFC baseline and 223.9 ODP tonnes of HCFC-141b contained in imported pre-blended polyols with a total cost-effectiveness of US $6.79/kg (or US $12.8/kg based only on the consumption eligible for funding of 126.46 ODP tonnes). Detailed activities and cost are shown in Table 9:

Table 9. Summary of proposed activities and cost of stage II of the HPMP for Viet Nam

Sector	Substance	Total phase-out		Eligible for MLF funding		Funded CE (US $)	Overall CE (US $)	Funds requested (US $)
		mt	ODP tonnes					
PU foam	HCFC-141b	2,035	223.9	712*	78.36*	9.98	3.49	7,112,054
XPS foam	HCFC-22	100	5.5	100	5.5	8.22	8.22	822,000
Commercial refrigeration		303	16.7	303	16.7	21.07	21.07	6,384,850
AC manufacturing		251	13.8	175**	9.6	16.02	11.17	2,802,627
Refrigeration servicing		352	19.4	352	19.4	4.71	4.71	1,659,230
TA and policy		0	0	n/a	n/a	n/a	n/a	752,907
(PMU)		0	0	n/a	n/a	n/a	n/a	1,129,361
Total stage II		**3,041**	**279.3**	**1,642**	**129.56**	**12.58**	**6.79**	**20,663,029**

* Includes 28.18 mt (3.1 ODP tonnes) of (bulk) HCFC-141b remaining consumption eligible for funding
** Excludes non-eligible enterprise LG (non-Article-5 ownership)

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

52. The Secretariat reviewed stage II of the HPMP for Viet Nam in light of stage I (in particular the third and last tranche submitted to the 76th meeting), the policies and 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 2016-2018 business plan of the Multilateral Fund.

Verification

53. The verification confirmed that Viet Nam is implementing a licensing and quota system for imports and exports of HCFCs and that consumption of HCFCs in 2015 was in compliance with the Montreal Protocol and the consumption targets established under stage I.

Overarching strategy for stage II

54. The Secretariat noted the comprehensive strategy proposed by the Government of Viet Nam for stage II of the HPMP, with an associated phase-out of 3.10 ODP tonnes of HCFC-141b, 55.33 ODP tonnes of HCFC-22 and 223.90 ODP tonnes of HCFC-141b contained in imported pre-blended polyols (noting that only 75.26 ODP tonnes are eligible for funding). Through implementation of stage II, the Government has committed to achieve a 35 per cent reduction on the HCFC baseline for compliance by 2020.

Discrepancy on consumption data in survey and CP data

55. The Secretariat noted that the surveys conducted to prepare stage II of the HPMP indicated a different sectoral consumption than that specified in the CP report. In particular, consumption of HCFC-22 in the RAC manufacturing and servicing sectors; the consumption of HCFC-22 used by the recently identified XPS foam enterprise; and the consumption of HCFC-141b contained in imported pre-blended polyols. As a result, it was agreed that the Government would update the 2014 CP report in light of the improved information contained in the submission.

Deduction of HCFC consumption associated with foreign-owned enterprises

56. Based on the information provided in the project proposal, five AC manufacturing enterprises had a consumption of HCFC-22 in 2009 and 2010, the years where the HCFC baseline for compliance was established. Since then these enterprises stopped manufacturing AC units based on HCFC-22 refrigerants as shown in Table 10.

Table 10. AC manufacturing enterprises no longer producing AC units with HCFC-22

Enterprise	Ownership	Refrigerant	Average 2008-2009 production (units)	Year when production stopped	Notes
Carrier Viet Nam	Foreign	HCFC-22	150,000	2012	AC units are now being produced by Midea (China)
Sanyo (Aqua)	Foreign	HCFC-22, HFC-410A	30,000	2011-2013	Resumed AC production in 2015 using HFC-410A
GREE Viet Nam	Joint	HCFC-22, HCFC-410A	12,780	2011 or 2012	Fully exited AC production
Nikkokendo	Joint	HCFC-22		2011	Fully exited AC production
Samsung Vina	Joint	HCFC-22	9,000	2012	From 2015 AC units would be produced by Midea, but not yet been implemented
SAMURAI	Local	HCFC-22	3,000	2011	Fully exited AC production

57. While no information was provided on the consumption of HCFC-22 by the enterprises in 2009 and 2010, the Secretariat estimated that consumption to be 190 mt (10.45 ODP tonnes). As the consumption of those AC enterprises was taking into account in the calculation of the starting point for sustained aggregate reduction, but the enterprises are no longer consuming HCFC-22, the Secretariat proposed deducting only the consumption associated with the non-Article 5 ownership of those enterprises from the remaining HCFC-22 consumption eligible for funding in accordance with decision 33/57. The World Bank, however, disagreed with the proposed deduction and indicated that the consumption associated with the six enterprises has been taken up by other enterprises and industry; furthermore, upon approval of stage I of the HPMP when remaining eligible consumption was recorded in Appendix 2A of the Agreement with the Executive Committee, the consumption from those non-funded, non-Article 5 owned AC enterprises was not deducted.

Proposed activities in stage II

PU foam manufacturing sector

58. The overall calculation of the incremental cost of the PU foam sector was based on the information gathered from 44 foam enterprises that participated and responded to the survey undertaken for the preparation of stage II. Based on the survey, "typical" manufacturing lines with baseline equipment required for each of the application produced (i.e., roof and sandwich panels; insulation foam for refrigeration equipment; blocks, spray and in situ; electrical and solar water heaters; and thermoware), were proposed. "Standard" costs of major equipment items were proposed based on the previous experience in conversion of similar production lines in Viet Nam and other countries.

59. During the project review process, the Secretariat sought independent advice from technical foam experts, and embarked on several discussions with the World Bank. The discussions focussed on *inter alia* whether the data gathered from the 44 surveyed enterprises was representative for the entire foam sector in Viet Nam, and on the "standard" costs proposed for several of the equipment items in the

"typical" manufacturing lines. Based on those discussions, adjustments to the "standard" costs of several equipment items were agreed. Specifically:

(a) For insulation roofing and electric and solar water heaters applications, costs for TA and safety audits were rationalized by US $269,500 and US $10,000, respectively;

(b) For sandwich panels by enterprises with consumption below 20 mt, and electric and solar water heaters applications converting to reduced-HFOs, costs for retrofit foaming machine were removed as no changes to dispensers are needed; thus, cost per production line was adjusted from US $64,919 to US $59,400;

(c) For the enterprise manufacturing sandwich panels with consumption above 20 mt, the cost of the production line was adjusted from US $519,519 to US $360,519, given that only one of the of three production lines at the enterprise is eligible but the funds for pre-mixing units and plant safety related to the three lines; and

(d) For two enterprises producing insulation foam for refrigeration equipment, safety costs for the enterprise with a consumption of 42 mt were considered at US $205,000, while for the enterprise with a consumption of 18 mt, were considered at US $120,000. Accordingly, the cost of the production line was adjusted from US $786,500 to US 737,000 for the larger enterprise and to $643,500 for the smaller enterprise.

60. The World Bank also confirmed that the 25 enterprises manufacturing imitation wood products will be converted without the assistance from the Fund, noting most of them are foreign-owned; and that the Government of Viet Nam has requested to include the conversion of Sanaky under stage I of the HPMP.

61. The agreed capital costs for the conversion of the foam enterprises are summarized in Table 11.

Table 11. Agreed incremental capital costs for the foam sector

Application	Enterprises (and lines)	Technology	Consumption		Agreed ICC (US $)
			mt	> 20 mt	
Insulation roofing	23 (35)	c-pentane	1,031.5	7.4%	8,277,500
Sandwich panels < 20 mt	4 (4)	HFO	26.4	100.0%	237,600
Sandwich panels > 20 mt	1 (3*)	c-pentane	57.0	0.0%	360,519
Refrigeration	2 (4**)	c-pentane	60.0	30.0%	1,380,500
EWH and SPH	3 (8)	HFO	94.1	36.3%	465,200
Thermoware	4 (4)	HFO	19.4	100.0%	88,076
Spray, block and in-situ foam	6 (6)	HFO	174.0	65.3%	132,114
Total	**43 (64)**	**n/a**	**1,462.4**	**n/a**	**10,941,509**

* Only one production line was established before 21 September 2007.
** Sanaky was initially submitted but removed following discussions between the Secretariat and the World Bank.

62. Discussions between the Secretariat and the World Bank also addressed issues related to the IOC requested for the various foam applications. For the HFO technology, IOC were agreed at US $5.90/kg as submitted and US $5.00/kg for enterprises with a consumption of HCFC-141b below and above 20 mt, respectively (in line with decision 74/50). However, no agreement on IOCs was reached for cyclopentane-blown technology, where US $2,147,695 had been requested mainly due to an increase in foam density of 4.3 per cent. Based on technical advice received from three technical experts, the Secretariat concluded that the requested increase in density for this conversion was not incremental, as it could be addressed through the formulation of the polyol systems. On this basis, the Secretariat proposed, on an exceptional basis, to set the IOC for the conversion to cyclopentane to zero, notwithstanding the fact that with no increase in density operating savings of US $367,520 would be realized.

63. As the consumption of 160.9 ODP tonnes of HCFC-141b contained in imported pre-blended polyols of the 43 foam enterprises addressed in stage II of the HPMP is higher than the remaining consumption eligible for funding of 75.26 ODP tonnes (46.8 per cent of the phase-out), the eligible funding would be US $5,522,397 on the basis of the agreed ICC and zero IOC proposed by the Secretariat, or US $6,464,900 based on IOC of US $1.87/kg of HCFC-141b as proposed by the World Bank.

64. In light of the fact that Viet Nam's consumption of HCFC-141b in imported pre-blended polyols is substantially higher than its remaining eligible consumption and the large number of enterprises in the foam sector still using those polyols, the Government had requested flexibility to use the funding as best needed to assist the conversion of the entire sector to low-GWP alternatives. In assessing this request, the Secretariat noted that the funding level was determined only on the levels of consumption and enterprises that were eligible for funding, and that the flexibility requested by the Government could be provided on the understanding that enterprises established prior to the cut-off date will be prioritized, and that it would only be used in the rare cases when there was remaining funding and was needed to ensure compliance of the newer enterprises with the ban on HCFC-141b both in bulk and in pre-blended polyols.

XPS foam manufacturing sector

65. Discussions between the Secretariat and the World Bank centered on the need to replace the existing DME/alcohol metering pump system and introduce safety equipment to address flammability, as the XPS foam enterprise was already using a flammable substance (alcohol); and on rationalizing on costs related to equipment and technical assistance activities. With regard to IOC, discussion centered on the amounts of foam produced and lost during production, losses associated with blowing agents, and the costs of raw materials (particularly HCFC-22 and HFO). Taking into account the above and reducing cost of other equipment and TA component, the total ICC were agreed at US $540,000 (consisting of US $400,000 for the conversion of the baseline equipment, US $120,000 related to plant safety, and US $20,000 for technical assistance, training and trials and safety certification); while the total IOC were agreed at US $73,568 (based on a price of US $3.00/kg for HCFC-22 and US $16.27/kg for HFOs). Therefore, the agreed overall cost of the conversion amounted to US $613,568, with a cost-effectiveness value of US $6.14/kg.

Refrigeration manufacturing sector

66. Stage II is proposing to phase-out only the HCFC consumption used by the refrigeration manufacturing enterprises eligible for funding (i.e., enterprises that were established prior to September 2007), without indicating the approach that would be followed for other enterprises that were not eligible for funding. On this basis, the Secretariat pointed to potential challenges associated with this approach (i.e., market distortion, the difficulty in ensuring the sustainability of the conversions), and suggested the Government may consider phasing out the entire sector.

67. Following further discussion, on behalf of the Government of Viet Nam the World Bank proposed phasing out the entire sector, noting that additional time may be needed to complete such phase-out, given the state of alternative technologies in Viet Nam. Accordingly, it was proposed a stepwise approach so that enterprises included in the original submission could be converted first and the enterprises with technology limitations will be addressed later, thus benefiting from the experience and lessons learned. If during project implementation the Government determines that additional time is needed to complete the transition to low-GWP refrigerants of enterprises with technology limitations, a request for the extension of the implementation period could be submitted, noting that Viet Nam could submit stage III of its HPMP prior to the completion of stage II.

68. All the refrigeration manufacturing enterprises would convert only to low-GWP alternative refrigerants (including but not limited to HC-290, HFC-32, ammonia, R-744); however, the technology selection for a particular enterprise would only be determined during implementation. On this basis, the Secretariat proposed that the most meaningful approach for calculating the incremental cost for the conversion of the enterprises was to use an average cost-effectiveness of US $15.00/kg, and a total sector consumption of 607.71 mt (33.42 ODP tonnes) of HCFC-22 estimated on the basis of the information provided by the 59 surveyed enterprises that responded to the survey, which are representative of the 71 enterprises in the sector. On this basis, the total funding for the sector would be US $9,115,678. The Secretariat also noted that if during project implementation, any of the enterprises included in stage II were found to be ineligible under the policies of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), the associated funding (calculated at US $15.00 per kg of HCFC-22 used) would be returned to the Multilateral Fund. Further to discussions on this matter and the flexibility in the funds utilization as in the case of the PU foam, the World Bank agreed with the approach proposed by the Secretariat noting that funds associated with any manufacturing enterprises found to be ineligible would be returned to the Fund.

AC manufacturing sector

69. With regard to the sustainability of the proposed conversions to HC-290 and HFC-32 technologies in the AC manufacturing sector, given that manufacturing of HFC-410A-based AC units is already prevalent in Viet Nam and the substantial imports of such units, the World Bank indicated it expected the successful introduction of these technologies given the change to HFC-32 in the AC manufacturing sectors in Japan and Thailand and the technical support to be provided by Japanese industry to the three enterprises converting to HFC-32. In addition, the World Bank noted that HC-290 and HC-32 will be used in smaller fixed-speed AC units whereas the HFC-410A units entering the Viet Nam market use inverter technology, and which should support the sustainability of the conversions.

70. With regard to the financial viability of the AC enterprises, the World Bank indicated that technical and financial appraisal was done for each enterprise to be converted with the assistance from the Fund as a precondition for a sub-grant agreement between the enterprise and country. The World Bank confirmed that the four enterprises are well-known in the local market and, aside from manufacturing AC units, most of them produce a range of household appliances.

71. With regard to the incremental costs, discussions between the Secretariat and the World Bank focussed on the request for equipment and training related to installation of the AC units and those needed for servicing the AC units post-installation. On this matter, it was agreed to consider the costs related to installation of the units as part of the conversion, while the costs related to servicing of the units be considered under the servicing sector with a corresponding reduction in the remaining consumption of HCFC-22 calculated at US $4.80/kg. Accordingly, installation costs were agreed at US $75,000, while those for training of in-house technicians and dealers (i.e., servicing sector) were agreed at US $84,600, resulting in a reduction of 17.6 mt (0.97 ODP tonnes) of HCFC-22 from the remaining consumption eligible for funding.

72. The costs for Midea were agreed at US $782,017 based on adjustments related to: model redesign as it could be provided from Midea China; charging equipment (i.e., US $52,000 instead of US $65,000); and excluding new vacuum pumps as they are not required for conversion to HC-290. The costs of the other three enterprises were also agreed based on adjustments to costs related to the model redesign including software; testing for rating and labeling; and technical assistance. However, no agreement was reached on the three HFC-32 charging machines where the Secretariat proposed US $155,000 as compared to US $195,000 proposed by the World Bank.

73. In summary, the incremental costs for the conversion of the four AC manufacturing enterprises proposed by the Secretariat amount to US $2,100,267, while the costs proposed by the World Bank amount to US $2,144,267.

Refrigeration servicing sector

74. Upon discussions with the World Bank, the cost of the refrigeration sector was adjusted by US $69,400 (i.e., removing contingency costs), resulting in a funding level of US $1,620,200, with an associated phase-out of 337.50 mt (18.6 ODP tonnes) of HCFC-22.

TA and PMU

75. During the project review process, clarifications were sought on: the potential duplication of the training workshops for the foam, AC and refrigeration enterprises on the objectives of stage II of the HPMP of those organized under the PMU; the need for international and national technical consultant services under TA noting that the cost for technology transfer, training, and other TA had been included in the proposed conversions of enterprises; the safety trainings to be provided under the PMU as compared to training for technicians of the foam and refrigeration manufacturing enterprises; the management information system (MIS) and public awareness activities as compared to those activities undertaken under the PMU and the institutional strengthening project.

76. Despite constructive discussions where clarification was provided and reductions in costs on some of TA activities were proposed, no agreement was reached on the costs of these components of the HPMP. Noting that the level of funding for stage II of the HPMP is approximately twice that of stage I, and that funding for TA and PMU of comparable HPMPs (e.g., stage II of the HPMP for Brazil, and stage I of the HPMP for Thailand) were provided at 6.00 per cent of the investment costs, the Secretariat proposed a level of 7.00 per cent for the TA and PMU (i.e., US $1,333,970). However, the World Bank proposed a level of 8.86 per cent, similar to that for stage II of the HPMP for Indonesia, noting that four sectors are covered, including one particularly challenging sector in terms of alternative technology and production patterns, and another where 66 per cent of the consumption is not eligible for funding; three sectors involve a complete ban of HCFC use; that the majority of the enterprises are SMEs; and that stage II implementation would last at least five years.

Summary of proposed costs for stage II of the HPMP

77. Despite a number of constructive discussions, a final agreement on the funding level of stage II of the HPMP between the Secretariat and the World Bank could not be reached. Table 12 summarizes the Secretariat's recommendation and the proposal of the World Bank.

Table 12. Funding levels of stage II of the HPMP proposed by the Secretariat and the World Bank

Sector	Phase-out		Eligible phase-out		Costs (US $)			CE* (US $/kg)
	mt	ODP	mt	ODP	Secretariat	World Bank	Difference	
AC sector (including installation kits)	251.0	13.8	175.0	9.6	2,100,267	2,144,267	(44,000)	12.00/12.25
AC sector servicing	17.6	1.0	17.6	1.0	84,600	84,600	-	4.80
Refrigeration manufacturing	607.7	33.4	607.7	33.4	9,115,678	9,115,678	-	15.00
XPS foam	100.0	5.5	100.0	5.5	613,568	613,568	-	6.14
Servicing	337.5	18.6	337.5	18.6	1,620,200	1,620,200	-	4.80
Sub-total HCFC-22	1,313.9	72.3	1,237.9	68.1	13,534,313	13,578,313	(44,000)	10.93/10.97
Pre-blended polyol	2,035.0	223.9	684.2	75.3	5,522,397	6,464,900	(942,503)	8.07/9.45
TA and PMU					1,333,970	1,775,829	(441,859)	
Total	**3,348.9**	**296.2**	**1,922.1**	**143.4**	**20,390,679**	**21,819,042**	**(1,428,362)**	**10.61/11.35**

* Based on eligible phase-out. Overall cost-effectiveness including non-eligible phase-out is US $6.09/kg based on the Secretariat's proposed costs and US $6.52/kg based on the World Bank's proposal.

78. Excluding the phase-out of HCFC-141b contained in pre-blended polyols, implementation of stages I and II of the HPMP will result in the phase-out of 126.2 ODP tonnes of HCFCs, representing 57.0 per cent of the HCFC baseline for compliance of 221.2 ODP tonnes. Implementation of the two

stages of the HPMP will also result in the complete phase-out of HCFC-141b contained in imported pre-blended polyols (i.e., a consumption which is not reported under Article 7 of the Montreal Protocol). With the proposal to phase-out the refrigeration manufacturing sector, the Government of Viet Nam would phase out 72.3 ODP tonnes (plus 223.9 ODP tonnes of HCFC-141b in pre-blended polyols) rather than the 55.3 ODP tonnes originally proposed. The Secretariat encouraged the Government of Viet Nam to consider a higher level of commitment than 35 per cent by 2020. The World Bank indicated that stage II will extend to at least 2021 and that it would be extremely difficult for Viet Nam to have a commitment in its Agreement that requires levels of consumption lower than that required to meet its 2020 obligations.

Impact on the climate

79. The conversion of the XPS and remaining PU foam manufacturing enterprises in Viet Nam would avoid the emission into the atmosphere of some 1,632 thousand tonnes of CO_2 equivalent per year, as shown in Table 13.

Table 13. Impact on the climate PU foam projects

Substance	GWP	Tonnes/year	CO_2-eq (tonnes/year)
Before conversion			
HCFC-141b	725	2035.00	1,475,375
HCFC-22	1810	100.00	181,000
Total before conversion			1,656,375
After conversion			
Cyclopentane, HFO, water	~20	1221.00	24,420
CO_2	1	16.95	17
DME	6	16.95	102
HFO	6	25.42	153
Impact			**(1,631,684)**

80. Table 14 summarizes the climate impact in the AC sector calculated using the Multilateral Fund Climate Impact Indicator, indicating that the conversions would avoid the emission to the atmosphere of some 357 thousand tonnes of CO_2 equivalent per year. In light of the range of equipment manufactured in the refrigeration manufacturing sector, and that the selection of low-GWP technology may vary by enterprise, the climate benefits of the conversions in the refrigeration manufacturing sector are estimated based on the emission reductions of HCFC-22, resulting in an additional avoidance of some 1,100 thousand tonnes of CO_2 equivalent per year.

Table 14. Climate impact of AC and ICR conversion projects from HCFC-22 technology

Sector/Enterprise		AC sector				ICR**
		Midea*	Nagakawa*	REE*	Hoa Phat*	
Baseline technology		HCFC-22	HCFC-22	HCFC-22	HCFC-22	HCFC-22
Alternative technology		HC-290	HFC-32	HFC-32	HFC-32	Low-GWP***
Charge of HCFC-22 (kg/unit)		1.00	1.60	3.30	1.15	n/a
Yearly consumption (mt)		103	28	10	47	607
Yearly output per production line (unit)		102,827	17,400	3,000	40,816	n/a
Number of production line/enterprise		1	1	1	1	70
Export to non-A5 countries (%)		0.0	0.0	0.0	0.0	0.0
Cooling capacity (KW)*		3.0	5.0	14.0	4.0	n/a
Life span of equipment		12	12	12	12	15
Baseline	Direct impact	186,693	50,546	17,974	85,221	1,098,670
	Indirect impact	893,366	252,010	121,633	472,921	n/a
	Sub-total	1,080,059	302,556	139,607	558,142	1,098,670
After conversion	Direct impact	217	16,793	5,972	28,313	607
	Indirect impact	870,547	238,495	115,164	447,560	n/a
	Sub-total	870,764	255,288	121,136	475,873	607

Sector/Enterprise		AC sector				ICR**
		Midea*	Nagakawa*	REE*	Hoa Phat*	
Reduction	Direct impact	186,476	33,753	12,002	56,908	1,098,063
	Indirect impact	22,819	13,515	6,469	25,361	n/a
	Sub-total	209,295	47,268	18,471	82,269	1,098,063
Percentage of reduction (%)		19.38	15.62	13.23	14.74	99.94
Total emission reduction		1,455,366				

* calculated using MCII for a 7-year lifetime of equipment
**only calculated the direct impact from refrigerant emission
***HC-290, HFC-32, NH3, CO_2, possibly HFO

81. The proposed activities in the servicing sector, which include better containment of refrigerants through training and provision of equipment, will reduce the amount of HCFC-22 used for refrigeration servicing. Each kilogramme of HCFC-22 not emitted due to better refrigeration practices results in a savings of approximately 1.8 CO_2-equivalent tonnes. Although a calculation of the impact on the climate was not included in the HPMP, the activities planned by Viet Nam, in particular its efforts to promote low-GWP alternatives, refrigerant recovery and reuse, indicate that the implementation of the HPMP will reduce the emission of refrigerants into the atmosphere therefore resulting in benefits on the climate. However, at this time, a more accurate quantitative assessment on the impact on climate cannot be conducted. The impact might be established through an assessment of implementation reports by, *inter alia*, comparing the levels of refrigerants used annually from the commencement of the implementation of stage II of the HPMP, the reported amounts of refrigerants being recovered and recycled, the number of technicians trained and the HCFC-22 based equipment being retrofitted.

2016-2018 draft business plan of the Multilateral Fund

82. The total level of funding and amounts of HCFCs to be phased out according to the 2016-2018 business plan of the Multilateral Fund are US $6.625 million and 70.4 ODP tonnes, respectively. The level of funding requested for the implementation of stage II of the HPMP for the period 2016 to 2018 is US $5.18 million (excluding support cost) as originally submitted, US $1.44 million below the amount in the business plan between 2016 and 2018.

Draft Agreement

83. At the time of finalizing this document, the draft Agreement between the Government of Viet Nam and the Executive Committee was being discussed with the World Bank. The outcome of those discussions may be communicated via an addendum to this document prior to the 76th meeting, as appropriate.

Concluding remark by the Secretariat

84. Decision 20/15 specifies that no project proposals should be submitted to the Committee until agreement has been reached on the costs required to implement the project, and that in such cases the underlying basis of the disagreement should be presented to the Executive Committee for its consideration. This document is presented in accordance with that decision. Notwithstanding that an agreement on costs had not been reached, the Secretariat is seeking advice from the Executive Committee on the difference between the costs proposed by the Secretariat (US $20,390,679) and the costs proposed by the World Bank (US $21,819,042) (i.e., a difference of US $1,428,362). The Secretariat notes that Viet Nam's current level of HCFC consumption is 3 per cent below the allowable level of consumption under the Protocol, and thus there is a need to continue implementing phase-out activities, and that a comprehensive proposal that would introduce low-GWP alternatives had been submitted.

85. On this basis, the Secretariat could not provide a recommendation to the Executive Committee. However, to facilitate discussion during the meeting, the Executive Committee may wish to consider the text below as the basis for a recommendation if stage II of the HPMP for Viet Nam were to be approved:

(a) Approving, in principle, stage II of the HCFC phase-out management plan (HPMP) for Viet Nam for the period 2016 to [2022] to reduce HCFC consumption by [35] per cent of its baseline, in the amount of US $[20,390,679][21,819,041] plus agency support costs of US $[X] for the World Bank and US $233,630 plus agency support costs of US $30,372 for Japan;

(b) Noting that the Government of Viet Nam has committed to reducing HCFC consumption by [35] per cent in 2020[, and [X] per cent by 202[2]];

(c) Noting the commitment of the Government of Viet Nam to issue a ban on:

(i) Imports of HCFC-141b contained in imported pre-blended polyols by 1 January 2022;

(ii) Imports and manufacture of HCFC-22 air-conditioning units by 1 January 2022;

(iii) Imports and manufacture of HCFC-22 refrigeration manufacturing equipment by the completion of stage II;

(d) Noting that low-global warming potential alternatives may not yet be available for some applications in the refrigeration manufacturing sector and, if during implementation the Government of Viet Nam determines that additional time is needed to complete the transition to low-GWP for applications with technology limitations, the implementation period of stage II could be extended and, in such case, it is understood that Viet Nam could submit its stage III proposal prior to the completion of stage II;

(e) Noting that the remaining consumption of 75.26 ODP tonnes of HCFC-141b contained in imported pre-blended polyols eligible for funding is lower than the consumption of 223.9 ODP tonnes in 2014, and further noting the ban on imports of this consumption by 1 January 2022, agreeing, on an exceptional basis, to provide flexibility to the Government of Viet Nam to assist Article 5-owned enterprises established after the cut-off date in the foam sector given that the funding eligibility was determined only by the consumption of Article-5-owned enterprises established prior to the cut-off date, and on the understanding that:

(i) The Government would prioritize assistance to enterprises established prior to the cut-off date; and

(ii) This flexibility would only be used if needed to ensure compliance with the ban on HCFC-141b both in bulk and in pre-blended polyols;

(f) Deducting 143.3 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding in Viet Nam;

(g) [Deducting an additional [10.58] ODP tonnes of HCFC-22 associated with non-Article 5-owned enterprises from the remaining HCFC consumption eligible for funding in Viet Nam;] and

(h) Approving the first tranche of stage II of the HPMP for Viet Nam, and the corresponding tranche implementation plans, at the amount of US $[X], consisting of US $[X] plus agency support costs of US $[X] for the World Bank, and US $ [X] plus agency support costs of US $[X] for Japan.

RECOMMENDATION

86. Pending.

Annex I

POSSIBLE TEXT TO BE INCLUDED IN THE UPDATED AGREEMENT BETWEEN THE GOVERNMENT OF VIET NAM 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)

15. This updated Agreement supersedes the Agreement reached between the Government of Viet Nam and the Executive Committee at the **71st** meeting of the Executive Committee.

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2011	2012	2013	2014	2015	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	n/a	n/a	221.2	221.2	199.08	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	n/a	n/a	221.2	221.2	199.08	n/a
2.1	Lead IA (World Bank) agreed funding (US $)	3,054,423	0	5,663,016	0	**407,581***	**9,125,020**
2.2	Support costs for Lead IA(US $)	229,082	0	424,726	0	**30,569**	**684,377**
3.1	Total agreed funding (US $)	3,054,423	0	5,663,016	0	**407,581**	**9,125,020**
3.2	Total support cost (US $)	229,082	0	424,726	0	**30,569**	**684,377**
3.3	Total agreed costs (US $)	3,283,505	0	6,087,742	0	**438,150**	**9,809,397**
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)						0
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)						167.15
4.2.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)						0
4.2.2	Phase-out of HCFC-123 to be achieved in previously approved projects (ODP tonnes)						0
4.2.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)						0.16
4.3.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)						**53.9**
4.3.2	Phase-out of HCFC-141b to be achieved in previously approved projects (ODP tonnes)						0
4.3.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)						**0**
4.4.1	Total phase-out of HCFC-141b contained in imported pre-blended polyols agreed to be achieved under this Agreement (ODP tonnes)						89.30
4.4.2	Phase-out of HCFC-141b contained in imported pre-blended polyols to be achieved in previously approved projects (ODP tonnes)						0
4.4.3	Remaining eligible consumption for HCFC-141b contained in imported pre-blended polyols (ODP tonnes)						75.26

* **Funds associated with Glory withdrawn from stage I.**