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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Sixtieth Meeting
Montreal, 12-15 April 2010

2010 WORK PROGRAMME OF THE WORLD BANK

COMMENTS AND RECOMMENDATION OF THE FUND SECRETARIAT

1. The World Bank is requesting approval from the Executive Committee of US $638,491 for its 2010 Work Programme, plus agency support costs of US $47,887. The Work Programme is attached to this document.

2. The activities proposed in World Bank's Work Programme are presented in Table 1 below:

Table 1: World Bank's Work Programme

Country	Activity/Project	Amount Requested (US $)	Amount Recommended (US $)
SECTION A: ACTIVITIES RECOMMENDED FOR BLANKET APPROVAL			
A1. Renewal of institutional strengthening projects:			
Philippines	Renewal of institutional strengthening project (Phase VII)	158,491	158,491
	Subtotal for A1:	158,491	158,491
A2. Project preparation of HPMP (investment component)			
Jordan	Preparation of HCFC refrigeration sector plan (commercial)	30,000	30,000
Viet Nam	Preparation of HCFC foam and refrigeration sector plan	200,000	200,000
	Subtotal for A2:	230,000	230,000
SECTION B: ACTIVITIES RECOMMENDED FOR INDIVIDUAL CONSIDERATION			
B1. Technical Assistant:			
Global	Resource mobilization for maximizing climate benefits of HCFC phase-out	250,000	*
	Subtotal for B1:	250,000	
	Total for sections A and B	638,491	388,491
Agency support costs (7.5 per cent for project preparation and institutional strengthening, and for other activities over US $250,000, and 9 per cent for other activities under US $250,000):		47,887	29,137
Total:		686,378	417,628

*Project for individual consideration or pending.

SECTION A: ACTIVITIES RECOMMENDED FOR BLANKET APPROVAL

A1. Renewal of institutional strengthening projects

(a) Philippines (Phase VII): US $158,491

Project description

3. The World Bank submitted the request for the renewal of the institutional strengthening (IS) project for the Philippines. The description of this request for the Philippines is presented in Annex I to this document.

Secretariat's comments

4. The Fund Secretariat reviewed the IS terminal report and action plan submitted by the World Bank on behalf of the Philippines to support the renewal request and found that the reports are is in order and consistent with requirements for these renewals. The Secretariat took into account decisions 57/36(b), 58/16 and 59/47, particularly the last decision where the Executive Committee decided "to extend financial support for IS funding for Article 5 Parties beyond 2010 and up to December 2011". In

view of the above decisions, the funding recommended for the IS renewal was calculated on a pro-rata basis up to December 2011 only.

Secretariat's recommendations

5. The Fund Secretariat recommends blanket approval for the IS renewal request for the Philippines at the level of funding pro-rated up to December 2011 as indicated in Table 1 of this document. The Executive Committee may wish to express to the Governments of the Philippines the comments which appear in Annex II to this document.

A2. Project preparation of HPMP (investment component)

Jordan: Preparation for HPMP investment activities (commercial refrigeration sector): US $30,000

Project description

6. The World Bank is requesting for additional funds for the preparation of investment activities for Jordan. The preparation funding for an HCFC phase-out management plan (HPMP) was approved for Jordan at the 55th Meeting, following which project preparation funds for a demonstration project in one company for the refrigeration sector were agreed at the 56th Meeting. This demonstration project has since been converted into an investment project and is being considered at this meeting. All these project approvals were for UNIDO's implementation as lead agency. In its submission, the World Bank indicated that the Government of Jordan has requested it to prepare a project to cover the country's other air conditioning (AC) manufacturer, while developing a sector plan to address climate benefits that encompass all three enterprises in the sector. The Bank indicates that additional funding will be sought outside of the Multilateral Fund to cover the climate benefit aspects for the entire sector for the full project implementation.

Secretariat's comments

7. The Secretariat reviewed the submission in detail, and found that the information provided and the funding requested is consistent with decision 56/16(d). The Secretariat noted that this request is in addition to what has already been submitted by UNIDO for the refrigeration sector, which covers the largest refrigeration company in the country. The total funding requested for this country is within the limits set by decision 56/16(d) where Jordan, based on its HCFC consumption for 2007 is eligible for up to US $100,000 for project preparation of investment projects as part of its HPMP. The Secretariat also noted that consultations have been held between UNIDO and the World Bank as well as the country and that there is a clear understanding on the division of responsibilities for each agency.

Secretariat's recommendation

8. The Secretariat recommends blanket approval for project preparation of the investment activities for the commercial refrigeration sector as part of the HPMP for Jordan at a level of US $30,000.

Viet Nam: Preparation for HPMP investment activities (refrigeration and foam sector): US $200,000

Project description

9. The World Bank is requesting additional funds for the preparation of investment activities for Viet Nam for the refrigeration and the foam sectors. Viet Nam received HPMP preparation funding at the 55th Meeting with the World Bank as the implementing agency. In its submission, the World Bank indicated that based on the supply side survey being conducted under the HPMP, more than 200 enterprises in the commercial and industrial refrigeration sector and another 200 enterprises in the foam

sector have been identified. The request for project preparation funds would allow the Bank to cover at least 15 per cent of identified enterprises in each sector.

Secretariat's comments

10. The Secretariat reviewed the submission in detail, and found that the information provided and the funding requested is consistent with decision 56/16(d). The total funding requested for this country is within the limits set by decision 56/16(d) where Viet Nam, based on its HCFC consumption for 2007 is eligible for up to US $200,000 for project preparation of investment projects as part of its HPMP. The Secretariat also noted that the World Bank has indicated that the preparation of these two sector plans would allow the implementation of investment projects that would cover the required ten per cent reduction in HCFC consumption that the country needs to meet by 2015.

Secretariat's recommendation

11. The Secretariat recommends blanket approval for project preparation of the investment activities for the foam sector (US $100,000) and the refrigeration sector (US $100,000) as part of the HPMP for Viet Nam, as indicated in Table 1 above.

SECTION B: ACTIVITIES RECOMMENDED FOR INDIVIDUAL CONSIDERATION

B1. Technical Assistance

Global: Resource mobilization for HCFC phase-out and climate co-benefits US $250,000

Project description

12. The World Bank submitted a request to the 57th, 58th and 59th Meetings for a technical assistance project for mobilizing resources to maximize climate benefits of HCFC phase-out, at a funding level of US $250,000. This request is being resubmitted by the World Bank for the consideration at this meeting. The proposal includes a concept note describing the objectives, activities, as well as expected results of this project. As the project was not considered in full detail at the previous meetings, the proposal was resubmitted by the World Bank without any changes to that presented at the 59th Meeting.

13. According to the World Bank, the project intends to explore options for preempting an increase in the demand for HFCs or any other high global-warming potential (GWP) gases in the consumption sector as a result of HCFC phase-out in developing countries. The study will review and examine potential mechanisms available for financing the transition to low GWP alternatives, including a scheduled phase-down of HFCs in developing countries and countries with economies in transition. The project will also address technology limitations and the trade-off between energy efficiency gains and low GWP gases in order to maximize overall energy benefits.

14. The World Bank indicates that they will initially produce a detailed terms of reference (TOR) for this study to be submitted for consideration by the Executive Committee once a decision on resource mobilization is taken. The TOR will be used as a basis for this study and will take about 12 months to complete. The final report of the study will be submitted to the Executive Committee as soon as it has been completed.

15. The table below provides a breakdown of the US $250,000 as requested by the World Bank:

Element	Description	US$
Potential volume of carbon dioxide equivalent emission reduction	Review of current HCFC applications and available non-HCFC alternatives; market analysis on penetration of various alternatives (high and low GWP) and estimates on benefits from improved energy performance (taking into account ongoing work of TEAP and OORG)	35,000
Barriers associated with conversion of HCFC technology with baseline energy and resource efficiency to low GWP alternatives with improved energy and resource efficiency	Industrial survey in a selected number of Article 5 countries and Article 2 countries that are major technology providers for each HCFC application	50,000
Consumption and production of HCFCs	Industrial survey focusing on chemical producers in both Article 5 and non-Article 5 countries; market analysis to project trends	10,000
Potential funding resources	Review of existing activities or projects funded by various funding mechanisms; review of existing CDM and non-CDM methodologies; interview with prospective beneficiaries in Article 5 countries; identification of potential sources of financing; development of approaches and project model for securing such resources	55,000
Development of funding criteria/standards/methodologies	Development of tools for capturing co-financing resources outside the MLF	70,000
Stakeholder consultation meetings	3 consultation meetings	30,000
Total		**250,000**

Secretariat's comments

16. Decision XIX/6 paragraph 11(b) of the Nineteenth Meeting of the Parties provided guidance to the Executive Committee to give priority to, *inter alia*, "substitutes and alternatives that minimize other impacts on the environment, including on the climate, taking into account global-warming potential, energy use and other relevant factors", when looking into HCFC phase-out projects. The Executive Committee has so far approved funds for over 160 countries for HPMP preparation. There is an expectation that the HPMPs submitted to the Executive Committee for approval should consider and include financial incentives and opportunities for co-financing, in accordance with decision 54/39. These elements for co-financing could be relevant for ensuring that HCFC phase-out results in benefits in accordance with paragraph 11(b) of decision XIX/6 as mentioned above.

17. The Secretariat notes that with the results of the study proposed by the World Bank being available in 2010 or even later, it may only assist countries by providing guidance to the agencies in the implementation of stage 1 of the HPMP, and in examining their options for co-financing for the preparation of stage 2, as appropriate. In addition, it also notes that there is so far no guidance from the Executive Committee on how climate benefits of HCFC phase-out are to be costed, and whether these costs could be considered as incremental costs under the Multilateral Fund. However, at the 58th and 59th Meetings, the Committee discussed the Multilateral Fund Climate Indicator (MCII) in the context of the paper that examined prioritisation of HCFC phase-out technologies to minimise other impacts on the environment. Discussion on this issue will continue at this meeting.

18. The Executive Committee at its 57th and 58th Meetings, discussed a facility for additional income from loans and other sources. At the 59th Meeting during the discussion of this same agenda item, the Executive Committee, in decision 59/48 requested the Secretariat to consolidate the material presented on

the Special Funding Facility, with any additional contributions submitted by Members by the end of 2009, into a single agenda item addressing both the Facility as well as any issues related to decision XIX/6 paragraph 11(b) of the Nineteenth Meeting of the Parties for consideration at its 60th Meeting. This revised paper is being presented at the 60th Meeting.

19. In line with decision 58/37, the World Bank made a presentation on "mechanisms, such as advanced commitments, for dealing with additional financing and blending Multilateral Fund funds with carbon financing" at the 59th Meeting held in Port Ghalib, Egypt.

Secretariat's recommendation

20. The Executive Committee may wish to consider this proposal in light of the information presented above, and in the discussion under Agenda item 11, Incentives associated with Multilateral Fund climate impact indicator and a Special Funding Facility.

Annex I

INSTITUTIONAL STRENGTHENING PROJECT PROPOSAL

Philippines: Renewal of institutional strengthening

Summary of the project and country profile	
Implementing Agency:	World Bank
Amounts previously approved for institutional strengthening (US $):	
Phase I: Mar-93	209,000
Phase II: Jul-99	139,333
Phase III: Mar-02	181,133
Phase IV year I: Apr-04	90,566
Phase IV year II: Apr-05	90,567
Phase V: Apr-06	181,133
Phase VI: Apr-08	181,133
Total	1,072,865
Amount requested for renewal (Phase VII) (US $):	158,491
Amount recommended for approval for Phase VII (US $):	158,491
Agency support costs (US $):	11,887
Total cost of institutional strengthening Phase VII to the Multilateral Fund (US $):	170,378
Equivalent amount of CFC phase-out due to institutional strengthening Phase VII at US $12.1/kg (ODP tonnes):	n/a
Date of approval of country programme:	1993
ODS consumption reported in country programme (1993) (ODP tonnes):	2,905.1
Baseline consumption of controlled substances (ODP tonnes):	
(a) Annex A Group I (CFCs) (Average 1995-1997)	3,055.8
(b) Annex A Group II (Halons) (Average 1995-1997)	103.9
(c) Annex B Group II (Carbon tetrachloride) (Average 1998-2000)	0
(d) Annex B Group III (Methyl chloroform) (Average 1998-2000)	0
(e) Annex E (Methyl bromide) (Average 1995-1998)	10.3
Latest reported ODS consumption (2008) (ODP tonnes) as per Article 7:	
(a) Annex A Group I (CFCs)	169.4
(b) Annex A Group II (Halons)	0
(c) Annex B Group II (Carbon tetrachloride)	0
(d) Annex B Group III (Methyl chloroform)	0
(e) Annex E (Methyl bromide)	1.8
(f) Annex C Group I (HCFCs)	226.2
Total	397.4
Year of reported country programme implementation data:	2008
Amount approved for projects (US $):	31,236,495
Amount disbursed (as at February 2010) (US $):	26,901,256
ODS to be phased out (ODP tonnes):	3,704
ODS phased out (as at February 2010) (ODP tonnes):	3,699

1. Summary of activities and funds approved by the Executive Committee:

	Summary of activities	**Funds approved (US $)**
(a)	Investment projects:	26,218,630
(b)	Institutional strengthening:	1,072,865
(c)	Project preparation, technical assistance, training and other non-investment projects:	3,945,000
	Total	31,236,495

Progress report

2. Currently in the sixth phase of its Institutional Strengthening (IS) project the Government of Philippines has successfully ushered in a complete ban of Annex A and Annex B consumption of ozone depleting substances by 1 January 2010. During the period of 2008 to 2010, the Philippines Ozone Desk (POD) has concentrated on the elimination of CFC-12 consumption in the servicing sector primarily by management and oversight of the National CFC Phase-out Plan (NCPP) but also through monitoring for illegal importation and trafficking of CFC-12, active enforcement of its Chemical Control Order (CCO) and cooperation with the Bureau of Customs and regional bureaus of the Environment Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR). The POD has also developed and led an initiative for confiscating illegally imported and traded CFCs in the 2008-2010 period.

3. During the sixth phase of the IS, the POD mobilized for the new phase of HCFC elimination with a consultation meeting for stakeholders in order to compile concerns of the different sectors on the accelerated phase-out for future policy-making. The POD continued to collect and report on HCFC consumption under Article 7 and the Montreal Amendment requirements. Other activities included the continuation of the registration of handlers of ODS and updating POD's database. The POD ensured that the non-QPS methyl bromide phase-out schedule was observed as planned by working closely with the Fertilizer and Pesticide Authority under the Department of Agriculture. The POD also oversaw several annual consumption verification audits for both CFC and methyl bromide during the two-year period. Finally, POD has begun taking Decision XIX/6 of the Parties into account in its outreach activities, particularly by integrating climate change concerns in presentations to partner agencies and stakeholders in the country.

4. In addition to this work, the POD undertook its normal programme of work, including implementation of the quota system and management of the licensing system. Other ongoing work included public awareness, monitoring of converted enterprises, and reporting to the Ozone and Multilateral Fund Secretariats. Finally, the POD actively participated in the UNEP network meetings for South East Asia and the 20th and 21st Meetings of the Parties to the Montreal Protocol.

Plan of action

5. The seventh phase of the Philippines' IS will have the dual objectives of ensuring sustainable and complete phase-out of Annexes A, B and E substances, and developing a new programme that addresses Annex C, Group II phase-out of obligations under the Montreal Protocol. The POD therefore has one central goal of overseeing the completion of the NCPP and the methyl bromide phase-out strategy. This entails heavy emphasis on the proper management of ODS that is either installed, stored in cylinders or in circulation within the country, through monitoring, inspection, and enforcement; and on promoting ODS disposal activities. In the 2010-2011 period of the IS, the POD will utilize coordination mechanisms, tools and lessons learned associated with the NCPP to carve out a new strategy and associated policy measures for HCFCs. Most critically will be legal issuances on HCFC phase-out, including a quota system. The POD will continue to lead on the HPMP development process and on identifying investment opportunities to enable the Philippines to meet its 2013 and 2015 HCFC freeze and reduction obligations. Finally, the POD has included regular annual monitoring, reporting and public communication activities in its IS action plan for phase seven.

Annex II

VIEWS EXPRESSED BY THE EXECUTIVE COMMITTEE ON RENEWALS OF INSTITUTIONAL STRENGTHEING PROJECTS SUBMITTED TO THE 60th MEETING

Philippines

1. The Executive Committee has reviewed the terminal report presented with the institutional strengthening project renewal request for the Philippines. The Committee commends the Government of the Philippines for having successfully phased out Annex A and B substances in 2010, while looking ahead towards its HCFC phase-out control measures by instituting a licensing system. The Executive Committee encourages the Philippines to implement the remaining activities under its national CFC phase-out plan as soon as possible in order to ensure that its phase-out achievements are sustained, that the measures put into place under the plan to monitor compliance of the regulated community and enforce national regulations are well institutionalized, and, incidences of illegal ODS trade are thereby pre-empted. It also encourages the Philippines to expedite the preparation of the HCFC phase-out management plan in order for HCFC phase-out activities to commence as soon as possible and allow the country to meet compliance with the 2013 and 2015 phase out targets.

2010 WORK PROGRAM

PRESENTED TO THE 60th MEETING of the EXECUTIVE COMMITTEE

WORLD BANK IMPLEMENTED MONTREAL PROTOCOL OPERATIONS

February 17, 2010

WORK PROGRAM FOR WORLD BANK-IMPLEMENTED MONTREAL PROTOCOL OPERATIONS

1. This proposed work program for Bank-Implemented Montreal Protocol Operations is prepared on the basis of the World Bank 2010 business plan also being submitted to the 60th meeting of the Executive Committee. The proposed 2010 Business Plan consists of investment and non-investment activities to ensure Article 5 partner countries' full compliance with the 2010 complete phase-out of CFCs, halon, and CTC, and also includes activities identified as necessary to assist Article 5 countries to meet their first two HCFC reduction targets (i.e., freeze in 2013 and 10% reduction in 2015).

2. The value of deliverables contained in the proposed 2010 World Bank Business Plan, including investment and non investment activities, totals US $58.54 million, including agency support costs. Funds will be used to support both new and previously approved activities which combined, will capture an estimated 14,600 ODP tonnes in 2010.

3. The proposed 2010 Business Plan includes deliverables of 9 investment activities in 8 countries, totaling roughly US $56.3 million. These include annual work programs for 6 previously approved multi-year projects and 3 new HCFC sector phase-out plans.

4. The proposed 2010 Business Plan allocates US $2.15 million (roughly 3.8% of the total investment deliverables for the year) to support national and sector phase-out plans in Antigua & Barbuda, Thailand and Tunisia, as well as India CFC production closure projects. The Business Plan also allocates US $50.15 (roughly 96% of total investment deliverables for the year) to support national and sectoral HCFC phase-out work in China, Indonesia and Sri Lanka.

5. In 2010, requests to support implementation of previously approved phase-out and sector plans will include subsequent funds for: i) approved CFC phase-out plans in Antigua and Barbuda, Thailand and Tunisia; and, ii) a commercial refrigeration sector plan for Turkey.

6. The Government of China has informed the World Bank that it will submit a request for a technical audit for its HCFC production phase-out for the consideration of the Executive Committee at its 60th Meeting. The formal request, along with preliminary HCFC production data, in accordance with ExCom guidelines, will be submitted to the Multilateral Fund Secretariat shortly.

7. The proposed 2010 Business Plan includes requests to extend support for implementation of four existing institutional strengthening projects in Jordan, the Philippines, Thailand and Tunisia, totaling US$0.992 million.

8. The proposed 2010 Business Plan also includes a request to carry out a comprehensive study on resource mobilization to maximize climate benefits from HCFC

phase-out. The concept note for this proposed activity, along with a breakdown of costs associated with conducting this proposed study, is included in Annex I.

9. The proposed 2010 Work Program, which is being submitted for consideration at the 60th Meeting of the Executive Committee, includes five (5) project preparation funding requests:

10.

i. three (3) for preparation of HCFC phase-out sector plans, as follows:

   a. one (1) for preparation of an HCFC refrigeration sector plan (commercial) in Jordan – The Government of Jordan requested UNIDO to prepare its HPMP, as well as to implement a demonstration project for one AC-refrigeration manufacturer. Stand alone preparatory funds of US $40,000 were approved for the demonstration project.

      |

      The Government of Jordan has requested the Bank to prepare a project to cover the country's other AC manufacturer, while developing a sector plan with climate benefits to cover the total 3 enterprises in the sector, one of which is not eligible for funding from the Multilateral Fund. A proposal for US $30,000 in preparatory funds is being requested to cover preparation costs for the one enterprise (MEC) per Dec. 56/16(f). Additional funding will be sought outside of the Multilateral Fund to cover the climate benefit aspects for the entire sector (3 enterprises, including the one demonstration enterprise covered by UNIDO).

   b. two (2) in Vietnam, one (1) for development of an HCFC Foam Sector Plan and the other (1), for development of an HCFC Refrigeration Sector Plan. Based on the supply side survey being conducted under the HPMP, more than 200 enterprises in the commercial and industrial refrigeration sector and another 200 enterprises in the foam sector have been identified. The request for project preparation funds would allow the Bank to cover at least 15% of identified enterprises in each sector. Taken together, these two sector plans would cover the whole sector with detailed investment plans to capture at least 10% of the expected baseline consumption of 20 ODP tons (300 - 400 MT);

ii. one (1) for initiation of a comprehensive study on resource mobilization to maximize climate benefits from HCFC phase-out; and,

iii. a funding request for the renewal of the institutional strengthening program for the Philippines.

11. The five project preparation funding requests are outlined in Table 1.

Table 1: Project Preparation Funding Requests Submitted for Consideration of the 60th Meeting of the Executive Committee

Country	Request (US$)*	Duration	Description
Jordan	30,000	April 2010 – April 2011	Preparation of HCFC refrigeration sector plan (commercial)
Vietnam	100,000	April 2010 – April 2011	HCFC Foam Sector Plan
Vietnam	100,000	April 2010 – April 2011	HCFC Refrigeration Sector Plan
Philippines (the)	158,491	April 2010 – December 2011	Institutional Strengthening renewal
Global	250,000	April 2010 – November 2011	Resource Mobilization for HCFC Phase-out Co-benefits Study
Support Costs	47,887		
Total	**686,378**		

Annex I
DRAFT CONCEPT NOTE
RESOURCE MOBILIZATION FOR
MAXIMIZING CLIMATE BENEFITS OF HCFC PHASE-OUT

BACKGROUND

The Montreal Protocol on Substances that Deplete the Ozone Layer has been considered as one of the most successful global environmental treaties as it has proven to be an effective instrument in bringing down consumption and production of the most potent ozone depleting substances (ODS) by more than 400,000 Mt within the last two decades[1]. Consumption and production of CFCs, halons, and CTC will be completely phased out in less than 12 months, except for a limited quantity for essential usages.

As most ODS are high global warming gases, phase-out of CFCs, halons, and CTC has also brought climate benefits. The Montreal Protocol in the last two decades has resulted in avoided emissions of high global warming gases equivalent to 25 billion tons of CO2 equivalent in comparison with 2 billion tons of CO2 equivalent to be achieved under the firs the commitment period of the Kyoto Protocol[2].

However, phasing out of these potent ODS has resulted in an increasing demand for high global warming gases including gases regulated under the Kyoto Protocol[3]. For example, the demand for HFC-134a, which is a primary alternative for CFC in new refrigeration and air-conditioning applications, was more than 133,000 Mt in 2002[4] and could exceed 400,000 Mt by 2015[5]. In the short term, replacing CFCs, which have significant higher global warming values than HFCs, resulted in significant climate benefits as mentioned above. With continuing growth in the demand for refrigeration and air-conditioning equipment particularly in developing countries, however, continuing dependence on HFCs could eventually pose significant burden to the climate in the long run.

The ozone and climate communities recognize the linkage between their efforts in protecting the ozone layer and the climate. Increasing efforts have been asserted in order to ensure synergy between the two associated global conventions. When the Parties of the Montreal Protocol decided in 2007 to accelerate the phase-out of HCFCs[6], it was recognized that selection of alternative technologies for HCFCs should take into consideration climate impact and benefits. However, the accelerated phase-out of HCFCs

[1] 2007 Consolidated Progress Report, Multilateral Fund Secretariat, July 2008.
[2] Velder and al. 2007. The Importance of the Montreal Protocol in Protecting Climate, Vol 104. PNAS,
[3] Emissions of greenhouses regulated under the first commitment period of the Kyoto Protocol (2008-2012) are CO_2, CH_4, N_2O, HFCs, PFCs and SF_6.
[4] Consumption of HCFCs grew at an average growth rate of more than 20% a year from 1995 – 2001. Consumption continues to grow at almost the same rate from 2002 – 2007.
[5] IPCC/TEAP Special Report: Safeguarding the Ozone Layer and the Global Climate System
Chapter 11
[6] HCFCs are controlled by the Protocol since 1994 as "Annex C" substances. In 2007, The Parties of the Montreal Protocol negotiated an accelerated schedule of phase-out by ten years for all Parties for HCFCs. Developing countries have agreed to phase-out HCFCs by 2030.

could result in an unintentional growth of HFC demand as it was the case for CFC phase-out; therefore, efforts should be made to ensure that more consideration be given to low GWP alternatives despite the fact that some alternatives will require higher investment capital[7].

Under the current regulatory frameworks, neither the Montreal Protocol, nor the Kyoto Protocol is systematical covering the costs associated with a transition to low GWP technologies. The Kyoto Protocol is covering the mitigation of emissions, while the concern will be at the production and consumption levels. The Montreal Protocol has proven to be an effective instrument to deal with phasing out of ODS at the production and consumption levels; however, HFCs, which is primarily replacing ODS in the air-conditioning sector are regulated under the Kyoto Protocol, a protocol that has demonstrated, through the Clean Development Mechanism, the effectiveness of market instrument to leverage funding for technology transfer in developing countries[8]. Elements from both conventions can therefore be analyze and compared to preempt the increase in the demand of HFCs or high GWP gases.

OBJECTIVES

The objective of this study is to explore options for preempting an increase in the demand of HFCs or any other high global warming gases as a result of HCFC phase-out in developing countries. The study will review and examine potential financing mechanisms available for financing the transition to low GWP alternatives, including a scheduled phase-down of HFCs in developing countries and transition economies. This study will focus on direct emissions of chemical; however, it recognized that actions to reduced indirect emissions indirect emissions, such as energy efficiency improvement, can have a significantly higher impact that focusing strictly on chemical used[9]. Therefore, the proposed study will also addressed technologies limitations and tradeoff between energy efficiency gains and low GWP gases in order to maximize overall energy benefits.

HCFCS PHASE-OUT SCHEDULE OF THE MONTREAL PROTOCOL

As per Article 7 data reporting requirements under the Montreal Protocol, the total consumption of HCFCs, mainly HCFC-141b, HCFC-142b, and HCFC-22, of all developing country Parties in 2006 is approximately 352,000 MT. Consumption of other HCFCs (for example, HCFC-123) represents only a small fraction in the HCFC consumption of most developing countries. It is expected that consumption of HCFCs would continue to grow if there were no Montreal Protocol obligations as demand for

[7] Use of certain low alternative may result in higher capital due to toxicity and/or flammability of product and necessity to ensure that manufacturing facilities, production and servicing personnel are trained and equipped with necessary safety equipment.

[8] The State and Trends of the Carbon Market 2008, World Bank, 2008 reported a cumulative committed investment to CDM projects activities over 2002-2007 of about US$59 billion, for an average leverage ratio of 3.8.

[9] I IPCC/TEAP Special Report: Safeguarding the Ozone Layer and the Global Climate System Chapter 11.

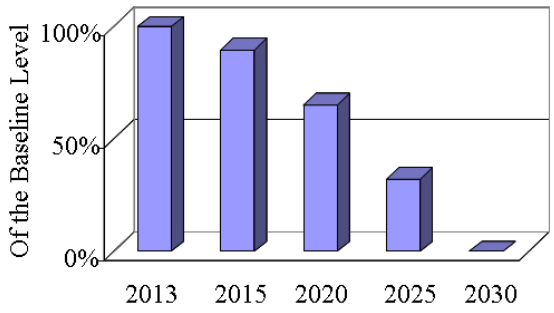
refrigeration and air-conditioning, and better insulation, in developing countries is growing at a rapid pace. Based on the aggregate HCFCs consumption trends of developing countries in the previous years, a growth rate of 9 - 10% per annum could be expected. By applying a 9% growth rate to the demand of each type of HCFCs, the total demand of HCFCs in developing countries could reach up-to 2.78 million tons level in 2030. The breakdown of HCFC demand in 2030 is shown in Table 1.

Table 1. Demand of HCFCs (MT) Under Business-as-Usual Scenario in Developing Countries

HCFC/Year	2010	2015	2020	2025	2030
HCFC-141b	171,445	242,008	372,360	572,921	881,510
HCFC-142b	45,070	63,620	97,887	150,611	231,734
HCFC-22	324,594	458,191	704,983	1,084,704	1,668,951
Total	541,108	763,818	1,175,229	1,808,236	2,782,195

Actual demand of HCFCs is expected to be much lower than the business-as-usual scenario as the Montreal Protocol requires Article 5 countries to freeze their HCFC consumption by 2013 and followed by interim reduction steps leading to a complete phase-out by 2030, except a small quantity for meeting the servicing tail up to 2040.

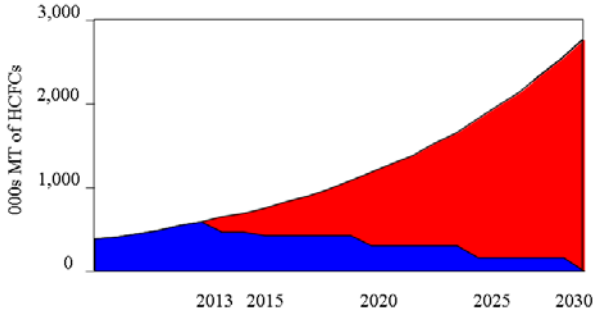
Fig. 1. HCFC Allowance Production and Consumption Schedule in Developing Countries



With the accelerated HCFC phase-out schedule of the Montreal Protocol, a total HCFC consumption of 21 million MT could be avoided during the period 2013 – 2030[10]. This avoided consumption would result in early introduction of alternatives. Climate impacts or benefits are, therefore, dependent on the choices of alternatives to be adopted by Parties of the Montreal Protocol.

[10] For illustration purposes, it is assumed that the same demand growth for the BAU scenario and the same reduction schedule are applied to each HCFC.

Fig. 2 Estimated consumption of HCFCs and alternatives for 2013 – 2030



If the avoided consumption (the red area in Fig. 2) is replaced by low GWP alternatives, the total climate benefits from the accelerated HCFC phase-out schedule (excluding impacts from improved or inferior energy efficiency performances) could be as high as 30.5 Gt of CO_2 equivalent by 2030[11]. As early phase-out of HCFC-22 also results in avoided production of byproduct HFC-23, the accelerated HCFC phase-out schedule contributes therefore to additional indirect emission reductions of 5.6 Gt of CO_2 equivalent associated with avoided production of HFC-23[12].

NON-HCFC ALTERNATIVES

Major applications of HCFC-22, HCFC-141b, and HCFC-142b in developing countries are in the refrigeration, air-conditioning, and foam sectors. Alternatives to these HCFC applications include HFCs, which have high global warming potential values, and hydrocarbons (HC), CO_2 and ammonia, which have lower GWP values. Currently available non-HCFC alternatives for various applications are summarized in Appendix 1.

Selection of alternatives depends on the desired product quality and safety. For example, hydrocarbons, which are flammable, may not be desirable for certain applications. Certain alternatives may also compromise product quality (such as insulation performance of insulation foam products.

CLIMATE IMPACT OF HCFC PHASE-OUT

The ozone depleting substances (HCFCs) are also high global warming gases, the phase-out of these chemicals presents an opportunity to maximize climate benefits, including energy efficiency gains and uses of low GWP alternatives. Alternatives currently available for replacing HCFCs consist of high global warming gases such as HFCs, low GWP gases such as hydrocarbons, CO2 and ammonia.

[11] Assuming that HCFCs are replaced by only low GWP alternatives.
[12] Assuming 3% byproduct HFC-23 in the HCFC-22 production, refer to HCFC Phase-out under the Montreal Protocol - Introductory Note on a Programmatic Approach, Montreal Protocol Operations, World Bank, 2008

Selection of these substances would have to take into account a number of factors ranging from desired product qualities, flammability, toxicity, and associated costs of using such alternatives, including energy consumption and servicing aspects.

In terms of climate benefits, the selection of alternative gases, should not only focus on low GWP of alternatives, but should also cover energy efficiency benefits that could be gained over the lifetime of the equipment. This is particularly true for the foam products, air-conditioning and refrigeration equipment that are generally made with a small quantity of HCFCs, but are characterized by long product lifetime. Alternatives could be categorized according their energy efficiency potential and GWP of the products (refer to appendix 2).

ADDITIONALITY OF CLIMATE BENEFITS ASSOCIATED WITH ACCELERATED HCFC PHASEOUT

To meet the accelerated HCFC phase-out schedule stipulated by the Montreal Protocol, major policies and actions must be undertaken to minimize the current demand of HCFCs and future dependence on HFCs. Restricting manufacturing of new HCFC-based equipment is also another important measure to avoid the build-up of HCFC demand for servicing this equipment in the future. Restricting production of new HCFC-based equipment and products could be applied to existing manufacturers or manufacturing capacity by providing them with incentives for early conversion. Establishment of new manufacturing capacity based on HCFC technologies should also be prohibited.

Recovery, recycling and reuse of HCFCs, particularly HCFC-22 which represents more than 80% of the total consumption in most developing countries, would assist countries to meet their Montreal Protocol obligations. Since the Montreal Protocol defines consumption as production plus import and minus export, recycled HCFC-22 would replace the need for production and/or import of virgin HCFC-22 which in turn assists countries in meeting their consumption limit.

Replacement of HCFC-based equipment would also contribute to significant reduction in HCFC demand. Given that HCFC-based equipment or products (e.g., air-conditioning equipment, insulation foams, and etc.) have a long product life, early replacement of these items could be costly and not financially viable. Based on experience from CFC phase-out, early replacement of HCFC-based equipment or products could be viable when new products are more energy (and resource) efficient. As there have been a number of projects addressing this issue, this option will not be addressed in this proposed study.

As pointed out earlier, replacement of HCFCs in most applications could be done via both low and high GWP alternatives. In most cases, applications of low GWP technologies in the foam and refrigeration sectors could result in lower product costs. However, because of related toxicity and/or flammability issues of these low GWP alternatives, higher capital investments are required to ensure that manufacturing facilities, production and servicing personnel are trained and equipped with necessary safety equipment. Conversion costs could be prohibitive, particularly for small-and-medium scale enterprises.

The CFC phase-out experience clearly demonstrates that while cyclopentane is available as a foam blowing agent, all small-and-medium scale enterprises opt for HCFC-141b as initial investments are much lower. Hence, the preferred choice for phasing out of HCFC in the foam sector for small-and-medium scale enterprises could as well be HFCs, rather than cyclopentane. Common HFCs for foam blowing applications include HFC-134a, HFC-152a, HFC-245fa, HFC-365mc, and HFC-227ea. These chemicals have GWP many times higher than hydrocarbon alternatives (with GWP of less than 25) (Appendix 3).

Similarly, HCFC-22 refrigerant in the refrigeration and air-conditioning applications could be replaced by either low or high GWP refrigerants (i.e, hydrocarbons, ammonia, carbon dioxide, and HFCs). For developing countries in particular where the demand of residential air-conditioners is rapidly increasing, selection of appropriate alternatives to HCFC-22 refrigerant would render significant climate benefits. Currently, HFC-410A, which has a high GWP value, seems to be an alternative of choice. Extensive research and development has been put in place to improve energy efficiency of new HFC-410A residential air-conditioners. Providing that similar energy efficiency could be achieved by hydrocarbon technology, replacing HCFC-22 with hydrocarbon refrigerant could contribute additional benefits to the climate since GWP of hydrocarbon refrigerant are more than 100 times lower than HFC-410A. However, safety concerns on the flammability of hydrocarbons could prevent a large-scale adoption of this technology. Extensive training of production and servicing personnel may be required in order to employ this technology safely. More awareness for end-users is also equally important in order to educate consumers of the safe use of these products.

Recovery and recycling of HCFC-22 during servicing and maintenance of refrigeration and air-conditioning equipment is considered as an eligible activity for funding from the Multilateral Fund. Thus far, the Multilateral Fund has allocated significant resources to support establishment of recovery and recycling networks in almost all developing country Parties of the Montreal Protocol. In addition, training on better containment (reducing leak, recovery and recycling, and reuse) has also been one of the core activities funded by the Multilateral Fund.

Experience from CFC recovery and recycling, thus far, is not encouraging. Implementation of recovery and recycling practice is more desirable financially when servicing equipment with a large refrigerant charge size. For example, recovery and recycling of refrigerants in large industrial and commercial refrigeration systems and in large chillers are common. However, recovery and recycling of CFCs from mobile air-conditioning equipment and domestic refrigerators have not shown a similar success as the price of CFCs and the quantity of CFCs that could be recovered from each unit are low.

It is expected that the economic of recovery and recycling HCFC-22 from residential air-conditioning units would probably be similar to recovery and recycling of CFCs from mobile air-conditioning equipment and domestic refrigerators. A combination of the low price of HCFC-22 and a small charge size of HCFC-22 in each piece of equipment, and

high transaction costs to implement recovery and recycling HCFC-22, makes the recovery and recycling practice less financial attractive to most service technicians.

Potential climate benefits of recovery and recycling HCFC-22 warrants further consideration as it leads to a lower requirement for production of virgin HCFC-22. Excluding the direct GWP associated with HCFC-22, recovery and recycling of one MT of HCFC-22 reduces emission of 30 kg of byproduct HFC-23 from production of one MT of virgin HCFC-22 or about 420 MT of CO_2 equivalent. This significant climate benefits render opportunity to mobilize additional resources to lower high transaction costs of implementing the recovery and recycling practice experienced by service technicians.

PROPOSED STUDY

As indicated above, HCFC phase-out could result in an increased use of HFCs . In order to maximize benefits of both ozone layer protection and climate protection, a synchronized strategy for managing the use of HCFCs and phasing-down HFCs could assist Parties to the Montreal Protocol to develop a conducive environment for climate friendly technologies. This would also assist industries in developing countries to avoid two-steps conversion to low GWP technologies (from HCFC to HFC and to low GWP alternatives). To support market penetration of low GWP technologies, financial incentives within and outside the Multilateral Fund should be considered in order to offset higher costs, if any, of adoption of low GWP technologies. In addition, consumption and production of HFCs including those produced as byproducts of other chemical processes will also be considered.

Since all Parties to the Montreal Protocol are now in the process of developing their HCFC phase-out strategies, it is an opportune time for Parties to also consider their HFC strategy as part of their response to the call for more consideration of other environmental benefits, particularly the climate benefits, when phasing out HCFCs. Based on the business-as-usual scenario, it is obvious that the need for HFCs equipment or products (e.g., air-conditioning and insulation foam products) will continue to grow in spite of the HCFC phase-out schedule under the Montreal Protocol. Hence, to minimize the growth of HFCs the choice of technologies to be made by existing manufacturing facilities of those products currently produced with or containing HCFCs not only has to be considered, but also the choice of technologies for facilities to be established in the future in order to meet the demand of these products.

OBJECTIVES OF THE STUDY

While HCFC phase-out renders two climate benefit opportunities: (i) improved energy efficiency; and (ii) use of lower GWP chemicals, the proposed study will focus on resource mobilization to support the latter, but will addressed technologies limitations and tradeoff between energy efficiency gains and low GWP gases.

The study will focus on resource mobilization to support projects aiming at reducing use of HFCs[13] as a result of HCFCs phase-out and reducing HFCs as a byproduct from HCFC production.

SCOPE OF THE STUDY

The study will investigate: (i) review of tradeoff between energy efficiency gains and low GWP gases; (ii) costs and barriers associated with conversion of HCFC technology with to low GWP alternatives; (iii) volume of HFCs and equivalent in carbon dioxide equivalent associated with the consumption and production in developing countries and transition economies including those produced as byproducts of other chemical processes; and (iiv) potential funding resources (e.g., Multilateral Fund, Carbon Market, Carbon Partnership Funds, Clean Technology Fund, and etc.) to support adoption of better HCFC containment practice, and climate friendly technologies (v) recommendations (or development of a) for a funding methodologies such as approaches to evaluate and setting the baseline consumption and production of HFCs, etc. In addition, the study will investigate effective modalities for implementing these activities in order to ensure seamless synergy between the MLF funded activities and activities funded by resources outside the MLF.

Based on experience from CFC phase-out, it is anticipated that HCFC phase-out will involve a large number of beneficiaries. Moreover, HCFC phase-out strategies and HFC strategies may require not only investment and technical assistance activities but also a combination of policy and timely investment interventions to ensure cost-effective means of achieving the targets. Experiences from implementation of CFC phase-out activities in the last two decades clearly demonstrate effectiveness of sectoral or national approaches whereby policy and investment activities are carried out in chronology. Similarly, the climate community also recognizes the need to scale up its CDM activities. Recently, a program of activity approach has been adopted by the CDM Board.

There are some similarities between the sectoral or national approaches under the Multilateral Fund and the CDM program of activity approach. The study will review these different approaches and offer recommendations to synchronize implementation modalities as well as to synchronize, to the extent possible, monitoring and verification procedures that may be required by the MLF mechanism, CDM mechanism, and other potential funding mechanisms.

STUDY APPROACH

The study will entail a desk review of the on-going study on HCFC alternatives and their climate benefits being conducted by UNEP TEAP under the auspices of the Montreal Protocol, the cost study being carried out by the Multilateral Fund, all applicable CDM methodologies, proposed approaches under negociations by the climate community, funding mechanisms outside UNFCCC and MP such as the Clean Technology Carbon

[13] It includes HFCs used as a result of CFC phaseout and possibly HCFC phase-out. For example, the study will explore financing opportunities for replacing HFC-134a MACs with low GWP alternatives.

Partnership Funds, Clean Technology Fund and others. Findings of the desk review will lead to recommendations or development of a funding methodologies for potential funding sources. The study will also include workshops to inform developing countries of findings of the study, which will lead to identification of potential pilot projects in a few developing countries.

TIMEFRAME

Detailed terms of reference for this study will be submitted for the consideration of the Executive Committee at its 61st Meeting in July 2010. The study will then take about 12 months to complete. The final report of the study will be submitted to the ExCom at its 65th Meeting in November 2011.

Appendix 1: Non-HCFC Alternative Matrix

Sector	Sub-sector	HCFCs Currently Used	Alternative Options
Foam	XPS	HCFC 22/HCFC 142b (blends), HCFC 22, HCFC 142b	CO_2, CO_2/Ethanol, CO_2/HCs; HFC 134a
	Polyurethane Spray	HCFC 141b, minor use of HCFC 141b/HCFC 22	HFC, CO_2 (CO_2 not preferred option if superior thermal insulation performance is required.)
	Domestic refrigerators/freezers	HCFC 141b, minor use of HCFC 141b/HCFC 22	HFC, HC (Small enterprises use HFCs)
	Commercial refrigerators/freezers	HCFC 141b	HFC, HC, CO_2 (Adhesion problem with CO_2)
	Sandwitch panels - continuous	HCFC 141b	HFC, HC
	Sandwitch panels - discontinuous	HCFC 141b	HFC, HC
	Insulated pipes	HCFC 141b	HFC, HC
	Integral skin foams	HCFC 141b	HFC 134a, CO_2, HC
Refrigeration	Supermarket refrigerators	HCFC 22	R-404A, CO_2, HCs and Ammonia (R-717)
	Industrial refrigeration	HCFC 22	R-717, CO_2
	Transport refrigeration	HCFC 22	HFC 134a, R-404A, R-410A
Air-conditioning	Air-conditioning	HCFC 22	R-410A, HCs, CO_2
	Water -heating heat pumps	HCFC 22	HFC 134a, R-410A, CO_2
	Chillers	HCFC 22	HFC 134a

Source: OORG Presentations, OORG Meeting, October 2008, Washington DC
Note: R-404A and R-410A are HFC blends.

Appendix 2: Selection of HCFC's Alternatives and Climate Considerations

In terms of climate benefits, it could be described that the available alternatives in the consumption sector can be categorized according to Figure 3. These four regions represent:

- Region I – Low GWP alternatives with improved energy and resource efficiency or thermal insulation property of the final products;
- Region II – High GWP alternatives with improved energy and resource efficiency or thermal insulation property of the final products;
- Region III – Low GWP alternatives with inferior energy and resource efficiency or thermal insulation property of the final products when compared with HCFC products;
- Region IV – High GWP alternatives with inferior energy and resource efficiency or thermal insulation property of the final products when compared with HCFC products.

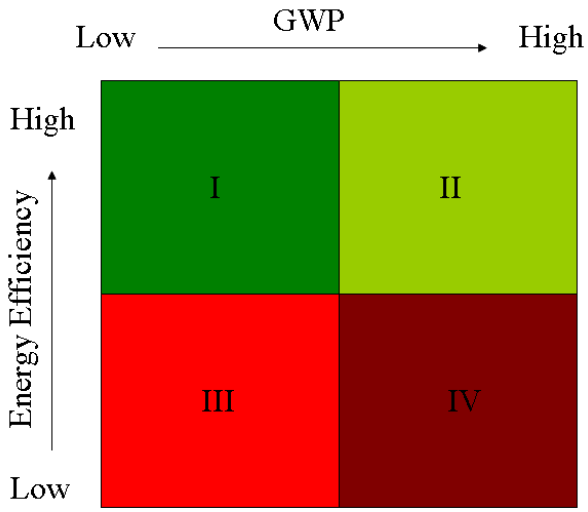


Fig. 3 Characteristics of Non-HCFC Alternatives

Foam products, air-conditioning and refrigeration equipment, are made with a small quantity of HCFCs. However, they have a long product lifetime. Therefore, any alternatives of HCFCs that fall in Regions III and IV are not desirable. For example, replacing HCFCs with low GWP alternatives (Region III) but resulting in low energy efficiency or insulation property, could result in higher energy consumption during the lifetime of these products. Emissions of carbon dioxide during the lifetime of the products normally are many times higher than the difference between the GWP values of HCFCs and alternatives used for manufacturing or maintaining these products. Alternatives in Region IV are even less desirable.

Appendix 3: GWP of HCFCs and HFC alternatives[14]

Substance	GWP
HCFC-22	1,700
HCFC-141b	630
HCFC-142b	2,000
HFC-134a	1,300
HFC-152a	140
HFC-245fa	820
HFC-365mc	840
HFC-227ea	2,900
HFC-23	14800
R-410A (HFC Blends)	2,100
R-404A (HFC Blends)	3,900
R-407C (HFC Blends)	1,800

Note: R-404A, R-407C, and R-410A are HFC blends

[14] 2006 UNEP Technical Options Committee Refrigeration, A/C and Heat Pump Assessment Report

Appendix 4: Preparation Cost Breakdown

Element	Description	US$
Potential Volume of Carbon Dioxide Equivalent Emission Reduction	Review of current HCFC applications and available non-HCFC alternatives; market analysis on penetration of various alternatives (high and low GWP) and estimates on benefits from improved energy and resource performance (taking into account ongoing work of TEAP and OORG)	35,000
Barriers Associated with Conversion of HCFC Technology with Baseline Energy and Resource Efficiency to Low GWP Alternatives with Improved Energy and Resource Efficiency	Industrial survey in a selected number of Article 5 countries and Article 2 countries that are major technology providers for each HCFC application	50,000
Consumption and Production of HCFCs	Industrial survey focusing on chemical producers in both Article 5 and non-Article 5 countries; market analysis to project trends	10,000
Potential Funidng Resources	Review of existing activities or projects funded by various funding mechanisms; review existing CDM and non-CDM methodologies; interview with prospective beneficiaries in Article 5 countries; identification of potential sources of financing; development of approaches and project model for securing such resources	55,000
Development of Funding Criteria/Standards/Methodologies	Development of tools for capturing co-financing resources outside the MLF	70,000
Stakeholder Consultation Meetings	3 consultation meetings	30,000
Total		**250,000**