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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Seventy-seventh Meeting
Montreal, 28 November - 2 December 2016

PROJECT PROPOSALS: MALAYSIA

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, fourth tranche) UNDP
- HCFC phase-out management plan (stage II, first tranche) UNDP

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Malaysia

(I) PROJECT TITLE	AGENCY	MEETING APPROVED	CONTROL MEASURE
HCFC phase-out plan (Stage I)	UNDP (lead)	65th	15% by 2016

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2015	420.1 (ODP tonnes)
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(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2015	
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22				59.0	239.4				298.4
HCFC-123				0.6	0.7				1.3
HCFC-141b		117.8				0.9			118.7
HCFC-225						0.1			0.1

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	515.8	Starting point for sustained aggregate reductions:	515.76
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	111.85	Remaining:	403.91

(V) BUSINESS PLAN		2016	Total
UNDP	ODS phase-out (ODP tonnes)	5.2	5.2
	Funding (US \$)	515,000	515,000

(VI) PROJECT DATA			2011	2012	2013	2014	2015	2016	Total
Montreal Protocol consumption limits			n/a	n/a	515.76	515.76	464.18	464.18	n/a
Maximum allowable consumption (ODP tonnes)			n/a	n/a	515.18	515.76	464.18	438.40	n/a
Agreed funding (US\$)	UNDP	Project costs	5,000,000	0	3,628,723	0	817,452	141,295	9,587,470
		Support costs	375,000	0	272,154	0	61,309	10,597	719,060
Funds approved by ExCom (US\$)	UNDP	Project costs	5,000,000	0	3,628,723	0	817,452	0	9,446,175
		Support costs	375,000	0	272,154	0	61,309	0	708,463
Total funds requested for approval at this meeting (US\$)		Project costs						141,295	141,295
		Support costs						10,597	10,597

Secretariat's recommendation:	For blanket approval
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PROJECT DESCRIPTION

1. On behalf of the Government of Malaysia, UNDP, as the designated implementing agency, has submitted to the 77th meeting a request for funding for the fourth and final tranche of stage I of the HCFC phase-out management plan (HPMP), at the amount of US \$141,295, plus agency support costs of US \$10,597.¹ The submission includes a progress report on the implementation of the third tranche, the verification report on HCFC consumption and the tranche implementation plan for 2016 to 2017.

Background

2. The Agreement between the Government of Malaysia and the Executive Committee was updated at the 75th meeting to reflect an additional reduction of 8.83 ODP tonnes of HCFC-22 associated with the reallocation of savings of US \$722,952 from the foam sector to expand activities in the refrigeration servicing sector and redistribution of funding between third and fourth tranches as per decision 75/61.

Report on HCFC consumption

HCFC consumption

3. The Government of Malaysia reported a consumption of 418.50 ODP tonnes of HCFC in 2015, which was 19 per cent below the baseline of 515.76 ODP tonnes and 9.9 per cent below the maximum allowable consumption established by the Agreement between the Government and the Executive Committee. The 2011-2015 HCFC consumption is shown in Table 1.

Table 1. HCFC consumption in Malaysia (2011-2015 Article 7 data)

HCFC	2011	2012	2013	2014	2015	Baseline
Metric tonnes (mt)						
HCFC-22	6,167.26	7,635.02	5,355.20	5,913.75	5,425.28*	6,355.19
HCFC-21	0.00	0.00	0.00	0.00	0.00	18.60
HCFC-121	0.17	0.00	0.00	0.00	0.00	0.00
HCFC-123	33.70	64.29	14.95	72.93	65.48	56.65
HCFC-141	80.0	0.00	0.00	0.00	0.00	13.38
HCFC-141b	1,242.06	2,869.16	1,321.08	1,239.97	1,079.04	1,477.61
HCFC-142b	1.80	0.00	86.74	4.47	0.00	12.10
HCFC-225	1.08	1.18	0.58	0.00	1.52	1.11
Total (mt)	7,526.07	10,569.65	6,778.55	7,231.12	6,571.32	7,934.74
ODP tonnes						
HCFC-22	339.20	419.93	294.54	325.26	298.39	349.54
HCFC-21	0.00	0.00	0.00	0.00	0.00	0.74
HCFC-121	0.01	0.00	0.00	0.00	0.00	0.00
HCFC-123	0.67	1.29	0.30	1.46	1.31	1.13
HCFC-141	5.60	0.00	0.00	0.00	0.00	0.94
HCFC-141b	136.63	315.61	145.32	136.40	118.69	162.54
HCFC-142b	0.12	0.00	5.64	0.29	0.00	0.79
HCFC-225	0.08	0.08	0.04	0.00	0.11	0.08
Total (ODP tonnes)	482.30	736.90	445.83	463.40	418.50	515.76

*In accordance with an email to the Ozone Secretariat on 19 October 2016, corrected value to reflect the export of 29.28 mt of HCFC-22 that was not originally captured in the Ozone Secretariat's reported value.

¹ As per the letter of 30 September 2016 from the Ministry of Natural Resources and Environment of Malaysia to the Secretariat.

4. In 2013 and 2014 HCFC consumption was already below the baseline level by 14 and 10 per cent as a result of the conversion of 13 polyurethane (PU) foam enterprises, control measures taken by the Government of Malaysia and inflow of imported HCFC-free refrigeration and air-conditioning (RAC) equipment. The minor growth in HCFC consumption in 2014 relative to 2013 was due to additional imports in anticipation of the 2015 control measure. Approximately 39 ODP tonnes of HCFC-141b contained in pre-blended polyols was exported to Viet Nam in 2015.

Verification report

5. The verification report confirmed that the Government is implementing a licensing and quota system for HCFC imports and exports and that the total consumption of HCFCs for 2015 was 418.50 ODP tonnes.

Country programme (CP) implementation report

6. The Government of Malaysia reported HCFC sector consumption data under the 2015 CP implementation report of 418.5 ODP tonnes, which differed from the consumption reported under Article 7 of the Montreal Protocol (420.11 ODP tonnes). On 19 October 2016 the Government of Malaysia clarified to the Ozone Secretariat that 300.0 ODP tonnes (5,454.56 mt) of HCFC-22 were imported in 2015 and 1.6 ODP tonnes (29.28 mt) were exported. Therefore, Malaysia's consumption of HCFC-22 in 2015 was 298.4 ODP tonnes (5,425.28 mt), and its national consumption was 418.50 ODP tonnes. In addition, the Secretariat noted that the consumption of HCFC-142b in 2013 and of HCFC-225 in 2012 and 2013 was reported to be zero under the CP report while imports of those substances were reported under Article 7 of the Montreal Protocol reports. UNDP clarified that this difference was because CP data was reported earlier than under Article 7 when the final, verified data was still being produced by the Statistics Department; the Article 7 data reflected the final, verified data. The Government of Malaysia corrected the CP data.

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

Legal framework

7. The existing licensing and quota system for HCFC import established by the Department of Environment (DOE) was enhanced in 2014 by adding the licensing of HCFC re-exports.

8. A ban on the establishment and expansion of new HCFC-based manufacturing capacities as of 1 January 2013 was issued. The prohibition on manufacturing, assembly and import of HCFC-based air-conditioning (AC) units with a capacity up to 2.5 horse power (HP), and an update to regulations to ensure proper refrigerant handling during servicing and proper disposal of HCFC-based equipment are under review by the Attorney General Chamber and approval is anticipated by the end of 2016. The Energy Commission of Malaysia, which is the permit issuing agency on the importation of AC equipment, has ceased issuing permits for the import of HCFC-based air-conditioners (2.5 HP and lower) since January 2016.

9. Three hundred thirty-one customs officers were trained with 60 to 80 to receive training annually and 15 refrigerant identifiers were purchased.

Foam manufacturing sector

10. All thirteen PU foam manufacturers included in stage I had completed their conversions to cyclopentane, resulting in the phase-out of 860 mt (94.6 ODP tonnes) of HCFC-141b. Through the technical assistance (TA) programme four local systems houses had customized at least one low-GWP formulation and shared their experiences with downstream clients.

Refrigeration servicing sector

11. A total of 8,430 technicians have been trained to date. In addition, 82 trainers were certified as Master Trainers; a training manual for technicians in the RAC sector was developed and distributed, with the Malay language version to be distributed by the end of 2016 or early 2017; the technicians' certification programme was updated and a mandatory, online certification programme for technicians using controlled refrigerants launched during the Ozone Day celebration on 29 September 2016; 30 recovery units and service tools were procured and distributed to 30 selected Authorised Training Centres (ATC); and six mini-reclaim units for reclaim centres are in the process of being procured with delivery expected by the end of the year.

12. The pilot project to replace 78 small-size HCFC-22 based AC units by HFC-32 based units has been completed at two demonstration sites (University Kuala Lumpur and the Environmental Institute of Malaysia). At the 75th meeting, funding was reallocated to the pilot incentive programme to introduce CO₂-based systems in the industrial and commercial refrigeration sector. A meeting to review proposals for this programme has been scheduled for end September 2016, with an expected completion in 2017.

Project implementation and monitoring unit (PMU)

13. The management, co-ordination and monitoring of the activities planned under the HPMP is undertaken with the overall supervision of the national ozone unit (NOU).

Level of fund disbursement

14. As of 30 June 2016, of the US \$9,446,175 so far approved, US \$8,054,443 had been disbursed. The balance of US \$1,391,732 will be disbursed in 2017 (Table 2).

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

Agency	First tranche		Second tranche		Third tranche		Total approved	
	Approved	Disbursed	Approved	Disbursed	Approved	Disbursed	Approved	Disbursed
UNDP	5,000,000	4,854,667	3,628,723	3,008,510	817,452	191,266	9,446,175	8,054,443
Disbursement rate (%)	97.1		82.9		23.4		85.3	

Implementation plan for the fourth tranche of the HPMP

15. The following activities will be implemented:

- (a) Finalisation of refrigerant management regulations by the Attorney General's office (US \$81,295);
- (b) A training session for approximately 40 customs officers on the use of refrigerant identifiers, agreements with HCFC exporting countries and informal prior informed consent (iPIC) system, labelling standards and practices, HC codes, harmonization of databases of refrigerants and blends, nomenclature of refrigerants and categories of refrigeration and air-conditioning equipment;
- (c) Training workshops on good refrigeration practices for approximately 400 technicians; ten refrigerant identifier units will be procured and provided to DOE training centres and selected ATCs; the signing of a Memorandum of Understanding between the six reclaim centres and DOE, and delivery of mini-reclaim units to the centres;

- (d) Continued activities in refrigeration management, including the completion of the ongoing pilot incentive programme to introduce CO₂-based systems in the industrial and commercial refrigeration sector; and
- (e) Co-ordination and management of the HPMP (US \$60,000).

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

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

Legal framework

16. The Government of Malaysia has already issued HCFC import quotas at 438.40 ODP tonnes for 2016.

17. The Secretariat asked for an update on the ban on imports of HCFC-141b contained in pre-blended polyols, which was expected in 2016. UNDP explained that the ban is included in the proposed update to regulations under review by the Attorney General's Chamber and is therefore not yet in place. However, in the meantime, an administrative approval system has been put in place for the import and export of these polyols.

Foam manufacturing sector

18. While the four local systems houses were able to customise formulations using low-GWP alternatives, UNDP explained that the uptake of the alternative systems based on HFO-1233zd, methyl formate and methylal has been delayed because of the need for additional optimization to improve performance, particularly as it relates to methyl formate, and the higher cost of the HFO-1233zd alternative (i.e. US \$15/kg). While further optimization may be needed to address concerns about the performance of methyl formate, in particular as it relates to dimensional stability for sandwich panels, methylal-based systems appear promising and have been developed for roofing applications for local and export markets. It is expected that with further optimization there is a high likelihood that the systems houses will export the low-GWP-based formulations to countries in the Association of South-East Asian Nations, and possibly more broadly.

Refrigeration servicing sector

19. The pilot project to introduce HFC-32 based AC units has been completed at two demonstration sites. A meeting to review proposals for the pilot project to introduce CO₂-based systems in the industrial and commercial refrigeration sector was held on 27 September 2016, and it is anticipated that the project will be completed in 2017. A roadshow on HFC-32 refrigerant management to certified technicians has been organized in seven locations in Malaysia, and a further two are planned in September and October 2016, resulting in the training of a total of approximately 1,500 technicians. The programme for the certification of service technicians has been upgraded into an online system, which was operational in August 2016 and launched on Ozone Day on 29 September 2016.

Conclusion

20. The implementation of the third tranche is progressing. Malaysia has an enforceable licensing and quota system and has been in compliance with the Montreal Protocol control targets set in the Agreement with the Executive Committee. Thirteen PU foam enterprises have successfully completed their

conversion to cyclopentane, resulting in the phase-out of 860 mt (94.6 ODP tonnes) of HCFC-141b, and four systems houses have developed foam formulations with low-GWP blowing refrigerants and are demonstrating them to downstream users, although further optimization of the technologies is ongoing. Activities in the refrigeration servicing sector have further contributed to reductions in Malaysia's consumption. The overall funding disbursement has reached 85 per cent. All remaining activities in stage I will be completed by the end of 2017.

RECOMMENDATION

21. The Fund Secretariat recommends that the Executive Committee:

- (a) Takes note of the progress report on the implementation of the third tranche of stage I of the HCFC phase-out management plan of (HPMP) for Malaysia; and
- (b) Requests the Government of Malaysia and UNDP to submit progress reports on a yearly basis on the implementation of the work programme associated with the final tranche until the completion of the project, verification reports until approval of stage II, and the project completion report by the second meeting of the Executive Committee in 2018.

22. The Fund Secretariat further recommends blanket approval of the fourth and final tranche of stage I of the HPMP for Malaysia, and the corresponding 2016-2017 tranche implementation plan, at the funding level shown in the table below:

	Project title	Project funding (US \$)	Support cost (US \$)	Implementing agency
(a)	HCFC phase-out management plan (stage I, fourth tranche)	141,295	10,597	UNDP

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Malaysia

(I) PROJECT TITLE	AGENCY
HCFC phase-out plan (Stage II)	UNDP

(II) LATEST ARTICLE 7 DATA (Annex C Group I)	Year: 2015	420.1 (ODP tonnes)
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(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)								Year: 2015	
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab use	Total sector consumption
				Manufacturing	Servicing				
HCFC-22				59.0	239.4				298.4
HCFC-123				0.6	0.7				1.3
HCFC-141b		117.8				0.9			118.7
HCFC-225						0.1			0.1

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	515.8	Starting point for sustained aggregate reductions:	515.76
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:	111.85	Remaining:	403.91

(V) BUSINESS PLAN		2017	2018	2019	2020	Total
UNDP	ODS phase-out (ODP tonnes)	36.8	27.6	27.6	0	92.0
	Funding (US \$)	3,419,000	2,564,000	2,564,000	0	8,547,000

(VI) PROJECT DATA			2016	2017	2018	2019	2020	2021	2022	Total
Montreal Protocol consumption limits			464.18	464.18	464.18	464.18	335.24	335.24	335.24	n/a
Maximum allowable consumption (ODP tonnes)			438.40	438.40	438.40	400.00	335.24	309.46	294.63	n/a
Project costs requested in principle (US \$)	UNDP	Project costs	3,507,938	0	0	2,475,225	0	154,900	0	6,138,063
		Support costs	245,556	0	0	173,266	0	10,843	0	429,665
Total project costs requested in principle (US \$)			3,507,938	0	0	2,475,225	0	154,900	0	6,138,063
Total support costs requested in principle (US \$)			245,556	0	0	173,266	0	10,843	0	429,665
Total funds requested in principle (US \$)			3,753,494	0	0	2,648,491	0	165,743	0	6,567,728

(VII) Request for funding for the first tranche (2016)		
Agency	Funds requested (US \$)	Support costs (US \$)
UNDP	3,507,938	245,556

Funding request:	Approval of funding for the first tranche (2016) as indicated above
Secretariat's recommendation:	For individual consideration

PROJECT DESCRIPTION

23. On behalf of the Government of Malaysia, UNDP, as the designated implementing agency, has submitted to the 77th meeting, stage II of the HCFC phase-out management plan (HPMP) at a total cost of US \$8,051,562, plus agency support costs of US \$563,609, as originally submitted². The implementation of stage II of the HPMP will phase out 76.83 ODP tonnes of HCFC-22 and 66.94 ODP tonnes of HCFC-141b and assist Malaysia in meeting the Montreal Protocol compliance target of 42.9 per cent reduction by 2022.

24. The first tranche for stage II of the HPMP being requested at this meeting amounts to US \$5,690,000, plus agency support costs of US \$398,300, as originally submitted.

Status of implementation of stage I of the HPMP

25. Stage I of the HPMP for Malaysia was approved at the 65th meeting to meet 15 per cent reduction from the baseline by 2016 at a total cost of US \$9,587,470, plus agency support costs of US \$719,060, and phase out a total of 103.02 ODP tonnes of HCFCs (consisting of 94.6 ODP tonnes of HCFC-141b and 8.42 ODP tonnes of HCFC-22). The Agreement between the Government of Malaysia and the Executive Committee was updated at the 75th meeting to reflect additional reduction of 8.83 ODP tonnes of HCFC-22, as described in paragraph 2 of the present document, resulting in a total reduction of 111.85 ODP tonnes of HCFC in stage I.

Progress in implementation of stage I activities

26. The progress in implementation of stage I activities, including status of conversion projects, a report on the ODS policy and regulatory framework, activities in the refrigeration servicing sector, programme management unit and status of disbursement, is described in paragraphs 7 to 14 of the present document.

Stage II of the HPMP

27. The Government of Malaysia would commit in stage II to reduce HCFC consumption by 42.9 per cent of the baseline by 2022, with an associated phase-out of 143.77 ODP tonnes of HCFCs (i.e., 27.9 per cent of the baseline) and to achieve a complete phase-out of HCFC-141b in the foam and refrigeration manufacturing sectors and of HCFC-22 in the refrigeration and AC manufacturing sectors.

Remaining eligible consumption in Malaysia

28. After deducting 111.85 ODP tonnes of HCFCs associated with stage I of the HPMP and the proposed reduction of 143.77 ODP tonnes associated with stage II, the remaining consumption of HCFCs eligible for funding would amount to 260.14 ODP tonnes, as shown in Table 3.

² As per the letter of 22 August 2016 from the Ministry of Natural Resources and Environment of Malaysia to the Secretariat.

Table 3. Overview of the remaining HCFC consumption eligible for funding in Malaysia

HCFC	Starting point	Reduction in stage I	Reduction in stage II	Remaining eligible consumption
Mt				
HCFC-123	56.65	0	0	56.65
HCFC-141	13.38	0	0	13.38
HCFC-141b	1,477.61	860	608.55	9.06
HCFC-142b	12.1	0	0	12.1
HCFC-21	18.6	0	0	18.6
HCFC-22	6,355.29	313.64	1,396.91	4644.74
HCFC-225	1.11	0	0	1.11
Total (mt)	7,934.74	1,173.64	2,005.46	4,755.64
ODP tonnes				
HCFC-123	1.13	0.00	0.00	1.13
HCFC-141	0.94	0.00	0.00	0.94
HCFC-141b	162.54	94.60	66.94	1.00
HCFC-142b	0.79	0.00	0.00	0.79
HCFC-21	0.74	0.00	0.00	0.74
HCFC-22	349.54	17.25	76.83	255.46
HCFC-225	0.08	0.00	0.00	0.08
Total (ODP tonnes)	515.76	111.85	143.77	260.14

HCFC consumption and sector distribution

29. Malaysia's HCFC consumption is described in paragraphs 3 and 4 of the present document. Table 4 presents the consumption of HCFCs by sector as reported in the country programme (CP) data for 2015.

Table 4. Distribution of HCFCs by sector and substance in Malaysia (2015)

Description	HCFC	Sector	Mt	Mt (%)	ODP tonnes	ODP tonnes (%)
Manufacturing	HCFC-22	RAC	1,072.73	16.3	59.00	14.1
	HCFC-141b	PU foam	1,070.54	16.3	117.76	28.1
	HCFC-141b	Solvents	8.50	0.1	0.94	0.2
	HCFC-225	Solvents	1.52	0.0	0.11	0.0
	HCFC-123	RAC	30.78	0.5	0.62	0.1
Servicing	HCFC-22	RAC	4,352.55	66.2	239.39	57.2
	HCFC-123		34.70	0.5	0.69	0.2
Total			6,571.21	100	418.50	100

30. HCFC-22 and HCFC-141b are the main HCFCs used in the country. HCFC-141b is consumed mainly in the PU foam manufacturing, while HCFC-22 is consumed in the RAC manufacturing and servicing sectors. A small quantity of HFC-123 is consumed to manufacture and service chillers. Approximately 10 mt (HCFC-141b (8.50 mt) and HCFC-225 (1.52 mt)) are consumed in the solvent sector.

HCFC consumption in manufacturing sectors*HCFC consumption in the PU foam manufacturing sector*

31. There are 77 enterprises in the PU foam sector consuming HCFC-141b, of which eleven are large and the rest are small and medium-sized enterprises (SMEs). There are seven systems houses with facilities for blending and customization of HCFC-141b polyols, three of which are not eligible and four of which were funded for development of low-GWP alternative blowing agents during stage I. The distribution of HCFC-141b use among PU foam enterprises is presented in Table 5.

Table 5. Distribution of HCFC-141b use among PU foam enterprises (2013-2015)

Sub-sector / (enterprises)	Number of enterprises with consumption <20 mt	Number of enterprises with consumption >20 mt	HCFC-141b consumption (mt)		
			2013	2014	2015
Roofing (11)	6	5	189.27	235.70	261.55
Panels and insulated pipe (43)	38	5	277.48	310.19	335.68
Commercial freezer and chillers (15)	15	0	27.92	33.68	39.68
Ice box (and others) (8)	7	1	61.15	65.60	75.56
Total (77)	66	11	555.82	645.17	712.47

HCFC consumption in the AC manufacturing sector

32. The sector consumes both HCFC-22 (58.79 ODP tonnes) and HCFC-123 (0.62 ODP tonnes), with 12 enterprises producing about 1.2 million units in 2015. Of the 12 enterprises, only two are locally owned. About 90 per cent of all AC units manufactured in the country are residential; only one enterprise manufactures equipment with HCFC-123. While Malaysia is a significant export hub, exporting between 60 to 70 per cent of its production of AC equipment in the region (particularly air-cooled split and packaged AC units), Malaysia also imported about 358,000 HCFC-22-based units in 2015, mainly from China, Japan and the United States of America. Consumption of HCFC-22 in AC manufacturing is slowly decreasing given increased production with non-ODS alternatives, principally high-GWP-based refrigerants.

HCFC consumption in the refrigeration manufacturing sector

33. HCFCs are used in the commercial and cold chain refrigeration. Of 16 enterprises in the sector, nine use HCFC-22 as refrigerant (with an average 2013-2015 consumption of 5.4 mt) and HCFC-141b as a foam blowing agent (with an average 2013-2015 consumption of 45.37 mt). The total 2015 consumption of HCFC-22 in the RAC manufacturing sector was 1,072.73 mt (59 ODP tonnes).

HCFC consumption in fire-fighting sector

34. With the exception of one enterprise that may still consume minimal amounts of HCFC-123, enterprises in the sector have transitioned to the use of high-GWP HFCs and powdered fire suppressants.

HCFC consumption in solvent sector

35. HCFC-141b is also used as a cleaning agent in one enterprise with a consumption of 8.5 mt (0.94 ODP tonnes). In addition, 1.52 mt (0.11 ODP tonnes) of HCFC-225 were used as a cleaning solvent.

HCFC consumption in the refrigeration servicing sector

36. There were over 8 million air-cooled split and packaged units using 239 ODP tonnes of HCFC-22 and 0.7 ODP tonnes of HCFC-123 for servicing in the AC sector in 2015. The servicing demand for HCFC-22 in commercial refrigeration is expected to decrease due to an increase in the use of HFC refrigerant-based equipment.

Proposed activities in stage II of the HPMP

37. The activities to be implemented during stage II include regulatory actions; conversion of the remaining PU foam manufacturing enterprises; TA to RAC manufacturing enterprises to completely phase-out the use of HCFC-22; a workshop to provide TA to enterprises in the solvent sector; activities in the servicing sectors; and implementation and monitoring.

Regulatory actions

38. The activities to be implemented during stage II include a ban on the use, import and export of HCFC-22 in RAC manufacturing by 1 January 2020; and a ban on the import and export of HCFC-141b contained in pre-blended polyols, and the phase-out of all uses of HCFC-141b, both in bulk and contained in imported pre-blended polyols except for the solvent sector by 1 January 2022.

Activities in the manufacturing sector

PU foam manufacturing sector

39. Seventy-seven enterprises will be converted to low-GWP alternatives, including pre-blended hydrocarbons (HC), HC and HFO, with a total phase-out of 78.37 ODP tonnes of HCFC-141b. Of the 77 enterprises, 67 are eligible (with a consumption of 70.99 ODP tonnes), one is non-Article 5-owned (0.18 ODP tonnes), and nine were established after the 21 September 2007 cut-off date (7.21 ODP tonnes). Taking into account that 1 ODP tonne of HCFC-141b will be phased out in the solvent sector in later stages of the HPMP, funding is requested for only 66.94 ODP tonnes; the remaining 4.05 ODP tonnes of HCFC-141b consumption eligible for funding and 7.38 ODP tonnes of consumption ineligible for funding would be phased out without funding from the Multilateral Fund and would not be deducted from Malaysia's remaining consumption of HCFC-141b.

40. A staged approach will be used with enterprises with consumption above 5 mt converted during the first years, and the remaining smaller enterprises from 2019, in anticipation of the further optimization and introduction of low-cost, low-GWP alternatives developed during stage I. For enterprises consuming below 1 mt of HCFC-141b, US \$10,000 per enterprise was requested for modifications in the facilities to use alternatives and testing of new formulations. Conversion costs for enterprises consuming more than 1 mt was based on a conversion to pre-blended HC or to HC. Eligible enterprises that had purchased a foaming machine after the 21 September 2007 cut-off date would be provided with only safety measures (US \$80,000), storage for pre-blended HC (US \$10,000), and trials and technical support (US \$20,000). All of the enterprises with foaming machines would receive an additional US \$140,000 to replace a low-pressure machine with a high-pressure machine. Larger enterprises were expected to blend HC in house, resulting in an additional request for storage of HC (US \$50,000), a pre-mixer (US \$120,000) and either US \$60,000 to retrofit their high-pressure dispenser, if less than 5 years old, or US \$140,000 to replace the high-pressure machine.

41. The requested funding for eligible enterprises, except those with consumption of HCFC-141b below 1 mt, was limited by the cost-effectiveness (CE) threshold of US \$7.83/kg in line with decision 74/50, applying 25 per cent increase above the CE threshold for introduction of low-GWP alternatives or 40 per cent for enterprises with consumption of less than 20 mt. In addition, given the large number of enterprises to be converted, TA would be provided through workshops (US \$50,000 per year for five years for a total of US \$250,000).

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

Size of enterprise based on the consumption (mt/year)	Number of enterprises	Consumption of HCFC-141b		Eligible consumption of HCFC-141b		Funding requested	CE (US \$/kg)	CE eligible (US \$/kg)
		Mt	ODP tonnes	Mt	ODP tonnes			
Below 1	12	4.43	0.49	4.43	0.49	120,000	27.09	27.09
Between 1 and 5	29	80.88	8.90	75.79	8.34	830,810	10.27	10.96
Between 5 and 20	25	230.21	25.32	192.96	21.23	2,017,220	8.76	10.45
Above 20	11	396.96	43.67	335.37	36.89	2,429,032	6.12	7.24
TA						250,000		
Total	77	712.47	78.37	608.55	66.94	5,647,062	7.93	9.28

Refrigeration and AC manufacturing sector

42. The main refrigerants used in the refrigeration manufacturing sector are high-GWP refrigerants, including HFC-134a and R-404A, with HCFC-22 being a relatively limited use. Of the 16 enterprises in the sector, nine manufactured HCFC-22-based equipment with a total consumption of 0.29 ODP tonnes; of those nine enterprises, one was not eligible for funding; the remaining seven enterprises used HFC-based refrigerants. As the refrigeration manufacturing market in Malaysia tends to be dominated by the use of high-GWP refrigerants, it was expected that the nine HCFC-22-consuming enterprises would revert to the use of high-GWP HFCs with a prohibition on HCFC-22.

43. There are nine manufacturing enterprises in the air-conditioning manufacturing sector, of which only two are locally-owned; only one of the eligible enterprises, Fujiaire with an average 2013-2015 consumption of 281 kg responded to the survey. While HC-290 and HFC-32-based air-conditioners are available globally and, in the case of HFC-32, in Malaysia, their product market share is low compared to HCFC-22 and R-410A-based equipment. As virtually all HCFC-22 consumption in the AC manufacturing sector is in non-Article 5-owned enterprises, this limits the ability of the Government of Malaysia to influence the technology selection and therefore conversion of the sector would be achieved through TA.

44. TA will be provided through workshops, one per year (US \$20,000), for five years at a total cost of US \$100,000 to support the conversion of enterprises to low-GWP alternatives (e.g., R-600a, carbon dioxide, ammonia, and low-GWP blends, should those become available) in the refrigeration sector and HFC-32, HC-290 and low-GWP blends, should those become available, in the AC sector. While non-Article 5-owned AC manufacturers are expected to phase-out their consumption without funding from the Multilateral Fund and following their strategy, TA activities would include participation of all enterprises in the RAC sector to inform them on alternative technologies and to facilitate the achievement of phase-out.

Solvent sector

45. Stage II does not include the phase out of HCFCs in the solvent sector since there are limited alternatives that are cost-effective, safe and low-GWP. Instead, only TA (US \$30,000) to the sector for a workshop on ODS-free alternatives will be provided, on the understanding that a proposal to phase out consumption in the solvent sector will be submitted in stage III of the HPMP.

Activities in the refrigeration servicing sector

46. Stage II of the HPMP proposes to phase out 322.71 mt (17.75 ODP tonnes) of HCFC-22 used in the refrigeration servicing sector at a total cost of US \$1,549,000 through the following activities:

- (a) Training of 480 customs and enforcement officers on monitoring and controlling imports of HCFCs (US \$144,000);
- (b) Training of 100 trainers on safe and efficient servicing of equipment including low-GWP flammable alternatives (US \$75,000);
- (c) Procurement of equipment (e.g. reclaiming machine, multi-refrigerant recovery, recycling and re-use (R3) machine with accessories, refrigerant leak detector, refrigerant identifier and five sets of low-GWP-based RAC equipment to demonstrate good refrigeration practices) for 41 training institutions with US \$32,000 foreseen for each (US \$1,312,000); and
- (d) Servicing tools suitable for use with flammable refrigerants and safety equipment to train service technicians on handling flammable refrigerants for one centre of excellence (US \$18,000).

Implementation and monitoring activities

47. Under the co-ordination of the NOU, established within the DOE, the PMU will implement stage II through preparation of annual work plans; identification of beneficiaries and signature of contracts; support for designing and implementing HCFC regulations; preparation of documentation on technology, alternatives and policy issues; and support on verification activities (US \$725,000).

Total cost of stage II of the HPMP

48. The total cost of stage II of the HPMP for Malaysia has been estimated at US \$8,051,562, as originally submitted (excluding support costs). The proposed activities will result in the phase-out of 155.21 ODP tonnes of HCFCs, of which 84.98 ODP tonnes are eligible for funding, resulting in a CE of US \$8.60/kg (or US \$3.82/kg including 70.23 ODP tonnes of HCFC consumption not eligible for funding). On the basis of the reductions achieved under stage II, a total of 1,396.91 mt (76.83 ODP tonnes) of HCFC-22 and 608.55 mt (66.94 ODP tonnes) of HCFC-141b would be deducted from Malaysia's remaining consumption eligible for funding, representing 27.9 per cent of Malaysia's baseline, with a CE of US \$4.01/kg. In light of the 15 per cent reduction in HCFC consumption agreed to under stage I, Malaysia would commit to a reduction of 42.9 per cent reduction by 2022. Detailed activities and cost, as originally submitted, are shown in Table 7.

Table 7. Total cost of stage II of the HPMP for Malaysia

Sector	Substance	Total phase-out		Phase-out eligible for MLF funding		Funds requested (US \$)	Funded CE (US \$/kg)	Overall CE (US \$/kg)
		Mt	ODP tonnes	Mt	ODP tonnes			
PU foam	HCFC-141b	712.50*	78.38*	608.55	66.94	5,647,062	9.28	7.93
AC manufacturing	HCFC-22	1,068.91	58.79	0	0	100,000	18.97	0.09
Refrigeration manufacturing		5.27	0.29	5.27	0.29			
Refrigeration servicing		322.73	17.75	322.73	17.75	1,549,000	4.8	4.8
Solvent sector (TA)						30,000	n/a	n/a
PMU						725,500	n/a	n/a
Total		2,109.41	155.21	936.55	84.98	8,051,562	8.60	3.82
CE based on reductions in remaining eligible consumption (US \$/kg)								4.01

* Includes 36.82 mt (4.05 ODP tonnes) of HCFC-141b eligible for funding that would be phased out without assistance from the Multilateral Fund.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

49. The Secretariat reviewed stage II of the HPMP for Malaysia in light of stage I, 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.

Overarching strategy for stage II

50. The Secretariat noted the comprehensive strategy proposed by the Government of Malaysia for stage II of the HPMP, with an associated phase-out of 66.94 ODP tonnes of HCFC-141b and 76.83 ODP tonnes of HCFC-22. Through implementation of stage II, the Government would commit to achieve a 42.9 per cent reduction from the HCFC baseline for compliance by 2022.

Proposed activities in stage II

PU foam manufacturing sector

51. While noting the submission of a comprehensive PU foam sector plan that will phase out all HCFC-141b consumption through conversions to low-GWP alternatives, the Secretariat noted that the total cost of the sector plan is over US \$5.6 million and recalled that TA was provided to four systems houses and to downstream SME users under stage I at a cost of US \$970,000. At the time of approval of stage I, UNDP had indicated that this TA component could significantly reduce the cost of conversion at SMEs under stage II by an amount at least equal to the investments made at the systems houses during stage I. On that basis, UNDP and the Secretariat discussed the proposed costs.

52. The Secretariat discussed the costs of testing, trials and training, incremental operating costs (IOCs), TA, and sought clarification on technology selection. It was agreed that testing, trials and training for enterprises with consumption less than 500 kg would be US \$1,300; US \$3,000 for enterprises with consumption between 500 kg and 1 mt; US \$6,000 for enterprises with consumption between 1 and 20 mt; and US \$10,000 for enterprises with consumption greater than 20 mt. IOCs were agreed at

US \$5.90/kg for HFOs and were set to zero for HCs and pre-blended HCs. As no other costs were requested, and in light of the large number of enterprises to be converted and the challenges for SMEs to convert to reduced HFO formulations, the Secretariat considered that additional TA beyond that provided under stage I was meaningful. The level of funding for TA was agreed at US \$125,000 instead of the US \$250,000 as originally proposed.

53. UNDP clarified that most enterprises with consumption below 20 mt were expected to convert to reduced HFOs, though some might convert to methylal, while those enterprises with consumption above 20 mt would convert to pre-blended HCs or to HCs, with the exception of Asia Roofing Industries. That enterprise would not be able to rationalize safety-related costs between its two factories as they are not co-located; therefore, eligible incremental capital costs were determined based on the eligibility of equipment and based on a conversion to reduced HFOs. It was agreed that should an enterprise convert to a different technology, such as methylal, that resulted in reduced costs, that the savings would be returned to the Multilateral Fund.

54. The Secretariat sought additional clarification on the eligibility of enterprises, and clarified that equipment that was purchased by an eligible enterprise after the cut-off date was not eligible even if the capacity of the enterprise was not increased; however, the enterprise was still eligible for other incremental capital as well as operating costs. It was agreed that eligible enterprises would have the flexibility to use the provided funding to retrofit the newer, ineligible equipment and dismantle the older, eligible equipment, rather than use the funding provided to retrofit the eligible equipment.

55. Based on those considerations, the cost of the foam sector plan was agreed at US \$3,976,563 to phase-out 712.47 mt (78.37 ODP tonnes) of HCFC-141b, of which 608.54 mt (66.94 ODP tonnes) were eligible for funding and would be deducted from the starting point for remaining HCFC consumption eligible for funding (Table 8).

Table 8. Agreed costs for the PU foam sector

Enterprise size (mt/yr)	Number of enterprises	Technology	Consumption (mt)	Agreed ICC (US \$)	Agreed IOC (US \$)	Total cost (US \$)	Eligible cost (US \$)
Below 1	9	Reduced HFO	3.71	20,200	21,889	42,089	39,219
1 to 5	26	Reduced HFO	72.56	156,000	428,080	584,080	549,758
5 to 20	22	Reduced HFO	194.42	132,000	1,147,054	1,279,054	1,206,137
Above 20	10	HCs and pre-blended HCs, one reduced HFO	374.66	1,800,771	380,000	2,180,771	2,056,448
Ineligible enterprises	10	low-GWP	67.13	n/a	n/a	n/a	n/a
TA							125,000
Total	77		712.47	2,108,971	1,977,024	4,085,995	3,976,563
CE of eligible phase-out (US \$/kg)							6.53
CE of project (US \$/kg)							5.58

56. Noting that consumption of HCFC-141b in 2015 was 1,079.04 mt (78.37 ODP tonnes) and that 712.47 mt (78.37 ODP tonnes) were consumed in the foam sector and 8.5 mt (0.94 ODP tonnes) in the solvent sector, the Secretariat sought clarification as to whether HCFC-141b was exported in bulk or in pre-blended polyols. UNDP clarified that approximately 358 mt (39.4 ODP tonnes) of HCFC-141b contained in pre-blended polyols was exported to one country, Viet Nam. Noting the proposal to ban the export of HCFC-141b contained in pre-blended polyols by 1 January 2022, the Secretariat inquired whether an earlier ban was possible. UNDP emphasized that starting in 2015 an administrative order was put in place that required exporters to report and seek approval for such exports from the Government.

Notwithstanding that order, the Government agreed to implement an earlier ban. In light of the need to allow for sufficient time to put in place a new regulation, it was agreed that the Government would ban the export of HCFC-141b contained in pre-blended polyols by 31 December 2018.

Solvent sector

57. Noting that the remaining eligible consumption of HCFC-141b after stage II would be 1 ODP tonne, the Secretariat inquired whether a total phase-out could be pursued as this would minimize the risk that HCFC-141b could be diverted to uses that had been phased out. UNDP emphasized that although the solvent sector's consumption is small, it would be the only sector with remaining consumption, that there were limited cost-effective, low-GWP alternatives available in Malaysia, that the proposed workshop was an important mechanism to provide awareness and promote adoption of non-HCFC alternatives, and that the sector's consumption would therefore be addressed through a phase-out project in stage III.

58. On this basis, it was agreed that Malaysia would prohibit the use of HCFC-141b for all uses except for in the solvent sector, and to limit, through the allocation of quotas, the consumption of HCFC-141b in that sector to 1 ODP tonne or less by 1 January 2022; and TA for a workshop would be provided at US \$12,500 (instead of US \$30,000).

Refrigeration and AC manufacturing sector

59. While targeted workshops, complemented by activities in the servicing sector, could help facilitate a transition to low-GWP alternatives, the Secretariat recognized that most of the consumption in the sector was not eligible for funding, and that this limited the ability of the Government of Malaysia to influence the technology selected. The Secretariat and UNDP discussed whether the Government of Malaysia could consider implementing proactive measures to facilitate a transition to low-GWP alternatives. It was agreed that the Government of Malaysia would reflect in its specifications for Government procurement a preference for low-GWP alternatives and would consider other proactive measures, such as labelling, public awareness, and other measures. On this basis, it was agreed to retain US \$100,000 for TA to the sector.

Refrigeration servicing sector

60. The Secretariat noted that while the training of trainees and procurement of equipment for training institutions was included in stage II, no funding was requested for training of technicians. In addition, the Secretariat sought clarification on how equipment and training to be provided under stage II would complement that provided under stage I. With regard to the training of trainers on safe and efficient servicing of equipment including low-GWP flammable alternatives, the Secretariat sought clarification on whether the country has in place safety regulations on flammable alternatives. The Secretariat noted that the request for equipment to support one centre of excellence for training service technicians to handle flammable refrigerants could complement the TA provided under the RAC manufacturing sector and thus facilitate a transition to low-GWP alternatives. Noting that both a reclaiming machine and a multi-refrigerant machine may not be required at all the training institutions, the Secretariat suggested to consider whether a majority of training centres be provided both machines and the other centres be provided either the reclaiming or the multi-refrigerant machine, and to use the associated reductions in cost to support not one but two centres of excellence for training technicians on flammable refrigerants.

61. UNDP clarified that the Government has initiated a committee to develop Malaysian standards for flammable refrigerants, including HFC-32 which had been introduced in the market in 2015. Taking into consideration the suggestions of the Secretariat, it was agreed to adjust the activities as follows:

- (a) Customs and enforcement officers training for monitoring and controlling HCFCs (480 trainees) (US \$200,000);
- (b) Technology training on new refrigerants (US \$119,000);
- (c) Training of trainers (five-day programme) for 100 trainers (US \$100,000);
- (d) Equipment for 21 training institutions on good servicing practices (US \$32,000 each for a total of US \$672,000);
- (e) Equipment for 51 authorized training centres (US \$408,000); and
- (f) Equipment for two centres of excellence for training service technicians on handling flammable refrigerants (US \$50,000).

Remaining consumption of HCFCs no longer consumed

62. Noting that Malaysia's starting point for consumption eligible for funding included HCFC-141 (vice HCFC-141b), HCFC-21, and HCFC-142b, and that Malaysia had last reported such consumption in 2011, 2009, and 2014, respectively, the Secretariat inquired whether those substances had been phased out and, if so, whether Malaysia could implement a ban on the substances. UNDP clarified that while those substances were no longer imported into the country, there were a number of administrative procedures required to implement a ban. In order to minimize the administrative burden, it was agreed that licenses for the import of those substances would no longer be issued, and to deduct 0.94 ODP tonnes of HCFC-141, 0.79 ODP tonnes of HCFC-142b, and 0.74 ODP tonnes of HCFC-21 from Malaysia's remaining consumption eligible for funding.

Agreed cost for stage II of the HPMP

63. The agreed cost of the activities proposed in stage II of the HPMP amounts to US \$6,138,063, including US \$500,000 for the PMU, and excluding agency support costs, as shown in Table 9. Stage II of the HPMP will result in the phase-out of 146.24 ODP tonnes of HCFCs with an overall CE of US \$2.99/kg

Table 9. Agreed cost for stage II of the HPMP

Sector	Substance	mt	ODP	Funds requested (US \$)	CE (US \$/kg)
PU foam	HCFC-141b	608.55	66.94	3,976,563	6.53
AC manufacturing sector	HCFC-22	1,068.91	58.79	100,000	0.09
Refrigeration manufacturing	HCFC-22	5.27	0.29		
RAC servicing	HCFC-22	322.73	17.75	1,549,000	4.80
TA for solvent sector	n/a	-	-	12,500	n/a
PMU	n/a	-	-	500,000	n/a
Sub-total	All	2,005.45	143.77	6,138,063	3.06
HCFCs no longer consumed	HCFC-141	13.43	0.94	-	-
	HCFC-142b	12.15	0.79	-	-
	HCFC-21	18.50	0.74	-	-
Total	All	2,049.54	146.24	6,138,063	2.99

Agreed implementation plan for the first tranche

64. The first funding tranche of stage II of the HPMP will be implemented between December 2016 and December 2019, with the following activities:

- (a) Conversions in the PU foam sector, focused primarily on purchasing the necessary equipment for the larger enterprises that will convert to HC and pre-blended HC (US \$2,373,438);
- (b) Conduct three TA workshops in the RAC manufacturing sector (US \$60,000);
- (c) Undertake activities in the servicing sector, including provision of equipment for the training centres, ATCs, and centres of excellence, and training of technicians, trainers and customs officials (US \$774,500); and
- (d) Planning, implementing and monitoring activities under the HPMP (US \$300,000).

Impact on the climate

65. The conversion of the remaining PU foam manufacturing enterprises in Malaysia would avoid the emission into the atmosphere of some 508,000 tonnes of CO₂ equivalent per year, as shown in Table 10.

Table 10. Impact on the climate PU foam projects

Substance	GWP	Tonnes/year	CO ₂ -eq (tonnes/year)
Before conversion			
HCFC-141b	725	712.5	516,563
After conversion			
HFOs and cyclopentane	~ 20	427.5	8,550
Impact			508,013

66. It is difficult to estimate the climate impact of the TA to the RAC manufacturing sector given uncertainties in the technology choices. The proportion of consumption that will be converted to low-GWP alternatives will depend on the effectiveness of the TA activities, the effectiveness of the proactive measures to facilitate the introduction of low-GWP that will be taken by the Government, and market and other factors. In order to estimate the impact of the AC manufacturing sector, the Secretariat has calculated the climate impact based on a conversion to R-410A and to HFC-32 based on the multilateral climate impact indicator (MCII). If all the enterprises in the sector were to convert to R-410A, the climate impact would be an increase of approximately 324,000 tonnes of CO₂ equivalent per year. If all the enterprises in the sector were to convert to HFC-32, the climate impact would be a decrease of approximately 2,112,000 tonnes of CO₂ equivalent per year. The climate impact of the conversion in the AC manufacturing sector will likely be in between those two impacts.

Table 11. Climate impact of AC manufacturing conversion projects from HCFC-22 technology

Refrigerant charge: 0.9 kg/unit		Refrigerant capacity: 3.5 kW*		
Yearly output: 1,200,000		Export: 65%		
		Emission (tCO ₂ eq)		
Alternatives		Before conversion	After conversion	Emission reduction
R-410A	Direct	1,960,848	2,059,584	98,736
	Indirect	15,194,234	15,419,180	224,946
	Sub-total	17,155,082	17,478,764	323,682
HFC-32	Direct	1,960,848	651,442	-1,309,406
	Indirect	15,194,234	14,392,061	-802,173
	Sub-total	17,155,082	15,043,503	-2,111,579

* Assuming a lifetime of approximately 12 years, and that the majority of AC units have a charge size of approximate 0.9 kg/unit and approximately 1 tonne refrigeration capacity (3.5 kW).

67. Similarly, in order to estimate the climate impact of the refrigeration manufacturing sector, the Secretariat has estimated the climate impact based on a conversion to HFC-134a, R-404A, isobutane, and HFC-32 based on the MCII. Depending on the proportion of enterprises that convert to the respective refrigerant, the climate impact would range between an increase of approximately 19,000 tonnes of CO₂ equivalent per year to a decrease of approximately 11,000 tonnes of CO₂ equivalent per year.

Table 12. Climate impact of refrigeration manufacturing conversion projects from HCFC-22 technology

Refrigerant charge: 2.11 kg/unit		Thermal load: 3.7 kW		
Yearly output: 2,500		Export: 0%		
		Emission (tCO ₂ eq)		
Alternatives		Before conversion	After conversion	Emission reduction
HFC-134a	Direct	9,577	7,413	-2,164
	Indirect	116,131	115,432	-699
	Sub-total	125,708	122,845	-2,863
R-404A	Direct	9,577	19,823	10,246
	Indirect	116,131	124,797	8,666
	Sub-total	125,708	144,620	18,912
Isobutane	Direct	9,577	50	-9,527
	Indirect	116,131	114,671	-1,460
	Sub-total	125,708	114,721	-10,987
HFC-32	Direct	9,577	3,182	-6,395
	Indirect	116,131	111,447	-4,684
	Sub-total	125,708	114,629	-11,079

68. 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 CO₂-equivalent tonnes. Although a calculation of the impact on the climate was not included in the HPMP, the activities planned by Malaysia, in particular its efforts to promote low-GWP alternatives, and 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.

Co-financing

69. The conversions in the foam sector and in the RAC manufacturing sector include enterprises that are not eligible for assistance under the Multilateral Fund. It is anticipated that those enterprises would finance their conversion using their own resources. In addition, some eligible enterprises in the foam sector have ineligible equipment. Any costs associated with conversion of that equipment would be financed using their own resources.

2016-2018 draft business plan of the Multilateral Fund

70. UNDP is requesting US \$6,138,063, plus agency support costs for the implementation of stage II of the HPMP. The total value requested for the period 2016 to 2018 of US \$3,753,494 including support costs is US \$2,229,506 below the amount in the business plan between 2016 and 2018.

Draft Agreement

71. A draft Agreement between the Government of Malaysia and the Executive Committee for the phase-out of HCFCs in stage II of the HPMP is contained in Annex I to the present document.

RECOMMENDATION

72. The Executive Committee may wish to consider:

- (a) Approving, in principle, stage II of the HCFC phase-out management plan (HPMP) for Malaysia for the period 2016 to 2022 to reduce HCFC consumption by 42.9 per cent of the baseline, in the amount of US \$6,138,063, plus agency support costs of US\$ \$429,664 for UNDP;
- (b) Noting the commitment of the Government of Malaysia to:
 - (i) Reduce HCFC consumption by 22.4 per cent in 2019, 35.0 per cent in 2020, 40.0 per cent in 2021, and 42.9 per cent in 2022, respectively;
 - (ii) Issue a ban on export of HCFC-141b contained in pre-blended polyols by 31 December 2018 and a ban on the import and use of HCFC-141b contained in pre-blended polyols by 1 January 2022;
 - (iii) Phase-out all uses of HCFC-141b except in the solvent sector by 1 January 2022;
 - (iv) Limit consumption of HCFC-141b to 1 ODP tonne or less for use in the solvent sector by 1 January 2022;
 - (v) Issue a ban on import of refrigeration and air-conditioning (RAC) equipment operated with HCFCs and a ban on manufacturing and new installations of RAC equipment operating with HCFCs by 1 January 2020; and
 - (vi) No longer issue licenses for the import of HCFC-141, HCFC-142b, and HCFC-21.
- (c) Deducting 146.24 ODP tonnes of HCFCs from the remaining HCFC consumption eligible for funding;
- (d) Approving the draft Agreement between the Government of Malaysia and the Executive Committee for the reduction in consumption of HCFCs, in accordance with stage II of the HPMP, contained in Annex I to the present document; and
- (e) Approving the first tranche of stage II of the HPMP for Malaysia, and the corresponding tranche implementation plans, in the amount of US \$3,507,938, plus agency support costs of US \$245,556 for UNDP.

Annex I

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

Purpose

1. This Agreement represents the understanding of the Government of Malaysia (the “Country”) and the Executive Committee with respect to the reduction of controlled use of the ozone depleting substances (ODS) set out in Appendix 1-A (“The Substances”) to a sustained level of 294.63 ODP tonnes by 1 January 2022 in compliance with Montreal Protocol schedule.
2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A (“The Targets, and Funding”) in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances that exceeds the level defined in rows 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3 and 4.7.3 (remaining consumption eligible for funding).
3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A (“Funding Approval Schedule”).
4. The Country agrees to implement this Agreement in accordance with the stage II of the HCFC phase-out management plan (HPMP) approved (“the Plan”). In accordance with sub-paragraph 5(b) of this Agreement, the Country will accept independent verification of the achievement of the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A of this Agreement. The aforementioned verification will be commissioned by the relevant bilateral or implementing agency.

Conditions for funding release

5. The Executive Committee will only provide the Funding in accordance with the Funding Approval Schedule when the Country satisfies the following conditions at least eight weeks in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:
 - (a) That the Country has met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which there are no due country programme implementation reports at the date of the Executive Committee meeting at which the funding request is being presented are exempted;
 - (b) That the meeting of these Targets has been independently verified for all relevant years, unless the Executive Committee decided that such verification would not be required;

- (c) That the Country had submitted a Tranche Implementation Report in the form of Appendix 4-A (“Format of Tranche Implementation Reports and Plans”) covering each previous calendar year; that it had achieved a significant level of implementation of activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and
- (d) That the Country has submitted a Tranche Implementation Plan in the form of Appendix 4-A covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

Monitoring

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

Flexibility in the reallocation of funds

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

- (a) Reallocations categorized as major changes must be documented in advance either in a Tranche Implementation Plan as foreseen in sub-paragraph 5(d) above, or as a revision to an existing Tranche Implementation Plan to be submitted eight weeks prior to any meeting of the Executive Committee, for its approval. Major changes would relate to:
 - (i) Issues potentially concerning the rules and policies of the Multilateral Fund;
 - (ii) Changes which would modify any clause of this Agreement;
 - (iii) Changes in the annual levels of funding allocated to individual bilateral or implementing agencies for the different tranches;
 - (iv) Provision of funding for activities not included in the current endorsed Tranche Implementation Plan, or removal of an activity in the Tranche Implementation Plan, with a cost greater than 30 per cent of the total cost of the last approved tranche; and
 - (v) Changes in alternative technologies, on the understanding that any submission for such a request would identify the associated incremental costs, the potential impact to the climate, and any differences in ODP tonnes to be phased out if applicable, as well as confirm that the Country agrees that potential savings related to the change of technology would decrease the overall funding level under this Agreement accordingly;
- (b) Reallocations not categorized as major changes may be incorporated in the approved Tranche Implementation Plan, under implementation at the time, and reported to the Executive Committee in the subsequent Tranche Implementation Report;

- (c) Any enterprise to be converted to non-HCFC technology included in the Plan and that would be found to be ineligible under the policies of the Multilateral Fund (i.e., due to foreign ownership or establishment post the 21 September 2007 cut-off date), would not receive financial assistance. This information would be reported as part of the Tranche Implementation Plan;
- (d) The Country commits to examining the possibility of using pre-blended systems with low-global warming potential blowing agents instead of blending them in-house, for those foam enterprises covered under the Plan, should this be technically viable, economically feasible and acceptable to the enterprises;
- (e) The Country agrees, in cases where HFC technologies have been chosen as an alternative to HCFCs, and taking into account national circumstances related to health and safety: to monitor the availability of substitutes and alternatives that further minimize impacts on the climate; to consider, in the review of regulations standards and incentives adequate provisions that encourage introduction of such alternatives; and to consider the potential for adoption of cost-effective alternatives that minimize the climate impact in the implementation of the HPMP, as appropriate, and inform the Executive Committee on the progress accordingly in tranche implementation reports; and
- (f) Any remaining funds held by the bilateral or implementing agencies or the Country under the Plan will be returned to the Multilateral Fund upon completion of the last tranche foreseen under this Agreement.

Considerations for the refrigeration servicing sector

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

- (a) The Country would use the flexibility available under this Agreement to address specific needs that might arise during project implementation; and
- (b) The Country and relevant bilateral and/or implementing agencies would take into consideration relevant decisions on the refrigeration servicing sector during the implementation of the Plan.

Bilateral and implementing agencies

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

10. The Lead IA will be responsible for ensuring co-ordinated planning, implementation and reporting of all activities under this Agreement, including but not limited to independent verification as per sub-paragraph 5(b). The role of the Lead IA is contained in Appendix 6-A. The Executive Committee agrees, in principle, to provide the Lead IA with the fees set out in row 2.2 of Appendix 2-A.

Non-compliance with the Agreement

11. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A (“Reductions in Funding for Failure to Comply”) in respect of each ODP kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this Agreement, and take related decisions. Once decisions are taken, the specific case of non-compliance with this Agreement will not be an impediment for the provision of funding for future tranches as per paragraph 5 above.

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

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

Date of completion

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

Validity

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

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

APPENDICES

APPENDIX 1-A: THE SUBSTANCES

Substance	Annex	Group	Starting point for aggregate reductions in consumption (ODP tonnes)
HCFC-123	C	I	1.13
HCFC-141	C	I	0.94
HCFC-141b	C	I	162.54
HCFC-142b	C	I	0.79
HCFC-21	C	I	0.74
HCFC-22	C	I	349.54
HCFC-225	C	I	0.08
Total	C	I	515.76

APPENDIX 2-A: THE TARGETS, AND FUNDING

Row	Particulars	2016	2017	2018	2019	2020	2021	2022	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	464.18	464.18	464.18	464.18	335.24	335.24	335.24	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	438.40	438.40	438.40	400.00	335.24	309.46	294.63	n/a
2.1	Lead IA (UNDP) agreed funding (US \$)	3,507,938	0	0	2,475,225	0	154,900	0	6,138,063
2.2	Support costs for Lead IA (US \$)	245,556	0	0	173,266	0	10,843	0	429,665
3.1	Total agreed funding (US \$)	3,507,938	0	0	2,475,225	0	154,900	0	6,138,063
3.2	Total support costs (US \$)	245,556	0	0	173,266	0	10,843	0	429,665
3.3	Total agreed costs (US \$)	3,753,494	0	0	2,648,491	0	165,743	0	6,567,728
4.1.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)								0.00
4.1.2	Phase-out of HCFC-123 to be achieved in the previous stage (ODP tonnes)								0.00
4.1.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)								1.13
4.2.1	Total phase-out of HCFC-141 agreed to be achieved under this Agreement (ODP tonnes)								0.94
4.2.2	Phase-out of HCFC-141 to be achieved in the previous stage (ODP tonnes)								0.00
4.2.3	Remaining eligible consumption for HCFC-141 (ODP tonnes)								0.00
4.3.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)								66.94
4.3.2	Phase-out of HCFC-141b to be achieved in the previous stage (ODP tonnes)								94.60
4.3.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)								1.00
4.4.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)								0.79
4.4.2	Phase-out of HCFC-142b to be achieved in the previous stage (ODP tonnes)								0.00
4.4.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)								0.00
4.5.1	Total phase-out of HCFC-21 agreed to be achieved under this Agreement (ODP tonnes)								0.74
4.5.2	Phase-out of HCFC-21 to be achieved in the previous stage (ODP tonnes)								0.00
4.5.3	Remaining eligible consumption for HCFC-21 (ODP tonnes)								0.00
4.6.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)								76.83
4.6.2	Phase-out of HCFC-22 to be achieved in the previous stage (ODP tonnes)								17.25
4.6.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)								255.46
4.7.1	Total phase-out of HCFC-225 agreed to be achieved under this Agreement (ODP tonnes)								0.00
4.7.2	Phase-out of HCFC-225 to be achieved in the previous stage (ODP tonnes)								0.00
4.7.3	Remaining eligible consumption for HCFC-225 (ODP tonnes)								0.08

*Date of completion of stage I as per stage I Agreement: 31 December 2016

APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

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

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

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

- (a) A narrative report, with data provided by tranche, describing the progress achieved since the previous report, reflecting the situation of the Country in regard to phase out of the Substances, how the different activities contribute to it, and how they relate to each other. The report should include the amount of ODS phased out as a direct result from the implementation of activities, by substance, and the alternative technology used and the related phase-in of alternatives, to allow the Secretariat to provide to the Executive Committee information about the resulting change in climate relevant emissions. The report should further highlight successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Tranche Implementation Plan(s), such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this Agreement, or other changes;
- (b) An independent verification report of the Plan results and the consumption of the Substances, as per sub-paragraph 5(b) of the Agreement. If not decided otherwise by the Executive Committee, such a verification has to be provided together with each tranche request and will have to provide verification of the consumption for all relevant years as specified in sub-paragraph 5(a) of the Agreement for which a verification report has not yet been acknowledged by the Committee;
- (c) A written description of the activities to be undertaken during the period covered by the requested tranche, highlighting implementation milestones, the time of completion and the interdependence of the activities, and taking into account experiences made and progress achieved in the implementation of earlier tranches; the data in the plan will be provided by calendar year. The description should also include a reference to the overall Plan and progress achieved, as well as any possible changes to the overall Plan that are foreseen. The description should also specify and explain in detail such changes to the overall plan. This description of future activities can be submitted as a part of the same document as the narrative report under sub-paragraph (b) above;
- (d) A set of quantitative information for all Tranche Implementation Reports and Plans, submitted through an online database; and
- (e) An Executive Summary of about five paragraphs, summarizing the information of the above sub paragraphs 1(a) to 1(d).

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

- (a) The Tranche Implementation Reports and Plans referred to as part of this Agreement, will exclusively refer to activities and funds covered by this Agreement; and
- (b) If the stages under implementation have different HCFC consumption targets under Appendix 2-A of each Agreement in a particular year, the lower HCFC consumption target will be used as reference for compliance with these Agreements and will be the basis for the independent verification.

APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES

1. The monitoring process will be managed by the Department of Environment (DOE) through the Ozone Protection Section with the assistance of the Lead IA.

2. The consumption will be monitored and determined based on official import and export data for the Substances recorded by relevant government departments.

3. DOE shall compile and report the following data and information on an annual basis on or before the relevant due dates:

- (a) Annual reports on consumption of the Substances to be submitted to the Ozone Secretariat; and
- (b) Annual reports on progress of implementation of HPMP to be submitted to the Executive Committee of the Multilateral Fund.

4. DOE and Lead IA will engage an independent and qualified entity to carry out a qualitative and quantitative performance evaluation of the HPMP implementation.

5. The evaluating entity shall prepare and submit to DOE and the Lead IA, a consolidated draft report at the end of each annual implementation plan, comprising of the findings of the evaluation and recommendation for improvements or adjustments, if any. The draft report shall include the status of the Country's compliance with provisions of this Agreement.

6. Upon incorporating the comments and explanations as may be applicable, from DOE and Lead IA, the evaluating entity shall finalize the reports and submit to DOE and Lead IA.

7. DOE shall endorse the final report and the Lead IA shall submit the same to the relevant meeting of the Executive Committee along with the annual implementation plan and reports.

APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY

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

- (a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's HPMP;
- (b) Assisting the Country in preparation of the Tranche Implementation Reports and Plans as per Appendix 4-A;

- (c) Providing independent verification to the Executive Committee that the Targets have been met and associated tranche activities have been completed as indicated in the Tranche Implementation Plan consistent with Appendix 4-A;
- (d) Ensuring that the experiences and progress is reflected in updates of the overall plan and in future Tranche Implementation Plans consistent with sub-paragraphs 1(c) and 1(d) of Appendix 4-A;
- (e) Fulfilling the reporting requirements for the Tranche Implementation Reports and Plans and the overall plan as specified in Appendix 4-A for submission to the Executive Committee;
- (f) In the event that the last funding tranche is requested one or more years prior to the last year for which a consumption target had been established, annual tranche implementation reports and, where applicable, verification reports on the current stage of the Plan should be submitted until all activities foreseen had been completed and HCFC consumption targets had been met;
- (g) Ensuring that appropriate independent technical experts carry out the technical reviews;
- (h) Carrying out required supervision missions;
- (i) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Tranche Implementation Plan and accurate data reporting;
- (j) In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country, the allocation of the reductions to the different budget items and to the funding of the Lead IA;
- (k) Ensuring that disbursements made to the Country are based on the use of the indicators;
- (l) Providing assistance with policy, management and technical support when required; and
- (m) Timely releasing funds to the Country/participating enterprises for completing the activities related to the project.

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

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

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US \$80 per ODP kg of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met, on the understanding that the maximum funding reduction would not exceed the funding level of the tranche being requested. Additional measures might be considered in cases where non-compliance extends for two consecutive years.

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