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COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Quincuagésima novena Reunión
Port Ghalib, Egipto, 10 al 14 de noviembre de 2009

ENMIENDAS AL PROGRAMA DE TRABAJO DEL BANCO MUNDIAL PARA EL AÑO 2009

OBSERVACIONES Y RECOMENDACIONES DE LA SECRETARÍA DEL FONDO

1. El Banco Mundial solicita del Comité Ejecutivo la aprobación de una suma de 315 000 $EUA a título de enmiendas de su programa de trabajo para el año 2009, más unos costos de apoyo al organismo de 23 625 $EUA.

2. En el Cuadro 1 siguiente se presentan las actividades propuestas en las enmiendas del programa de trabajo del Banco Mundial:

Cuadro 1: Enmiendas del programa de trabajo del Banco Mundial

País	Actividad/Proyecto	Suma solicitada ($EUA)	Suma recomendada ($EUA)
SECCIÓN A: ACTIVIDADES RECOMENDADAS PARA APROBACIÓN GENERAL			
A1. Preparación de proyectos del plan de gestión de eliminación de HCFC (componente de inversión)			
Filipinas	Preparación de actividades de inversión en el sector de aire acondicionado	65 000	65 000
	Subtotal de A1:	65 000	65 000
SECCIÓN B: ACTIVIDADES RECOMENDADAS PARA CONSIDERACIÓN INDIVIDUAL			
B1. Asistencia técnica:			
Mundial	Movilización de recursos para aprovechar los beneficios climáticos en la eliminación de HCFC	250 000	*
	Subtotal de B1:	250 000	
Total de las secciones A y B		315 000	65 000
Costos de apoyo al organismo (7,5 por ciento para la preparación del proyecto y el fortalecimiento institucional, así como para otras actividades de más de 250 000 $EUA, y 9 por ciento para otras actividades de menos de 250 000 $EUA):		23 625	4 875
Total:		338 625	69 875

*Proyecto para consideración individual o pendiente.

SECCIÓN A: ACTIVIDADES RECOMENDADAS PARA APROBACIÓN GENERAL

A1. Financiación para la preparación de proyectos:

Filipinas: Preparación de proyectos de inversión del plan de gestión de eliminación de HCFC (sector de aire acondicionado doméstico): 65 000 $EUA

Descripción del proyecto

3. El Banco Mundial solicita fondos adicionales para la preparación de actividades de inversión en nombre del Gobierno de Filipinas, país para el que la 55th Reunión aprobó una financiación de 195 000 $EUA para la preparación del plan de gestión de eliminación de HCFC. En su comunicación, el Banco Mundial facilitó información sobre del consumo de HCFC en el país y en el sector concreto para el que se solicitan los fondos para la preparación de actividades de inversión. También se facilitó información sobre cómo se encuadra este plan sectorial en el exhaustivo plan de gestión de eliminación HCFC, dado que hay varios organismos trabajando en diferentes sectores del país.

Observaciones de la Secretaría

4. La Secretaría ha examinado detenidamente la solicitud del Banco Mundial y ha observado que esta actividad no figura en el Plan Administrativo del Banco Mundial para 2009 aprobado en la 57ª Reunión. Tras pedir explicaciones al respecto, se le informó de que se trata de una solicitud específica del país que, de conformidad con la Decisión 56/16 y el consumo de 180,2 toneladas PAO en 2007, este país no tiene derecho a más de 200 000 $EUA para la preparación de proyectos del componente de inversión del plan de gestión de eliminación de HCFC. Al examinar la solicitud, la Secretaría observó que también se han solicitado fondos similares para el sector de espumas y refrigeración (salvo aire acondicionado doméstico), y que la suma total solicitada es compatible con lo estipulado en la Decisión 56/16. La Secretaría también reparó en que el país ha consultado los diferentes organismos que colaboran en la preparación del plan de gestión de eliminación de HCFC, y ha quedado bien clara la división de responsabilidades de cada organismo. Pese a que esta solicitud no figura en el plan administrativo del organismo, la Secretaría considera que podría someterse a la consideración del Comité Ejecutivo, por cuanto ello no plantea ningún problema político y es compatible con la Decisión 56/16.

Recomendación de la Secretaría

5. La Secretaría recomienda la aprobación general de la solicitud de financiación para l apreparación de las actividades de inversión en el sector de aire acondicionado doméstico en el marco del plan de gestión de eliminación de HCFC en Filipinas, por una suma de 65 000 $EUA.

SECCIÓN B: ACTIVIDADES RECOMENDADAS PARA CONSIDERACIÓN INDIVIDUAL

B1. Asistencia técnica

Mundial: Movilización de recursos para la eliminación de HCFC y obtener beneficios adicionales para el clima: 250 000 $EUA

Descripción del proyecto

6. El Banco Mundial ha presentado a la 57ª y 58ª Reuniones una solicitud para un proyecto de asistencia técnica destinado a la movilización de recursos con el fin de maximizar los beneficios para el clima de la eliminación de HCFC, a un nivel de financiación de 250 000 $EUA. El Banco Mundial vuelve a someter esta solicitud a la consideración de esta reunión. La propuesta incluye una nota conceptual que describe los objetivos, las actividades y los resultados previstos de este proyecto. El Banco Mundial vuelve a presentar la misma propuesta que presentó a la 58ª Reunión sin ningún cambio.

7. Según el Banco Mundial, la finalidad del proyecto es investigar las opciones para evitar un aumento en la demanda de HFC u otros gases con elevado potencial de calentamiento de la atmósfera en el sector de consumo, debido a la eliminación de HCFC en los países en desarrollo. En el estudio se examinará y revisarán los posibles mecanismos disponibles para financiar la transición a alternativas de bajo potencial de calentamiento de la atmósfera, en particular una reducción programada de HFC en los países en desarrollo y los países con economías en transición. En el proyecto se tratará también el tema de las limitaciones tecnológicas y el equilibrio entre lograr una gran eficiencia energética y utilizar gases con bajo potencial de calentamiento de la atmósfera con el fin de maximizar los beneficios de energía.

8. En el estudio se investigará: i) los costos y los obstáculos que entraña la conversión de la tecnología HCFC a alternativas con bajo potencial de calentamiento de la atmósfera; ii) el volumen de

HFC y otras alternativas en cuanto a CO_2 equivalente que resulta del consumo y producción de HCFCs en países en desarrollo, con inclusión de los productos derivados de otros procesos químicos; iii) las posibles fuentes de financiación (es decir, el Fondo Multilateral, la CMNUCC, el mercado de comercio del carbono, los fondos de asociación de carbono, el Fondo para una tecnología limpia, etc.) para la adopción de una mejor práctica de retención de HCFC, y las tecnologías inocuas para el clima. Asimismo formulará una recomendación sobre metodologías de financiación, por ejemplo los métodos para evaluar y establecer un nivel de referencia de consumo y producción de HFC, así como un calendario de reducciones. Por otra parte, en el proyecto se investigarán las modalidades efectivas de aplicar estas actividades con el fin de obtener sinergias entre las actividades financiadas por el Fondo Multilateral, y aquellas que podrían financiarse con otras fuentes.

9. El Banco Mundial indica que al principio elaborará un mandato detallado de estudio que someterá a la consideración del Comité Ejecutivo una vez se haya tomado la decisión de movilizar recursos. Dicho mandato se utilizará como base de este estudio para el que se solicita financiación, para cuya realización se necesitarán unos 12 meses. El informe final del estudio se transmitirá al Comité Ejecutivo en cuanto se termine.

10. En el Cuadro que figura a continuación se desglosa la suma solicitada por el Banco Mundial de 250 000 $EUA:

Elemento	**Descripción**	**$EUA**
Volumen potencial de reducción de emisiones de dióxido de carbono equivalente	Examen de las aplicaciones HCFC actuales y las alternativas disponibles sin HCFC; análisis de mercado sobre la penetración de diversas alternativas (de alto y bajo potencial de calentamiento de la atmósfera) y cálculo de los beneficios basado en el mayor rendimiento energético (habida cuenta de la labor en curso del GETE y el OORG)	35 000
Obstáculos a la conversión de la tecnología HCFC con una determinada eficiencia energética y de recursos a tecnologías alternativas de bajo potencial de calentamiento de la atmósfera con mayor eficiencia energética y de recursos	Encuesta al sector industrial de determinados países que operan al amparo del Artículo 5 y del Artículo 2 que son los principales proveedores de tecnología para cada aplicación de HCFC	50 000
Consumo y producción de HCFC	Encuesta al sector industrial sobre los productores químicos en los países que operan al amparo del Artículo 5 y en los que no; análisis de mercado para prever las tendencias	10 000
Posibles fuentes de financiación	Examen de las actividades o proyectos existentes financiados por diversos mecanismos; examen de las metodologías del MDL y distintas al MDL; entrevista con los beneficiarios previstos en los países que operan al amparo del Artículo 5; identificación de las posibles fuentes de financiación; desarrollo de métodos y modelos de proyecto para garantizar tales recursos	55 000
Creación de criterios, normas y metodologías de financiación	Desarrollo de herramientas para obtener recursos de financiación conjunta externos al Fondo Multilateral	70 000
Reuniones de consulta con los interesados	3 reuniones de consulta	30 000
Total		**250 000**

Observaciones de la Secretaría

11. En el párrafo 11 b) de la Decisión XIX/6 de la Decimonovena Reunión de las Partes se dan pautas al Comité Ejecutivo para que al examinar los proyectos de eliminación de HCFC conceda prioridad, entre otras cosas, a "los sustitutos y alternativas que limitan a un mínimo otras repercusiones en el medio ambiente, incluido el clima, teniendo en cuenta el potencial de calentamiento de la atmósfera, el uso energético y otros factores de importancia". En su 54ª Reunión, el Comité Ejecutivo aprobó un conjunto de directrices para la preparación de planes de gestión de eliminación de HCFC, y en la 55ª y 56ª Reuniones, aprobó fondos para la preparación de dichos planes en 115 países. En las directrices aprobadas en la Decisión 54/39 se alienta a los países que operan al amparo del Artículo 5 a explorar los posibles incentivos financieros y las oportunidades que les permitan obtener recursos adicionales para aumentar al máximo los beneficios ambientales de los planes de gestión de eliminación de HCFC de conformidad con el párrafo 11 b) de la Decisión XIX/6 mencionada.

12. La Secretaría también observa que como los resultados del estudio propuesto por el Banco Mundial no estarán disponibles hasta 2010 o incluso más tarde, solo serán de ayuda a los países para dar orientaciones a los organismos para ejecutar la fase 1 del plan de gestión de eliminación de HCFC y para examinar sus opciones de financiación conjunta para la preparación de la fase 2, según proceda. Por otra parte, cabe destacar que hasta ahora el Comité Ejecutivo no ha establecido pautas sobre cuánto van a costar los beneficios climáticos de la eliminación de HCFC, y si estos costos podrían considerarse costos incrementales en el marco del Fondo Multilateral.

13. En su 57ª Reunión, el Comité Ejecutivo examinó un mecanismo de financiación especial para obtener ingresos adicionales de préstamos y otras fuentes (documento UNEP/OzL.Pro/ExCom/57/64), y en su Decisión 57/37 decidió solicitar a la Secretaría que sometiera un análisis más detallado de este mecanismo a la consideración de la 58ª Reunión del Comité Ejecutivo..

14. En la Decisión 58/37 adoptada en su 58ª Reunión, el Comité Ejecutivo decidió aplazar el examen de esta y otras propuestas similares a una futura reunión, por lo que esta propuesta no fue debatida en la 58ª Reunión. La Secretaría observa que el hecho de esta propuesta se presenta nuevamente a la 59ª Reunión del Comité Ejecutivo para su consideración en el marco del punto 11 del orden del día: Documento conceptual adicional sobre un mecanismo especial para obtener ingresos adicionales de préstamos y otras fuentes. La Secretaría observa además que en la Decisión 58/37, el Comité también aceptó la oferta del Banco Mundial de hacer una presentación sobre "mecanismos, tales como compromisos adelantados, para tratar con financiación adicional y combinar los fondos del Fondo Multilateral con la financiación del carbono".

Recomendación de la Secretaría

15. El Comité Ejecutivo pudiera examinar esta propuesta habida cuenta de la información presentada en los párrafos precedentes y de las deliberaciones del punto 11 del orden del día: Documento conceptual adicional sobre un mecanismo especial para obtener ingresos adicionales de préstamos y otras fuentes.

2009 WORK PROGRAM AMENDMENT

PRESENTED TO THE 59th MEETING OF THE EXECUTIVE COMMITTEE

WORLD BANK IMPLEMENTED MONTREAL PROTOCOL OPERATIONS

September 23, 2009

WORK PROGRAM AMENDMENT FOR WORLD BANK-IMPLEMENTED MONTREAL PROTOCOL OPERATIONS

1. The World Bank 2009 – 2011 Business Plan and the 2009 Work Program were submitted for the consideration of the 57th Meeting of the Executive Committee (ExCom) in March 2009. The 2009 -2011 Business Plan includes, among others, three renewals of existing institutional strengthening projects, one global study on resource mobilization to maximize climate benefits from HCFC phase-out, four demonstration projects, and three pilot ODS disposal projects.

2. The funding requests for preparation of the global study on resource mobilization, four demonstration projects, and three pilot ODS disposal projects were made as part of the 2009 Work Program submission for the consideration of the 57th Meeting of the ExCom.

3. At the 57th Meeting of the ExCom, project preparation funds for three demonstration projects for China, and two pilot ODS disposal projects for Indonesia and the Philippines, were approved. The proposed pilot ODS disposal project for Mexico was subsequently approved at the 58th Meeting of the ExCom.

4. With regard to the proposed global study on resource mobilization to maximize climate benefits from HCFC phase-out, the ExCom decided that the activity should be maintained in the World Bank 2009 – 2001 Business Plan. The funding request to prepare this study as presented in the 2009 Work Program was not approved at the 57th Meeting as this proposal should be considered along with the on-going analysis of the Multilateral Fund Secretariat on the facility for additional income from loans and other sources. The funding request for this activity was resubmitted for the ExCom's consideration at the 58th Meeting of the ExCom. Since the ExCom's deliberation on the new funding facility is still on-going, the consideration on the proposed global study on resource mobilization was deferred. Therefore, the Bank is resubmitting this request as part of its 2009 Work Program Amendment for the consideration of the 59th ExCom Meeting.

5. This World Bank 2009 Work Program Amendment proposes funding requests to support the following activities: (i) project preparation funds for development of an air-conditioning sector plan for the Philippines; and (ii) preparation funds for conducting the global study on resource mobilization.

6. Descriptions of four work program activities are included in Table 1.

Table 1: Project Preparation Funding Requests Submitted for Consideration of the 59th Meeting of the Executive Committee

Country	Request (US$)	Duration	Description
Philippines	65,000	January –	Development of a phase-out plan for the air-conditioning sector

		December 2010	and any other sectors to be identified by the HPMP preparation.
Global	250,000	January – December 2010	Resource Mobilization for HCFC Phase-out Co-benefits (Concept Note and cost breakdown included in Annex I)
Support Cost	23,625		
Total	**338,625**		

Annex I
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 uses.

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, in comparison with the 2 billion tons of CO2-equivalent to be achieved under the first commitment period of the Kyoto Protocol.[2]

However, phasing out of these potent ODS has resulted in increasing demand for several high global warming gases, including gases regulated under the Kyoto Protocol.[3] For example, the demand for HFC-134a, 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 a 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

[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.

recognized that selection of alternative technologies for HCFCs should take into consideration climate impact and benefits. However, the accelerated phase-out of HCFCs could result in an unintentional growth of HFC demand as 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 systematically 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 are primarily used to replace 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 instruments to leverage funding for technology transfer in developing countries.[8] Elements from both conventions can therefore be analyzed and compared to preempt an increase in the demand for HFCs or high GWP gases.

OBJECTIVES

The objective of this study is to explore options for preempting an increase in the demand for 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 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 chemicals; however, it recognizes that actions to reduce indirect emissions, such as energy efficiency improvement, can have a significantly higher impact than focusing strictly on chemical use.[9] Therefore, the proposed study will also addresse technologies limitations and the 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 of all developing country Parties in 2006, mainly HCFC-141b, HCFC-142b, and HCFC-22, is approximately 352,000 MT. Consumption of other HCFCs (for example, HCFC-123) represents only a small fraction of the HCFC

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

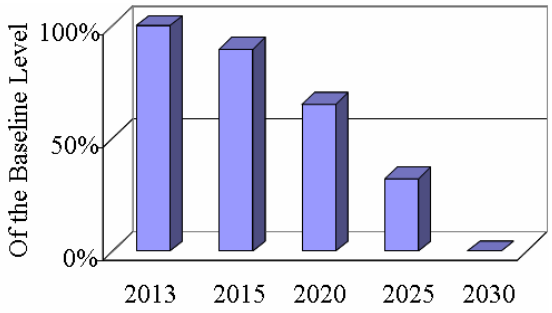
consumption of most developing countries. It is expected that consumption of HCFCs would continue to grow if there were no Montreal Protocol obligations, as demand for refrigeration and air-conditioning, and better insulation in developing countries is growing at a rapid pace. Based on the aggregate HCFCs consumption trends of developing countries in previous years, a growth rate of 9-10% per annum could be expected. By applying a 9% growth rate to the demand for each type of HCFCs, the total demand for HCFCs in developing countries could reach a level of as much as 2.78 million tons in 2030. The breakdown of projected HCFC demand in 2030 is shown in Table 1.

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

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

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

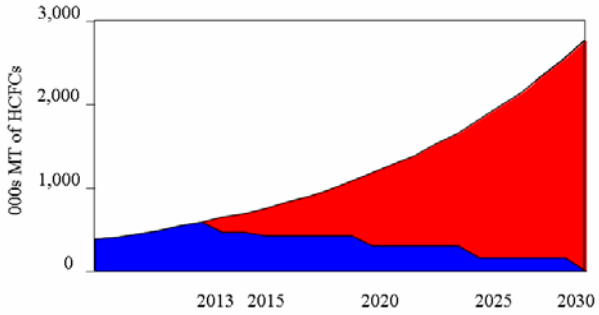


With the accelerated HCFC phase-out schedule of the Montreal Protocol, a total HCFC consumption of 21 million MT could be avoided during the period 2013-2030.[10] This avoided consumption would result in early introduction of alternatives. Climate impacts

[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.

or benefits are, therefore, dependent on the choices of alternatives to be adopted by Parties to the Montreal Protocol.

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.

[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

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.

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

[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.

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 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 58th Meeting in July 2009. The study will then take about 12 months to complete. The final report of the study will be submitted to the ExCom at its 62nd Meeting in November 2010.

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.

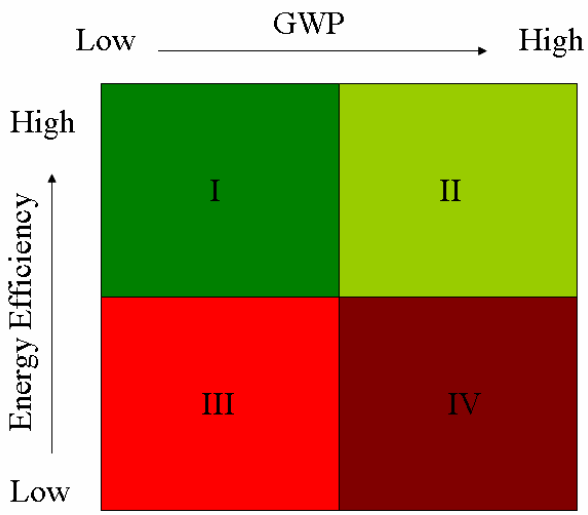


Fig. 3 Characteristics of Non-HCFC Alternatives

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**