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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Sixty-third Meeting
Montreal, 4-8 April 2011

PROJECT PROPOSAL: VIET NAM

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

Phase-out

- HCFC phase-out management plan (stage I, first tranche) World Bank

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

Viet Nam

(I) PROJECT TITLE	AGENCY
HCFC phase-out management plan (stage I, first tranche)	World Bank

(II) LATEST ARTICLE 7 DATA	Year: 2009	207.5 (ODP tonnes)

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP tonnes)									Year: 2009
Chemical	Aerosol	Foam	Fire fighting	Refrigeration		Solvent	Process agent	Lab Use	Total sector consumption
				Manufacturing	Servicing				
HCFC123					0.02				0.02
HCFC141b		52.58							52.58
HCFC-141b in Imported Pre-blended		682.00							682.00
HCFC22				86.46	68.42				154.88

(IV) CONSUMPTION DATA (ODP tonnes)			
2009 - 2010 baseline:	221.2	Starting point for sustained aggregate reductions:	385.8
CONSUMPTION ELIGIBLE FOR FUNDING (ODP tonnes)			
Already approved:		Remaining:	

(V) BUSINESS PLAN		2011	2012	2013	2014	Total
World Bank	ODS phase-out (ODP tonnes)	34.0	14	14	12	73
	Funding (US $)	7,525,000	3,225,000	2,603,000	2,156,000	15,509,000

(VI) PROJECT DATA			2011	2012	2013	2014	2015	Total
Montreal Protocol consumption limits					221.2	221.2	199.1	
Maximum allowable consumption (ODP tonnes)					221.2	221.2	199.1	
Project Costs requested in principle(US$)	World Bank	Project costs	4,103,693		7,930,807		1,337,887	13,372,387
		Support costs	307,777		594,811		100,342	1,002,929
Total project costs requested in principle (US $)			4,103,693		4,103,693		7,930,807	
Total support costs requested in principle (US $)			307,777		307,777		594,811	
Total funds requested in principle (US $)			4,411,470		4,411,470		8,525,618	

(VII) Request for funding for the first tranche (2011)		
Agency	**Funds requested (US $)**	**Support costs (US $)**
World Bank	4,103,693	307,777
Funding request:	Approval of funding for the first tranche (2011) as indicated above	
Secretariat's recommendation:	For individual consideration	

PROJECT DESCRIPTION

1. On behalf of the Government of Viet Nam, the World Bank, as the designated implementing agency, has submitted to the 63rd Meeting of the Executive Committee stage I of the HCFC phase-out management plan (HPMP) at a total cost of US $20,769,400 plus agency support costs of US $1,557,705 for the World Bank, as originally submitted. The Government of Viet Nam is requesting the approval of US $7 million and agency support costs of US $525,000 for the World Bank for the implementation of the first tranche of stage I of the HPMP.

Background

2. The Ministry of Industry and Trade (MOIT) and the Ministry of Natural Resources and Environment (MONRE) of Viet Nam are responsible for Montreal Protocol activities. MONRE also serves as the National Focal Point for the United Nations Framework Convention on Climate Change and the Kyoto Protocol. With the assistance of the Multilateral Fund, MONRE oversees the national programme to control ozone-depleting substances (ODS), enforces national policies and raises public awareness of Viet Nam's international obligations under the Montreal Protocol. The Ministry of Agriculture and Rural Development (MARD) is also a stakeholder in the HCFC phase-out process due to its role in the fish processing sector in which HCFC-22 is consumed.

3. The MOIT and MONRE issued an ODS licensing regulation which came into force on 10 August 2005. The licensing system covers all ODS, i.e. including HCFCs, with the exception of methyl bromide which is controlled under a MARD regulation. The Government of Viet Nam plans to extend the import quota system to HCFCs, as soon as the HPMP is approved by the Executive Committee. Once the HCFC import quota system is in place as of 1 January 2012, MONRE will no longer register any new importers of HCFCs.

HCFC consumption

4. Viet Nam consumes HCFCs in the manufacture of foam, refrigeration and air-conditioning (AC) products, as well as for servicing refrigeration equipment and systems. Country programme data reports for the period 2005 through 2009 indicate that 48 per cent of HCFC consumption is in the refrigeration and AC manufacturing sectors, 38 per cent in the servicing sector and 14 per cent for foam blowing. Viet Nam has no HCFC production or exports.

5. The total HCFC consumption and sectoral distribution is shown is Table 1. HCFC consumption increased from 130 ODP tonnes (2,070 metric tonnes (mt)) in 2005 to 207.5 ODP tonnes (3,294 mt) in 2009, indicating an average annual growth rate of over 15 per cent over the 2005 to 2009 period. The sharp growth in HCFC-22 consumption in the past few years is due to a rapid increase in the demand for residential air conditioning and cold storage systems.

Table 1: HCFC consumption in Viet Nam

Consumption Sector	2005		2006		2007		2008		2009	
	mt	ODP	mt	ODP	mt	ODP	mt	ODP	mt	ODP
HCFC-22 manufacturing	1709.00	94.00	2131.59	117.24	2324.59	127.85	1,452.00	79.86	1,572.00	86.46
HCFC-22 servicing							968.00	53.24	1,244.00	68.42
HCFC-141b foam	325.00	35.75	345.00	37.95	358.00	39.38	367.00	40.37	478.00	52.58
HCFC-123 servicing	22.00	0.44	60.80	1.22	39.80	0.80	9.00	0.18	1.00	0.02
Total	2,070.00	130.96	2,537.30	156.40	2,744.30	169.23	2,796.00	173.65	3,295.00	207.48

6. The baseline level for HCFC consumption is estimated at 221.2 ODP tonnes based on the actual 2009 Article 7 data of 207.5 ODP tonnes and an estimated 2010 consumption of 234.9 ODP based on average growth rates of HCFC-22 and HCFC-141b. Table 2 provides details.

Table 2: Estimated baseline consumption for Viet Nam

HCFC		2009	2010	Baseline
HCFC-22	ODS (mt)	2,816.0	3,219.4	3,017.7
	ODP tonnes	154.9	177.1	166.0
HCFC-141b	ODS (mt)	478.0	525.8	501.9
	ODP tonnes	52.6	57.8	55.2
Total	ODS (mt)	3,294.0	3,745.2	**3,519.6**
	ODP tonnes	207.5	234.9	**221.2**

7. The survey indicated that HCFC-141b consumption may be levelling off in 2010, however this is due to the increasing use of HCFC-based imported premixed polyols by key foam manufacturers. From 2007 to 2009 purchase of HCFC-based premixed polyol grew by 12 per cent and resulted in the use of 170 ODP tonnes (1,545.5 mt) of HCFCs in 2009 over and above the official 2009 HCFC consumption of 207.5 ODP tonnes.

8. The development of the fisheries sector and seafood industry will result in an expansion of fish storage and processing plants and an estimated total output of 7 million tonnes of seafood. Demand for HCFC-22 consumption in the refrigeration and AC manufacturing sector is expected to increase by 12 to 13 per cent annually due to the increased purchasing power and the availability of domestically-made units. HCFC-22 servicing demands will thus also rise.

9. HCFC consumption is projected to grow and peak at 274.4 ODP tonnes in 2012 and, according to this projection, Viet Nam would have to eliminate 52.6 ODP tonnes of HCFCs to meet the 2013 freeze, and a further 22 ODP tonnes to meet the 2015 reduction i.e., a total phase-out of 75 ODP tonnes.

Overview of sectoral consumption of HCFCs

10. In 2009 Viet Nam imported HCFC-22, HCFC-141b and HCFC-123 through 17 of its 24 registered importers. These HCFCs are used for manufacturing foam and refrigeration and AC products, as well as for servicing the existing fleet of refrigerators, chillers and other refrigeration systems. The manufacturing sector has over 150 enterprises: approximately 75 foam blowing, 11 AC, 30 industrial cold storage contractors, and several ice-makers.

Foam sector

11. HCFC consumption in the foam sector amounts to 25 per cent of the overall HCFC consumption on an ODP basis. In addition to the 52.6 ODP tonnes (478 mt) of HCFC-141b consumption reported under Article 7 of the Montreal Protocol in 2009, the foam enterprises imported 6,442 tonnes of pre-blended polyol containing 170.0 ODP tonnes (1,545.5 mt) of HCFC-141b. The 2007-2009 average amount of HCFC-141b contained in imported pre-blended polyols amounts to 164.6 ODP tonnes (1,496.1 mt).

12. The survey identified a total of 185 foam manufacturers covering four foam applications: polyurethane (PU) rigid foam, integral skin foam, flexible PU foam and extruded polystyrene. However, only 66 of these enterprises use HCFC-141b (two of the enterprises were established after the cut-off date of 21 September 2007). Eleven of the enterprises use bulk HCFC-141b and pre-blended polyols, one uses bulk HCFC-141b only, and the remaining use pre-blended polyols only. The 12 locally owned enterprises using bulk HCFC-141b are the larger foam producers in Viet Nam. They were all established before the cut off date of 21 September 2007 and sell their products in the domestic market. Their total consumption of bulk HCFC-141b in 2009 amounted to 50.8 ODP (462 mt), while the total consumption of HCFC-141b contained in imported pre-blended polyols amounted to 89.4 ODP tonnes (812.6 mt).

13. Three of the 12 larger foam enterprises received funding from the Multilateral Fund to convert from CFC-11 to HCFC-141b technologies (i.e., Searefico, Searee and Insulation Panel (6M)). The total consumption of HCFC-141b in these three second-stage conversion enterprise represents 27 per cent of the total consumption of HCFC-141b (excluding polyols) in the foam sector in Viet Nam.

Table 3: HCFC-141b consumption in the three second-stage foam conversion enterprises

Company	2007		2008		2009	
	Bulk	**Imported polyol**	**Bulk**	**Imported polyol**	**Bulk**	**Imported polyol**
Metric tonnes						
Searee	25.0	111.0	25.0	115.0	40.0	102.0
Searefico	30.0	690.0	35.0	730.0	55.0	600.0
Insulation Panel (6M)	28.0	133.0	23.0	135.0	35.0	125.0
Total (mt)	83.0	934.0	83.0	980.0	130.0	827.0
ODP tonnes						
Searee	2.8	12.2	2.8	12.7	4.4	11.2
Searefico	3.3	75.9	3.9	80.3	6.1	66.0
Insulation Panel (6M)	3.1	14.6	2.5	14.9	3.9	13.8
Total (ODP tonnes)	9.1	102.7	9.1	107.8	14.3	91.0

Refrigeration and air conditioning (AC) manufacturing sector

14. Refrigeration and AC manufacturing amounted to 47.7 per cent of the consumption of HCFC in Viet Nam in 2009, measured in metric tonnes for the manufacture of residential AC, commercial and industrial refrigeration systems and equipment, and ice makers as shown in Table 4.

Table 4: 2009 consumption of HCFC-22 in the refrigeration manufacturing sector

HCFC-22 Manufacturing	Quantity (mt)	Quantity (ODP tonnes)
Residential air-conditioning	659	36.2
Industrial: building air-conditioning (chillers)	100	5.5
Industrial: cold storage	570	31.4
Industrial: ice-making	100	5.5
Other	143	7.9
Total	**1,572**	86.5

Residential air-conditioners

15. The manufacturing of residential air-conditioners in Viet Nam for the domestic market began in 2004. There are 11 companies (four locally owned, four foreign owned, and three joint with local/foreign ownership) that assemble residential air-conditioners from mostly imported components with an annual output of 458,570 units per year (average 2008 and 2009). Units are charged with HCFC-22 at the end of assembly and in 2008 and 2009, the 11 enterprises consumed 29.5 ODP tonnes (536.5 mt) and 36.2 ODP tonnes (659 mt) of HCFC-22 respectively.

Industrial refrigeration

16. HCFC-22 is used in industrial refrigeration equipment in the cold storage and ice making sub-sectors. Viet Nam has an important aquaculture industry that uses 80 to 90 per cent of the total capacity of HCFC based cold storage systems in the fishery and food processing industries. There are 323 enterprises using HCFC-22 which are located in 30 different provinces and cities comprising about individual 4,000 cold storage units. The survey found 30 enterprises that re-assemble ice making and cold storage equipment, using second hand components and compressors, and obtained data from 23 of these. These manufacturers have limited engineering capacity and purchase equipment based on its cost rather than its performance.

17. Cold storage equipment is estimated to contain about 300 mt of HCFC-22. Since the equipment is out-of-date units have to be recharged every three to six months resulting in the consumption of about 100 mt of HCFC-22 each year. In the fishery sector, most cold storage systems are operated 24 hours per day and have high electrical consumption in addition to their refrigerant loss. Barriers to the adoption of energy efficient equipment are the high investment costs, perceived technology risks as to whether energy efficiency performance can be sustained over a long period, lack of awareness of potential savings and competing investment priorities.

18. There are a total of about 782 ice making facilities in Viet Nam using mostly second-hand imported machines with HCFC-22 as refrigerant. Leakages require most of the facilities to be recharged every three or four months and the volume of recharged refrigerant accounts for about 10 per cent of the total volume in each unit (about 42 mt HCFC-22 annually for 391 facilities with 996 units).

19. All industrial chillers installed in Viet Nam are imported. There are 37 facilities with HCFC-123 based chillers operating in Viet Nam out of 125 centrifugal chillers in total. It is estimated that about 100 mt of HCFC-22 are consumed to charge new chillers installed in Viet Nam. In 2009, only 1 mt of HCFC-123 was imported for servicing purposes.

Servicing

20. The HPMP survey indicated that only 142 of the 2,129 service facilities in Viet Nam consume over 1.1 mt of HCFC-22 per year as shown in Table 5. The remaining service shops are small scale. All facilities service both the refrigeration and AC sectors.

Table 5: Size of service shops by amount of HCFC-22 consumption

HCFC-22 consumption (kg/year)	Number of service shops	Scale
10-100	390	Very small
110-500	1,372	Small
510 – 1000	225	Average
1100 – 4000	125	Large
>4000	17	Very large
Total	**2,129**	

Solvent sector

21. The HPMP survey did not reveal any consumption of HCFCs in the solvent sector.

Overall strategy of the HPMP

22. The main objective of the HPMP for Viet Nam is to assist the Government to comply with the HCFC 2013 and 2015 reduction targets. Phasing out of HCFCs, mainly used for thermal insulation, residential air-conditioning and industrial cold-storage equipment, presents an opportunity for synergies between the ozone and climate protection as per decision XIX/6. Accordingly, the HPMP proposes a combination of policies, regulations, technical assistance activities and financial incentives to industry and Government which are embedded in an overarching framework that leads to global ozone and climate co-benefits while allowing the country to meet its development objectives of sustained levels of economic growth and industrial modernization and expansion.

Stage I of the HPMP

23. Consumption of 50.8 ODP tonnes (462 mt) of bulk HCFC-141b in 12 foam enterprises representing 96.6 per cent of the country's HCFC-141b consumption reported under Article 7 of the Montreal Protocol will be phased out. Additionally, the Government also plans to phase-out 89.3 ODP tonnes (812.6 mt) of HCFC-141b in imported pre-blended polyol used by the same 12 companies. The introduction of a quota system for HFCF-141b in 2011 will cap consumption by 2012 and the Government will introduce a complete ban on imports of bulk HCFC-141b by the completion of stage I.

24. An analysis of HCFC growth trends revealed that the complete phase-out of HCFC-141b by 1 January 2015 would not enable Viet Nam to meet its 2013 and 2015 consumption limits since HCFC-22 consumption would continue to grow beyond 2012; see Table 7.

Table 7: Consumption of HCFC by sector: phase-out model under stage I of the HPMP

	Unit	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
HCFC-22 Manufacturing	Mt	1,572.0	1,776.4	2,007.3	2,007.3	1,757.2	1,507.2	1,257.1
	ODP	86.5	97.7	110.4	110.4	96.6	82.9	69.1
Reduction required from 2009 level	*ODP*							17.3
HCFC-22 Servicing	Mt	1,244.0	1,443.0	1,673.9	1,824.6	1,988.8	2,167.8	2,362.9
	ODP	68.4	79.4	92.1	100.4	109.4	119.2	130.0
HCFC-141b Foam	Mt	478.0	525.8	578.4	578.4	140.0	70.0	-
	ODP	52.6	57.8	63.6	63.6	15.4	7.7	-
Reduction required from 2009 level	*ODP*							52.6
All HCFCs								
Total	Mt	3,294.0	3,745.2	4,259.6	4,410.3	3,886.0	3,745.0	3,620.0
Total	ODP	207.5	234.9	266.1	274.4	221.4	209.8	199.1
Total Phase-out in stage I (ODP tonnes)								**70***

* MLF funding is requested for 68.8 ODP tonnes.

25. The Government has decided to address the HCFC-22 consumption in the residential AC manufacturing sector. The residential AC sector was chosen for stage 1 since the cold storage sector (fisheries) would be better addressed subsequently as an entire sector and the commercial refrigeration sector would involve hundreds of enterprise. Activities to tackle the conversion in six locally owned enterprises in the residential AC sector to phase out 17.4 ODP tonnes of HCFC-22 will be implemented in the latter years of stage I due to the longer lead time required for technology transfer, capacity building and parallel support on the energy efficiency side. The additional 19 ODP tonnes of consumption in the residential AC sector from five foreign owned AC manufacturing enterprises would be addressed through

government policy. Following the conversion in the period of 2013-2016 a ban on locally manufactured and imported AC equipment containing HCFC-22 would be introduced.

26. The World Bank had originally submitted, as sole activity in the service sector, the preparation of a methodology for CDM, aimed at avoiding HFC-23 emissions through reducing the use of HCFC-22 in the service sector. The income from that activity was meant to supplement the support by the Multilateral Fund and ensure sufficient funds for the service sector, achieving long-term sustainability.

27. The stage I HCFC phase-out approach would be supported by closely matched sector policies and regulatory measures. Key policy instruments will focus on controlling and monitoring imports and discouraging the demand for HCFCs. Policies and regulations to be prepared and issued from 2011 to 2015 are summarized in Table 8. The levels of HCFC-141b and HCFC-22 consumption in the manufacturing sectors will be frozen in 2012 at the 2011 consumptions levels through import quotas supported by an environmental tax on HCFC imports to take effect as of 1 January 2012.

Table 8: Policies and regulations to be prepared and issued from 2011 to 2015

Classification	Policy	Year of issuance	Estimated date of effectiveness
Foam sector			
Import control	To issue quotas for HCFC-141b importation annually starting from 2012 (licensing system is already in place). Import quotas will be provided based on the share of the average imports during the past three years. The quota will not be transferable, as was the case for CFC control.	2011 and beyond	1 January 2012 and beyond
	No new HCFC-141b importers will be registered – quota system used for CFCs will be extended to HCFC	2011	2012
	Operative ban through the quota system by not permitting imports of bulk HCFC-141b for the foam sector	2015	1 January 2016
Consumption control	Ban on new or expansion of existing foam production facilities using HCFC-141b and HCFC-based polyol in the foam sector	2012	2012
	A policy statement or official notification that there should be no use of HCFCs and HCFC-based polyol in new installations in line with the national HPMP.	2012	2012
	Safety management requirements for PU foam enterprises using Hydrocarbons as blowing agent	2012	2013
	National standard of foam used in different sub-sectors	2014	2014
Air-conditioning sector			
Import control	To issue quotas for HCFC-22 importation annually starting from 2012. Import quotas will be provided based on the share of the average imports during the past three years. The quota will not be transferable, as was the case for CFC control.	2011	2012
	No new HCFC-22 importers will be registered – quota system used for CFCs will be extended to HCFCs	2011	2012
Consumption control	Ban on new, or expansion of existing facilities using HCFCs in the air-conditioning sector	2012	2012
	A ban in new manufacturing of AC units with HCFC-22 for both local and Art.5 owned companies, and non-Art. 5 owned companies.	2015/2016	2016/2017
	Ban on the import of HCFC-22-containing AC equipment.	2015/2016	2016/2017
Refrigeration sector			
	To be decided upon based on implementation results of the TA activities for energy efficiency promotion in the sector.		
Other overall policies			

Classification	Policy	Year of issuance	Estimated date of effectiveness
Environmental labelling	Technical requirement for environmental labelling products – ODS alternatives	2011/2012	2012/2013
Environmental tax	Environmental tax on HCFCs	2010	1 January 2012
Local policy	Encourage local governments to formulate and issue related local policies for regional phase-out	*tbd*	*tbd*

28. Technical assistance and capacity building activities would additionally aim to control growth in the other HCFC consuming sectors and lay the groundwork for subsequent investment activities in 2015 and beyond.

Table 9: Descriptions of technical assistance activities

Technical assistance	Activities
HCFC consumption phase-out in foam and air-conditioning sectors	-Training workshops for the foam and AC enterprises to be involved in stage I -Technical consultant services -Development of product standards -Training for local and provincial government officers -Study tours on HCFC alternatives
Technical assistance on energy efficiency improvement in the residential air-conditioning sector	-Technical capacity building for certifying energy efficiency of the residential air-conditioning equipment -Energy efficiency ratio (EER) Testing for residential air-conditioning units manufactured by the local manufacturers in Viet Nam -Promotion of energy efficiency awareness in the cold storage sector -Technical assistance activities in the servicing sector
Promotion of energy efficiency awareness in the cold storage sector	-To be done in conjunction with the TA activities for air-conditioning equipment (no Multilateral Fund finance) -Develop an inventory of cold storage facilities -Conduct an energy performance audit of the baseline equipment/industrial refrigeration sector -Develop and distribute a code of good practice for designing, maintenance and servicing of industrial refrigeration system
Technical assistance activities in the servicing sector	-Develop a clean development mechanism (CDM) methodology

29. The World Bank had calculated in its submission that during Stage I of the HPMP, 70.8 ODP tonnes of HCFC would be phased out. This would include a reduction in remaining eligible consumption of 3.06 ODP tonnes in the servicing sector through the preparation of a CDM methodology; this reduction would have to be achieved through regulatory measures, since no support other than the methodology development is foreseen for the service sector during stage 1 of the HPMP. It is estimated that the climate benefit from conversion projects for enterprises under the stage I of the HPMP will amount to 1,046,648 tonnes of CO_2 equivalent per year after completion. The remaining HCFC phase-out amount eligible for future Multilateral Fund assistance in later stages of the HPMP would be 149.9 ODP tonnes according to the World Bank.

Subsequent stages of the HPMP

30. The Government of Viet Nam proposes to submit stage II of the HPMP to the Executive Committee in 2014. Stage II will address HCFC consumption in the remaining HCFC sectors: the refrigeration manufacturing and the servicing sectors, the remaining part of the foam sector (54 other foam enterprises using HCFC in pre blended polyol) and possibly the ship-building sector if there is any

consumption found there. HCFC consumption should be reduced to 140 ODP tonnes by 2020. The following activities are proposed for stage II:

(a) Alternatives to HCFC-141b pre-blended polyol will be introduced to completely convert the foam sector (i.e. in the remaining 54 enterprises);

(b) Technical assistance activities for promoting the enabling environment for adoption of more energy efficient technologies across entire sectors in residential AC and in industrial refrigeration; and

(c) Conversion of cold-storage facilities plus a policy to prevent any new HCFC installations in the fishery and fish processing industry.

31. Viet Nam also proposes additional measures in the 2015-2020 period to address the servicing sector to focus on containment and reuse. Beyond 2020, Viet Nam will continue to phase out HCFC-22 in the refrigeration servicing sector to attain the 2025 and 2030 targets.

Technology selection and costs

Foam sector

32. Following a review of the available alternative technologies, hydrocarbon technology was chosen as the preferred technology for 11 foam enterprises while water blown (CO_2) technology was selected by the only shoe sole manufacturer (MINDICO). Conversion to hydrocarbon technology includes installation of hydrocarbon storage tanks, electrical and piping systems; pre-mixing stations, retrofit of the foam machines; safety related equipment for the introduction of a flammable technology; technology transfer and training. Conversion to water blown technology mainly includes replacement of the foam dispensers by high pressure units. The cost for the conversion of the entire foam sector in Viet Nam has been estimated at US $16,365,100 to phase out 219.2 ODP tonnes (1,993.0 mt) of HCFC-141b (including that contained in imported pre-blended polyols). Of this amount, the Government is requesting US $11,983,000 for the phase-out of 140.1 ODP tonnes (1,274.6 mt) during stage I of the HPMP (i.e., 50.8 ODP tonnes of HCFC-141b reported under Article 7 of the Protocol plus 89.3 ODP tonnes contained in imported pre-blended polyols).

33. Based on the CFC phase-out experience conversions are expected to take three years and thus conversion projects will require that funds are committed by the end of 2011 to ensure completion by December 2014. It is estimated that US $5,560,100 will be needed to convert the remaining 54 foam enterprises using imported HCFC-141b pre-blended polyols in a later phase.

Residential air-conditioning sector

34. Investment activities in the residential AC sector will convert six locally owned/partially locally owned enterprises. Following a review of available technologies HFC blends (HFC-410A in particular) were chosen to replace HCFC-22 in air-cooled systems. Hydrocarbons were not considered suitable as hydrocarbon compressors are not available locally and the technology would require significant upgrading of the manufacturing installations for safety reasons. The cost of adopting HFC-410A will include the purchase of equipment (pressure test and drying equipment, leak detection equipment, vacuum pumps), as well as the cost for quality inspection, finishing and testing. Conversions should commence by the end of 2012 in order to ensure completion of all projects by December 2015.

35. For converting the residential AC sector, the amount of US $6,671,000 was originally requested from the Multilateral Fund.

Total costs

36. The total costs for stage I of the HPMP including technical assistance and project management costs are presented in Table 10.

Table 10: Total costs for implementation of stage I of the HPMP for Viet Nam as submitted

Project components	Proposed MLF cost (US $)	Proposed cost from other sources	Counterpart funding
Investment			
Foam sector			
ICC	9,091,000		
IOC	2,892,000		
Subtotal	11,983,000		
Air-conditioning sector			
ICC	1,318,000		
IOC	5,353,000		
Subtotal	6,671,000		4,734,000
Total	**18,654,000**		
TA, policy and project management, including for the foam and AC sectors			
TA and polices (4% of investment)	746,160		
Project management (6% of investment) (2011-2015)	1,119,240		
Subtotal	1,865,400		
Total	**20,519,400**		
TA in servicing sector			
Methodology development for avoided HFC-23 production in servicing sector	**250,000**		
TA in AC and cold storage sectors			
TA on energy efficiency improvement in the air conditioning and cold storage sectors		2,000,000	
Total for HPMP Stage I	**20,769,400**	**2,000,000**	**4,734,000**

* Only from the six enterprises, and excluding the conversion costs at the other five ineligible enterprises

37. In addition to the funding requested for stage I of the HPMP for Viet Nam, the World Bank has also prepared a cost estimate for the remaining stages of the HPMP for Viet Nam. This includes the phase-out of 792.4 mt (87.2 ODP tonnes) of HCFC-141b in imported pre-blended polyol (based on the 2009 consumption and not on the 2007-2009 average conusmption) with an estimated cost of US $5,560,100; the phase-out of 670 mt (36.85 ODP tonnes) of HCFC-22 in the industrial refrigeration sector, with associated costs of US $10,190,700; the phase-out of HCFC consumption remaining un-addressed in other manufacturing sectors, amounting to 143 mt with unknown amounts for the different HCFC and related costs of US $643,000; and to the phase-out of 1,188 mt (65.34 ODP tonnes) of HCFC-22 consumption in the refrigeration and air conditioning servicing sector with the associated costs of US $5,348,000. With an added 10 per cent for TA activities and the PMU, the estimated funding for the remaining stages amounts to US $23,942,000. The cost of the first phase of the HCFC phase-out in Viet Nam to the Multilateral Fund has been estimated at US $20,769,400. The estimated total funding for Viet Nam to completely phase out the consumption of HCFC amounts to US $44,711,400.

38. To meet the 2013 and 2015 phase-out targets, 50.8 ODP tonnes of HCFC-141b used in the foam sector will be phased out and 36.6 ODP tonnes of HCFC-22 in the residential AC sector; of the latter, 17.4 ODP tonnes will receive funding, the remainder will be phased out in non-eligible enterprises.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

39. The Secretariat reviewed the HPMP for Viet Nam in the context of the guidelines for the preparation of HPMPs (decision 54/39), the criteria for funding HCFC phase-out in the consumption sector agreed at the 60th Meeting (decision 60/44), subsequent decisions on HPMPs made at the 62nd Meeting and the 2011-2014 business plan of the Multilateral Fund.

Starting point for aggregate reduction in HCFC consumption

40. The Government of Viet Nam agreed to establish as its starting point for sustained aggregate reduction in HCFC consumption the average level of consumption in 2009 and 2010, which has been estimated at 221 ODP tonnes; the baseline data can be found in paragraph 6. The business plan indicated a baseline of 215.8 ODP tonnes, based on a lower growth scenario than assumed by the World Bank. In addition, the starting point will include the amount of HCFC-141b contained in imported pre-blended polyols, used by the 66 foam enterprises identified by the World Bank. This amounts to 1,496 mt (164.56 ODP tonnes) based on the average 2007 to 2009 consumption. The starting point will thus be established at 385.8 ODP tonnes.

Servicing sector

41. The World Bank and the Secretariat entered into a series of discussions related to the eligibility of the intended activity in the service sector contained in the original submission, i.e. to solely develop a CDM methodology for the mitigation of HFC-23 emissions during production of HCFC-22 by reducing the amount of HCFC-22 used for service in Viet Nam. The proposal had not contained timelines by when the methodology would be developed, and when any income derived from the methodology would be available for implementation. The HPMP did also not contain any information as to what exactly is planned in the service sector, why more funds are needed, and how they would be spent. There was also no analysis of the costs for the activity, including its reduction of the remaining eligible consumption for Viet Nam, the risks associated such as non-acceptance of the methodology and value of the related credits, and the benefits expected.

42. The Secretariat had raised the issues and, in particular, pointed to the fact that the activity does not appear to contribute to compliance with the 2013/2015 targets; the Secretariat was also concerned that a generic activity would be funded under a national HPMP. The Secretariat and the World Bank agreed to remove the activity from the HPMP for Viet Nam and to allow the World Bank to submit it as a business plan entry and subsequently as a work programme amendment. It was understood that the related activity would be a standalone activity, but that there would be a relation to the HPMP for Viet Nam.

Air conditioning sector

43. The Secretariat welcomed the sectoral phase-out in the air conditioning sector, addressing 11 manufacturers, of which six are eligible to receive support from the Multilateral Fund. The incremental operating cost in the original submission had been revised to reflect the thresholds established in decision 60/44 (f) (viii); the World Bank also agreed to reflect in the phase-out achieved both the phase-out related to activities under the HPMP, and that related to legislative measures concerning non-eligible enterprises. The Government will ensure complete phase-out in the sector through regulatory measures. The Secretariat requested additional information to assess the eligibility of one company, technical details regarding the vacuum pumps, and leak detectors.

Foam sector

44. The Foam Sector Plan was reviewed taking into account recent developments in PU technology, as well as the technical review provided with the project proposal. Given that there are plans to assist smaller enterprises to phase out their use of HCFC-141b, it is essential that the whole range of conversion technologies available to the enterprises, currently and in the immediate future, be reviewed and assessed. This would enable the foam enterprises to make informed decisions with regard to selection of conversion technologies that would ensure long-term economic benefit and sustainability. In this regard, it was noted that the technology chosen for the eleven rigid foam enterprises is hydrocarbon. While the technology is appropriate for almost all the applications, it appears that its use for the application of PU foam blocks for one of the companies (Thanh Canh) would require further assessment to address safety matters. The World Bank explained that the block foam manufactured at Thanh Canh is for the refrigerated truck/reefers industry. Pentane-based foaming technologies have evolved during the past years in Western Europe and are presently the predominant technologies used for this application. The World Bank's foam technical expert has assessed the safety requirements, and the corresponding costs have been indicated in the project document. Hiring a special safety expert from a non-Article 5 block manufacturing plant will be considered during implementation on a need-to basis.

45. The Secretariat and the World Bank discussed the costs of ancillary equipment such as hydrocarbon storage facilities, safety and fire protection systems, and ventilation and exhaust systems, where the cost was found to be higher than in other similar projects, or appeared to be ineligible for funding. The costs for installing new polyol tanks and new water chillers were not considered to be incremental costs as they are not required for use of hydrocarbon technology per se. The funding request for technology transfer support, trials and testing, training and safety certification/audits was adjusted after consideration of various factors, including the size and scope of the activities and the number of enterprises involved. Incremental operating costs were calculated using the formulation ratios between the HCFC-based foam and the foams based on the selected technologies, which were higher than the US $1.60/kg for HCFC-141b agreed by the Executive Committee (decision 60/44). All these issues were satisfactorily addressed, resulting in a revised funding of US $8,876,200 (i.e., US $6,837,200 capital costs and US $2,039,000 operating costs) for the conversion of the 12 largest foam enterprises in the country. Once the project is completed, a total of 140.1 ODP tonnes (1,273.6 mt) of HCFC-141b will be phased-out (i.e., 50.8 ODP tonnes reported under Article 7 of the Protocol plus 89.3 ODP tonnes contained in imported pre-blended polyols).

46. It is to be noted that all the enterprises using HCFC-141b based imported pre-blended polyols in the country have been included in the overarching strategy; a sector plan for the complete phase-out of the use of HCFC-141b in imported pre-blended polyol has also been included in the HPMP. It is estimated that about 73.7 ODP tonnes (670 mt) of HCFC 141b contained in imported pre-blended polyol used by 54 foam enterprises will be phased out at a later stage of the HPMP. The Government is proposing to cap consumption of HCFC-141b by 2012 and a complete ban on imports of bulk HCFC-141b once stage I of the HPMP is completed. The Government also recognizes the importance of monitoring the 12 foam enterprises included in stage I of the HPMP. It will be part of the responsibility of the PMU to monitor these enterprises to ensure that they will not revert to produce foam with HCFC-141b blowing agent or to use imported HCFC-141b-based pre-blended polyol after conversion is completed (these enterprises will sign commitments with the Government; any violation will result in return of funding).

Second stage conversion

47. Three enterprises in the foam sector are second-stage conversion projects, Insulation Panel (6M); SEAREE; and SEAREFCO. The total consumption of these three enterprises as well as their share of several sub-sets of the national consumption is provided in table 11 below.

Table 11: HCFC use and consumption for three enterprises in the foam sector (second conversion)

	HCFC-141b (bulk) (mt)	HCFC-141b in polyol (mt)	Total (mt)	Total (ODP)
Use HCFC-141b at 3 enterprises, second-stage conversion	130.0	216.5	346.5	38.12
National use HCFC-141b	462.0	1,600.0	2,062.0	226.82
Share of enterprises in national HCFC-141b use	28.1%	13.5%	16.8%	16.8%
HPMP stage I consumption phase-out				87.1
Share of enterprises in HPMP stage 1 consumption phase-out				16.4%*
Total HCFC consumption (2009)				207.5
Share of enterprises in total HCFC consumption				6.9%*
Total HCFC consumption in the manufacturing sector				139.1
Share of enterprises in total HCFC consumption in the manufacturing sectors				10.3%*

*Refers to bulk HCFC-141b consumption only

48. The cost-effectiveness (CE) value of the proposed second-stage conversion projects is US $6.73/kg in comparison with the average CE of the whole foam sector of US $6.96/kg (or US $61.18/ODP kg versus US $63.27/ODP kg). The CE value of the air-conditioning sector as a whole is US $4.98/kg or US $90.54/ODP kg. Considering that the amount of HCFC-141b imported by the three second-stage conversion enterprises represents over 28 per cent of the total HCFC-141b consumption in the country, the phase-out will contribute to meet the 2013 and 2015 phase-out targets. Furthermore, once all the foam enterprises using bulk HCFC-141b have been converted (by end of 2014), the Government will introduce a ban on the import of HCFC-141b.

Impact on the climate estimated by the country in its HPMP

49. Viet Nam has proposed technical assistance activities in the HPMP which would directly lead to the reduction of HCFC-consumption at the users level. The activities foreseen in this HPMP are training workshops for beneficiaries, technical consultant services, training for local and provincial government officers, review, revision, formulation and enforcement of policies and technical standards, and public awareness activities. Consequently, it is unlikely that there will be climate impact directly attributable to these activities. The 2011-2014 business plan did not mention any specific figure for the climate impact of non-investment activities for Viet Nam, but referred to the figures in the project proposal.

50. A calculation of the impact on the climate of HCFC consumption through the foam project in Viet Nam, based only on the GWP values of the blowing agents and their level of consumption before and after conversion, provides the following results: 1,274.6 mt of HCFC-141b will be phased out, 591.8 tonnes of cyclopentane will be phased in, and 893,995 tonnes of CO_2 that would have been emitted into the atmosphere will have been avoided.

51. The calculation for the climate impact from the phase-out in the air conditioning sector is shown in table 12. The climate impact of the activities proposed results in total emissions of 188,130 CO_2 tonnes more than in the baseline case (HCFC-22). The detailed results are provided in table 12.

Table 12: MCII for air conditioning production in Viet Nam

Input	**Generic**							
	Country	[-]	**Vietnam**					
	System name		9,000 BTU model	12,000 BTU model	18,000 BTU model	24,000 BTU model	36,000 BTU model	48000 BTU model
	System type	[list]	AC onsite assembly	AC onsite assembly	AC onsite assembly	AC onsite assembly	AC onsite assembly	AC onsite assembly
	General refrigeration information							
	HCFC to be replaced	[-]	HCFC-22					
	Amount of refrigerant per unit	[kg]	0.6	1	1.4	2.2	3	3.9
	No. of units	[-]	81014	63616	30376	14594	3000	7830
	Refrigeration capacity	[kW]	2.637	3.516	5.274	7.032	10.548	14.064
	Selection of alternative with minimum environmental impact							
	Share of exports (all countries)	[%]	-	-	-	-	-	-
	Calculation of the climate impact							
	Alternative refrigerant (more than one possible)	[list]	HFC-410A, HC-290	HFC-410A, HC-290	HFC-410A, HC-290	HFC-410A, HC-290	HFC-410A, HC-290	HFC-410A, HC-290
NOTE								
All data displayed is specific to the case investigated and is not generic information about the performance of one alternative; performance can differ significantly depending on the case.								
Output	*Note: The output is calculated as the climate impact of the refrigerant systems in their life time as compared to HCFC-22, on the basis of the amount produced within one year. Additional/different outputs are possible*							
	Country		**Vietnam**					
	System name		9,000 BTU model	12,000 BTU model	18,000 BTU model	24,000 BTU model	36,000 BTU model	48000 BTU model
	Identification of the alternative technology with minimum climate impact							
	List of alternatives for identification of the one with minimum climate impact	[Sorted list, best = top (% deviation from HCFC)]	HC-600a (-22%)	HC-600a (-25%)	HC-600a (-24%)	HC-600a (-27%)	HC-600a (-25%)	HC-600a (-25%)
			HC-290 (-18%)	HC-290 (-21%)	HC-290 (-20%)	HC-290 (-22%)	HC-290 (-21%)	HC-290 (-20%)
			HFC-134a (-6%)	HFC-134a (-6%)	HFC-134a (-6%)	HFC-134a (-7%)	HFC-134a (-6%)	HFC-134a (-6%)
			HFC-407C (0%)	HFC-407C (0%)	HFC-407C (0%)	HFC-407C (0%)	HFC-407C (0%)	HFC-407C (0%)
			HCFC-22	**HCFC-22**	**HCFC-22**	**HCFC-22**	**HCFC-22**	**HCFC-22**
			HFC-410A (6%)	HFC-410A (6%)	HFC-410A (6%)	HFC-410A (6%)	HFC-410A (6%)	HFC-410A (6%)
	Calculation of the climate impact							
	Per unit, over lifetime (for information only):		HCFC-22	HCFC-22	HCFC-22	HCFC-22	HCFC-22	HCFC-22
	Energy consumption	[kWh]	1,048,649,841	1,097,932,181	786,377,356	503,748	155,328,685	540,543,824
	Direct climate impact (substance)	[kg CO2 equiv]	129,332	169,263	113,150	85,427	23,946	81,250
	Indirect climate impact (energy): In country	[kg CO2 equiv]	638,575	668,585	478,864	306,757	94,587	329,164
	Indirect climate impact (energy): Global average	[kg CO2 equiv]	-	-	-		-	-
	Calculation of the climate impact of the conversion							
	System name		9,000 BTU model	12,000 BTU model	18,000 BTU model	24,000 BTU model	36,000 BTU model	48000 BTU model
	Selected refrigerant		**HFC-410A**	**HFC-410A**	**HFC-410A**	**HFC-410A**	**HFC-410A**	**HFC-410A**
	*Total direct impact (post conversion – baseline)**	*[t CO2 equiv]*	*3,498.0*	*4,577.0*	*3,060.0*	*2,310.0*	648	2,197
	*Indirect impact (country)***	*[t CO2 equiv]*	*43,604.0*	*45,654.0*	*32,699.0*	*20,947.0*	6,459	22,477
	*Indirect impact (outside country)***	*[t CO2 equiv]*	-	-	-	-	-	-
	Total indirect impact	*[t CO2 equiv]*	*43,604.0*	*45,654.0*	*32,699.0*	*20,947.0*	*6,459.0*	*22,477.0*
	Total impact of the selected refrigerant	**[t CO2 equiv]**	**47,102**	**50,231**	**35,759**	**23,257**	**7,107**	**24,674**
	Alternative refrigerant		**HC-290**	**HC-290**	**HC-290**	**HC-290**	**HC-290**	**HC-290**
	*Total direct impact (post conversion – baseline)**	*[t CO2 equiv]*	*(128,742)*	*(168,490)*	*(112,633)*	*(85,037)*	*(23,837)*	*(80,879)*
	*Total indirect impact (country)***	*[t CO2 equiv]*	*(6,274)*	*(6,569)*	*(4,636)*	*(3,014)*	*(929)*	*(3,234)*
	*Total indirect impact (outside country)***	*[t CO2 equiv]*	-	-	-	*1*	-	-
	*Total indirect impact***	*[t CO2 equiv]*	*(6,274)*	*(6,569)*	*(4,636)*	*(3,013)*	*(929)*	*(3,234)*
	Total impact of alternative refrigerant	**[t CO2 equiv]**	**(135,016)**	**(175,059)**	**(117,269)**	**(88,050)**	**(24,766)**	**(84,113)**

Co-financing

52. In response to decision 54/39(h) on potential financial incentives and opportunities for additional resources to maximize the environmental benefits from HPMPs pursuant to paragraph 11(b) of decision XIX/6 of the Nineteenth Meeting of the Parties, the World Bank explained that the short-term co-financing sought for technical assistance related to climate benefits is US $2 million. Implementation of the PU foam and air conditioning manufacturing sector conversions will be carried out in the wider context of modernization and improving energy efficiency and in close coordination with ongoing and new projects on energy efficiency, including a US $50 million loan from the International Development Association on energy efficiency improvement in Viet Nam.

2011-2014 Business plan of the Multilateral Fund

53. The World Bank is now requesting US $13,372,388 plus support costs for implementation of stage I of the HPMP. The total value requested for the period 2011-2014 of US $12,937,088 including support cost is below the total amount in the business plan. While this amount represents only 90 per cent of the overall funding, with the last tranche being due in 2015, even the total funding for stage 1 of the HPMP is 7.4 per cent below the value in the business plan.

Overall cost of the HPMP

54. The level of funding agreed between the Secretariat and the World Bank for the implementation of stage I of the HPMP for Viet Nam is US $13,372,388 with an overall cost-effectiveness of US $6.92/kg, as shown in Table 13.

Table 13. Overall cost of Stage 1 of the HPMP for Viet Nam

Activity	Agreed funding level (US $)	Phase-out consumption		Phase-out in imported preblended polyol		Cost effectiveness (US $/kg)
		(mt)	(ODP tonnes)	(mt)	(ODP tonnes)	
Investment						
Foam sector		462.0	50.82	812.60	89.39	6.96
ICC	6,837,200					
IOC	2,039,000					
Sub-total	8,876,200					
Air Conditioning		659.0	36.25			4.98
ICC	1,341,300					
IOC	1,939,216					
Sub-total	3,280,516					
Total investment activities	12,156,716	1,121.0	87.07	812.60	89.39	n/a
Technical assistance						
Technical assistance and policies	486,269				-	n/a
Project management						
Project management (2011 - 2015)	729,403				-	n/a
Total	13,372,388	1,121.0	87.1	812.60	89.39	6.92

Draft Agreement

55. A draft Agreement between the Government of Viet Nam and the Executive Committee for HCFCs phase-out is contained in Annex I to the present document.

RECOMMENDATION

56. The Executive Committee may wish to consider:

(a) Approving, in principle, stage I of the HCFC phase-out management plan (HPMP) for Viet Nam for the period 2011 to 2015, at the amount of US $13,372,388 plus agency support cost of US $1,002,929 for the World Bank;

(b) Noting that the Government of Viet Nam had agreed at the 63rd Meeting to establish as its starting point for sustained aggregate reduction in HCFC consumption the estimated baseline of 221.2 ODP tonnes, calculated using actual reported consumption for 2009 of 207.5 ODP tonnes and the estimated consumption for 2010 of 234.9 ODP tonnes, plus the average consumption of pre-blended polyol in the years 2007 to 2009 of 164.6 ODP tonnes, leading to a total of 385.8 ODP tonnes;

(c) Approving the draft Agreement between the Government of Viet Nam and the Executive Committee for the reduction in consumption of HCFCs, as contained in Annex I to the present document;

(d) To deduct 176.5 ODP tonnes of HCFCs from the starting point for sustained aggregate reduction in HCFC consumption;

(e) Requesting the Fund Secretariat, once the baseline data were known, to update draft Appendix 2-A to the Agreement to include the figures for maximum allowable consumption, and to notify the Executive Committee of the resulting change in the levels of maximum allowable consumption; and

(f) Approving the first tranche of stage I of the HPMP for Viet Nam, and the corresponding implementation plan, at the amount of US $4,103,693 plus support cost of US $307,777 for the World Bank.

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