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EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Fifty-eighth Meeting  
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**ANALYSIS OF NEW APPROACHES ON SECOND-STAGE CONVERSIONS,  
DETERMINATION OF CUT-OFF DATE AND OTHER OUTSTANDING HCFC POLICY  
ISSUES (DECISION 57/34)**

## Background

1. At its 56<sup>th</sup> Meeting, the Executive Committee continued its deliberations on policy for determining the cut-off date for installation of HCFC-based manufacturing equipment and second-stage conversions (i.e., replacement of HCFC-based equipment installed with the assistance of the Multilateral Fund). As no agreement was reached, the Committee decided to continue its deliberations on these issues at its 57<sup>th</sup> Meeting (decision 56/65).

2. In response to decision 56/65, the Secretariat submitted a revised paper to the 57<sup>th</sup> Meeting presenting an analysis of the issues regarding the cut-off date, second-stage conversions and the starting point for aggregate reductions in HCFC consumption (UNEP/OzL.Pro/ExCom/57/60). The paper emphasized the significant impact of these issues on funding eligibility, and the need for the Executive Committee to finalize its deliberation to provide guidance and facilitate the preparation of HCFC phase-out management plans (HPMPs). Several views were expressed during the discussion regarding the selection of a cut-off date and second-stage conversions. It was also proposed that a decision on the cut-off date could only be made in the context of other outstanding issues. An attempt would be made to consider all cost parameters as a package in order to take the required policy decisions. The Chair therefore called for Executive Committee Members to further discuss the outstanding issues mentioned above in an informal meeting.

3. At the informal meeting, one Member proposed that incremental operating costs could be changed from direct payment to enterprises to payment to countries, based on a percentage of the capital cost associated with the conversion from HCFCs to the most cost-effective alternative technology available. Another Member proposed a long-term strategy for second-stage conversions taking into account compliance needs and cost-effectiveness. Subsequently, the Executive Committee requested the two Members to submit their proposals to the Secretariat. The Committee further requested the Secretariat to post the minutes of the informal meeting, including the two new approaches, on the Multilateral Fund's Intranet, for comment by Executive Committee members. The Secretariat was also requested to prepare a document compiling and analyzing the new approaches, as well as intersessional comments from Members, for consideration by the Executive Committee at its 58<sup>th</sup> Meeting (decision 57/34).

### Scope of the paper

4. The Secretariat has prepared this paper in response to decision 57/34 on the basis of the paper submitted to the 57<sup>th</sup> Meeting. The issues addressed in the paper are: cut-off dates; second-stage conversions; eligible incremental costs; cost-effectiveness thresholds for HCFCs; technological upgrades and conversion before the end of the equipment's useful life; and application of low-volume consuming (LVC) country criteria<sup>1</sup> to HCFCs consumption. The starting points for aggregate reductions in HCFC consumption (as stated in the guidelines for preparation of HPMPs<sup>2</sup>) and accounting for the phase-out of HCFCs from approved projects against the consumption identified in the HPMP, is also discussed. This paper does not cover issues related to funding of institutional strengthening projects post 2010, as these issues are considered under a separate document submitted to the 58<sup>th</sup> Meeting (UNEP/OzL.Pro/ExCom/58/48).

5. Part 1 of Annex I of the paper presents the complete text of the new approaches as submitted by the two members. Views expressed by members of the Committee in regard to these approaches are presented in Part 2 of Annex I. Methodologies for determining incremental operating costs in HCFC phase-out projects in the foam and refrigeration manufacturing sectors and incremental costs for the refrigeration servicing sub-sector are presented in Annex II.

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<sup>1</sup> In the context of the Multilateral Fund, countries with an annual consumption level of 360 ODP tonnes or less of ODS are categorized as LVC countries (decision 17/11 (a)).

<sup>2</sup> Adopted by the Executive Committee at its 54<sup>th</sup> Meeting (decision 54/39).

## Outstanding policy issues with regard to HCFC phase-out

6. Substantial progress has been made in determining on HCFC phase-out policy<sup>3</sup>. However, there are still some outstanding issues that need to be addressed to facilitate and expedite submission and implementation of HPMPs. Except for the applicability of the LVC country category and, to a lesser extent, the starting points for aggregate reductions in HCFC consumption, the remaining outstanding policy issues on HCFC phase-out are only relevant for Article 5 countries with HCFC manufacturing facilities<sup>4</sup>.

### Cut-off date

7. In light of technological advances the Executive Committee decided, at its 17<sup>th</sup> Meeting (July 1995), not to consider any projects to convert ODS-based capacity installed after 25 July 1995 (decision 17/7). On the basis of progress reports on the implementation of national phase-out plans received by the Secretariat, it can be assumed that CFC-based manufacturing enterprises that were established after the 25 July 1995 cut-off date have been converted to alternative technologies (including possibly HCFCs).

8. The issue of the cut-off date (as well as second-stage conversions) became relevant once again in light of adjustments to the Montreal Protocol on HCFCs, agreed by the Parties at their 19<sup>th</sup> Meeting (September 2007). The Parties, on the understanding that the funding available through the Fund in the upcoming replenishments shall be stable and sufficient to meet all agreed incremental costs to enable Article 5 Parties to comply with the accelerated phase-out schedule for HCFCs, directed the Executive Committee “to make the necessary changes to the eligibility criteria related to the post-1995 facilities and second conversions.” (Paragraph 5 of decision XIX/6).

9. The issue of the cut-off date was subsequently presented in the paper on options for assessing and defining eligible incremental costs for HCFC consumption and production phase-out activities<sup>5</sup>, considered by the Committee at its 53<sup>rd</sup> Meeting (December 2007). Although no agreement was reached on the issue, the following alternative cut-off dates were proposed by the Executive Committee (decision 53/37(k)):

- (a) 2000 (cap on HCFC production/consumption in one major country);
- (b) 2003 (Clean Development Mechanism);
- (c) 2005 (proposal for accelerated phase-out of HCFCs);
- (d) 2007 (19<sup>th</sup> Meeting of the Parties);
- (e) 2010 (end of the baseline for HCFCs);
- (f) Availability of substitutes.

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<sup>3</sup> Since the Parties agreed at their 19th Meeting to accelerate the phase-out of HCFCs, and gave the Executive Committee the mandate to develop funding guidelines to assist Article 5 countries to meet their commitments in accordance with the adjusted schedule, the Committee has considered eight substantive policy papers and adopted relevant decisions on HCFCs. Additionally, the Executive Committee has approved funding for the preparation of HPMPs in the majority of Article 5 countries.

<sup>4</sup> While there is not yet sufficient data to ascertain precise numbers, about 90 to 100 countries consume HCFC-22 only for servicing refrigeration systems, while 40 to 50 countries also have HCFC-based manufacturing enterprises (UNEP/OzL.Pro/ExCom/57/60).

<sup>5</sup> Paragraphs 32 to 35 of document UNEP/OzL.Pro/ExCom/53/60.

10. During its deliberations on this issue at its 57<sup>th</sup> Meeting, many Members supported 2007 as the cut-off date (some citing 21 September 2007, the date on which the accelerated HCFC phase-out schedule had been agreed). However, it was pointed out that, while some of the proposed cut-off dates could be ruled out (i.e., 2000 and 2010), a date could not be chosen without examining the overall cost implications for the Fund in the context of the other outstanding issues.

*Secretariat's comments*

11. The absence of a decision on the cut-off date leaves Article 5 countries, implementing agencies and a large number of enterprises uncertain about funding eligibility. It also poses difficulties in the HPMP preparation and review process, as several cost scenarios based on different potential cut-off dates would have to be analyzed.

12. Of all the cut-off dates under discussion, the following three appeared to have the widest support, based on the views expressed by members of the Executive Committee:

- (a) 2003 (Clean Development Mechanism);
- (b) 2005 (proposal for accelerated phase-out of HCFCs);
- (c) 21 September 2007 (19<sup>th</sup> Meeting of the Parties).

13. As shown in the table below, consumption levels of HCFCs are increasing in Article 5 countries as a result of new applications particularly in the air conditioning and foam insulation sectors, as well as the required CFC phase-out under Montreal Protocol since several industries selected these substances as interim replacements for CFCs and other controlled substances<sup>6</sup>. However, in the absence of surveys on the sectoral distribution of HCFCs by end-users in Article 5 countries, it is not feasible to assess the implications to the Fund associated with the different cut-off dates.

HCFC	HCFC consumption (ODP tonnes)(*)				
	2003	2004	2005	2006	2007
HCFC-141b	5,472	7,038	5,722	8,151	9,346
HCFC-142b	350	334	534	1,778	1,739
HCFC-22	7,853	10,176	12,837	14,885	18,426

(\*) HCFC consumption data reported under Article 7 of the Protocol, excluding Republic of Korea, Singapore and United Arab Emirates.

14. The current cut-off date was decided on the basis of technological advances. Applying the same criterion, the selection of the most recent year as the cut-off date for HCFC phase-out projects (i.e., 2007) would appear to be more consistent with the underlying principle of decision 17/7 than selection of an earlier year, when alternative technologies for several applications would not have been commercially available (e.g., methyl formate and methylal as blowing agents for several foam applications are currently being validated and optimized; HFO-1234ez as a blowing agent has been commercially launched in 2008).

Second-stage conversions

15. Funding for second-stage conversion projects was considered by the Executive Committee at its 53<sup>rd</sup> Meeting<sup>7</sup>. Some members said that the agreement by the Parties to accelerate the phase-out of HCFCs

<sup>6</sup> Annex II of document UNEP/OzL.Pro/ExCom/55/47.

<sup>7</sup> Paragraphs 36 to 42 of document UNEP/OzL.Pro/ExCom/53/60.

had been conditional on the agreement to fund second-stage conversions. Other members said that while it might be necessary to provide some level of assistance, this could take the form of technical assistance.

16. This issue was further discussed by the Committee at its 57<sup>th</sup> Meeting in the context of an informal meeting called by the Chair. At the informal meeting, one Member proposed two modalities for providing Multilateral Fund assistance for second-stage conversions<sup>8</sup> for consideration by the Committee:

- (a) Full funding of all eligible incremental costs would be paid for second-stage conversion projects, at a level based on the Executive Committee's final decisions with respect to HCFC incremental costs, in those cases where an Article 5 Party clearly demonstrated in its HPMP that such second-stage conversions:
  - (i) Would be necessary for the Party concerned to comply with the Montreal Protocol HCFC targets up to and including the 35 per cent reduction step by 1 January 2020, and/or
  - (ii) Are the most cost-effective projects that the Party concerned could undertake in order to comply with the Montreal Protocol HCFC targets up to and including the 35 per cent reduction step by 1 January 2020;
- (b) Funding for all other second-stage conversion projects not covered under paragraph (a) above, would be limited to reimbursing the cost differential between HCFC-based equipment and non-HCFC-based equipment, taking into account existing policies on avoidable technology upgrade and capacity increase.

17. The second funding modality in paragraph 16(b) above was proposed on the basis of an assumption that by 2025, when Article 5 countries have achieved the 67.5 per cent reduction in their HCFC consumption baselines, the manufacturing equipment provided through the Fund will have reached its end-of-life, since most of the Fund's second-stage conversion projects will have been completed by 2005 and the manufacturing equipment provided would have a life-time of 15 to 20 years.

18. Comments on the above approach were received from Executive Committee members<sup>9</sup> and summarized as follow:

- (a) The proposed approach assumes that all enterprises that converted to HCFC technologies committed to achieving the complete phase-out of HCFCs without further assistance from the Multilateral Fund. This commitment was made, however, when the HCFC phase-out compliance target was 2040. The accelerated schedule for HCFC phase-out has been agreed on the understanding that all enterprises that received funding for conversion to HCFC technologies would be eligible for additional funding. Therefore, the issue of not funding second-stage conversion projects should not be taken into account. It is important to provide further assistance to these enterprises in order to maintain their confidence in the Montreal Protocol;
- (b) The assumption that the life-time of manufacturing equipment is between 15 and 20 years has been challenged from time to time by Article 5 countries. Although this assumption could be valid for non-Article 5 countries, this is not the case in Article 5 countries, where equipment is repaired and used for longer periods of time. Therefore, it is proposed that full funding of all eligible incremental costs be paid for second-stage conversion

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<sup>8</sup> The complete text of the proposal is presented in Part 1 of Annex I to the present paper.

<sup>9</sup> The complete text of the comments from Executive Committee members is presented in Part 2 of Annex I to the present paper

projects to enable Article 5 countries to achieve HCFC targets up to and including the 67.5 per cent (instead of the 35 per cent being proposed) reduction step by 1 January 2025 (instead of 2020);

- (c) The selection of enterprises that could be totally or partially funded would be difficult to assess. If only part of a sector is funded, major market distortions could occur, resulting in the closure of some enterprises that will be unable to compete, a situation which is unsustainable in any Article 5 country. Furthermore, consideration of funding for enterprises based on cost-effectiveness values will exclude most, if not all SMEs;
- (d) The selection of enterprises for conversion is based on several factors, *inter alia*, their size and financial situation, their market share and geographical location, their plans for conversion (willingness to convert) and technologies to be selected. All these factors would need to be considered irrespective of whether the enterprises require second-stage conversions;
- (e) The proposal for reimbursing only the cost differential between HCFC-based equipment and non-HCFC-based equipment would need to be modified to also cover costs associated with the installation of new production equipment, modifications that would need to be introduced, such as safety equipment (i.e., when hydrocarbon-based technology is selected), and operational costs calculated as the difference between the HCFC being phased out and the alternative chemical, for a period of time to be determined.

*Secretariat's comments*

19. The issue of second-stage conversions should be considered in light of the following relevant decisions and guidelines adopted by the Executive Committee, and other considerations:

- (a) The existing policies and guidelines for funding the phase-out of ODS other than HCFCs would be applicable to the funding of HCFC phase-out unless otherwise decided by the Executive Committee (decision 53/37 (d)). This would include *inter alia*, issues regarding baseline equipment, technology upgrade, end of useful life of manufacturing equipment, export to non-Article 5 countries and foreign ownership;
- (b) So far, the Executive Committee has approved 858 stand-alone projects in 47 Article 5 countries where HCFCs have been selected as the technology to replace over 40,000 ODP tonnes of CFC consumption, partially or totally<sup>10</sup>. In preparing their HPMPs, Article 5 countries would need to assess the current status of these enterprises, their HCFC consumption and/or whether or not they had converted to non-HCFC technologies;
- (c) In 2007, 52 Article 5 countries reported a total consumption of 9,513 ODP tonnes of HCFC-141b (86,487 metric tonnes) under Article 7 of the Protocol. No projects for conversion of CFC-11 to HCFC-141b have been approved in 11 of these countries (with a total HCFC consumption of 330 ODP tonnes). HCFC-141b consumption in 40 countries with second-stage conversion projects is below 25 ODP tonnes (226 metric tonnes). In several Article 5 countries, the low levels of HCFC-141b consumption could be completely phased out through an umbrella project covering all of the manufacturing enterprises;

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<sup>10</sup> The majority of second-stage conversion projects relate to replacement of CFC-11 with HCFC-141b in foam applications. A few projects for replacing CFC-12 compressors with HCFC-22-based systems have also been approved in a few Article 5 countries (Annex II of document UNEP/OzL.Pro/ExCom/57/60).

- (d) It is anticipated that the incremental capital costs (ICC) required for second-stage conversion projects to adopt non-HCFC technologies other than hydrocarbon-based technologies would be related mainly to technical assistance/retrofit, training and trials. Therefore, it could be expected that in many cases, second-stage conversion projects would be more cost-effective than other projects for the first compliance phase-out targets.

#### Eligible incremental costs for HCFCs

20. The issue of eligible incremental costs for HCFC phase-out was first considered by the Executive Committee at its 55<sup>th</sup> Meeting in the context of a paper on cost considerations surrounding the financing of HCFC phase-out (UNEP/OzL.Pro/ExCom/55/47). On the basis of discussions, the Executive Committee decided, *inter alia*, to defer to its first meeting in 2010 any decision on policies for the calculation of incremental operating costs (IOC<sup>11</sup>) or savings from HCFC conversion projects, as well any decision on the establishment of cost-effectiveness thresholds, in order to benefit from the experience gained by reviewing HCFC phase-out projects as stand-alone projects and/or as components of HPMPs prior to that Meeting (decision 55/43 (c)(ii)).

21. At the 57<sup>th</sup> Meeting, during discussion of the paper on second-stage conversions and determination of the cut-off date for the installation of HCFC-based manufacturing equipment, one Member proposed a new approach for calculating incremental costs for HCFC phase-out by shifting IOC from direct payment to beneficiary manufacturing plants to payment to Article 5 Governments (i.e., Ozone Units) based on a percentage of the ICC associated with the conversion from HCFCs to the most cost-effective alternative technology available. The approach of providing funding to Governments would allow for the design of country-appropriate policies and/or programmes to encourage climate-friendly HCFC phase-out; it would also create a framework that is neutral for the choice of technology, without any unintended incentive. The direct payment of the IOC to enterprises often influenced the choice of technology by serving to encourage the selection of that with the highest level of IOC without regard for the long-term availability of the alternative chemical or the long-term competitiveness of the enterprise with the chosen technology. Enterprises sometimes found the long-term costs of the alternative chemical to be too expensive, or the chemical was too difficult to obtain.

22. In view of the above, the Member suggested that the Executive Committee should consider adopting an HCFC funding model that provides, directly to Article 5 Parties, the agreed IOC calculated at a flat percentage rate (i.e., 5 to 10 percent) of the lowest eligible agreed ICC of the HCFC phase-out project, or the average of agreed ICC associated with the HCFC sector concerned. For those cases in which Article 5 governments do not want to/or cannot receive the calculated eligible IOC for designing a country-appropriate climate incentive programme, only the IOC associated with training and testing the new alternative technology would be paid directly to the manufacturing enterprise, without including any payment for the purchase of the alternative chemical. This would be a technology-neutral HCFC funding model for eligible IOC.

23. Comments on the above approach for the calculation of eligible incremental costs for HCFCs were received from Executive Committee members<sup>12</sup> and summarized as follow:

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<sup>11</sup> The application of IOC as agreed by the Committee for those sectors/sub-sectors where HCFC technologies were chosen for phasing out the use of CFCs in Article 5 countries is: (i) no operating costs for compressors; (ii) for domestic refrigeration, ten per cent of incremental cost to be paid up front, or six months of IOC calculated at current prices and paid up-front, or IOC for a duration of one year adjusted according to prevailing costs at the time of disbursement, when the modified plant was operating, whichever is greater; (iii) two years for commercial refrigerator, rigid and integral skin foam manufacturing plants; and (iv) four years for aerosol enterprises.

<sup>12</sup> The complete text of the comments from Executive Committee members is presented in Part 2 of Annex I to the present paper

- (a) The model that has been historically used in the Multilateral Fund for calculating ICC and IOC has contributed greatly to the success of the Montreal Protocol. In most cases, the calculated ICC and IOC represented the reality of industrial conversions in the field. During this process the Committee received timely and independent advice from technical experts which was then translated into relatively simple policy decisions on incremental costs. This approach acted as an incentive for CFC consuming enterprises since they considered the concept of incremental costs as a fair and objective way to account for disruptions, uncertainties and losses caused by the transition to non-CFC technologies. All incremental costs were provided by the Committee as a package for a particular project or sector plan, which demonstrated the commitment of the Fund to assist Article 5 industries in achieving the phase-out. This process was supported by a robust and transparent monitoring and evaluation process, with clearly defined indicators;
- (b) The challenges arising from the accelerated phase-out schedule for HCFCs are greater. In volumetric terms, the amount of HCFCs to be phased out to meet the first control milestone in 2013 is comparable to the amounts of CFCs that were phased out over several years. In addition, HCFC consumption has grown significantly in the past few years. Accordingly, it would be advisable not only to continue using the model of calculating incremental costs but also to strengthen it to account for the additional uncertainties caused by lack of mature and environment-friendly HCFC alternatives, in line with decision XIX/6. This would minimize the risks for non-compliance with the adjusted HCFC phase-out schedule;
- (c) In regard to the reference on “unintended incentives” created by IOC, the Executive Committee and the Secretariat have been very diligent in revising project costs and ensuring that chemical prices were realistic. In cases where the operating costs of the new technologies were higher than those of the ODS technology, there was a disincentive to voluntarily convert; therefore, the cash payment had the intention of covering the incremental cost for up to four years. As the costs of the alternative technologies were reduced, the period for applying IOC was also reduced. It is therefore difficult to consider these payments as “unintended incentives”;
- (d) The assumption that Article 5 enterprises selected technologies to phase out ODS on the basis of an expected payment of high IOC is unsubstantiated, and questions the review process of the Multilateral Fund. The choice of technology was based on several factors, such as cost-effectiveness, availability on the local market, applicability to local conditions, market acceptance and, in some instances, the capacity of the enterprises to absorb the technology. Several enterprises (particularly SMEs) were not able to introduce more environmentally-friendly alternatives (such as hydrocarbon technology) due to the higher ICC, and were forced to select other lower cost, less environmentally-friendly technologies. In these cases, IOC did not play a major role in the selection of the technology;
- (e) The introduction of any new alternative technology is always more expensive and has lower performance compared to the ODS technology being replaced. The new products require extensive marketing to ensure timely penetration and wider acceptance. Thus, the conversion itself is associated with long-term negative financial implications. The aim of IOC has been to prevent market distortions and provide incentives to enterprises to implement projects without waiting for competitors;
- (f) The need for incentives to choose environmentally superior alternatives is recognized. However, these incentives should be considered within the framework of total incremental costs of the projects, and not only based on the IOC. The Executive

Committee could consider, for example, introducing GWP limits for the alternative chemicals into the existing guidelines for the calculation of IOC;

- (g) The new approach to channelling the IOC to governments rather than enterprises will reduce enterprises' willingness to convert, at least at the initial stages of HCFC phase-out, given the strong likelihood of losing their competitiveness since they will have no financial resources to compensate for the higher operating costs. It would require an in-depth analysis, long discussion and many negotiations before it could be adopted, thus delaying the urgent decision on funding to achieve the 2013 and 2015 phase-out targets. Additionally, it would increase bureaucracy, not only from the administrative point of view, but also in agreeing policy at the national level among several organizations (the approach to provide incentives to the Government rather than to enterprises was attempted in one Article 5 country and failed). The existing approach has been a positive incentive that has engaged enterprise participation in national ODS phase-out plans, and has become very effective after many years of development;
- (h) The proposal to calculate the IOC as a percentage of the lowest eligible agreed ICC violates the principle of funding incremental costs. By taking the lowest ICC and a fixed percentage of the IOC, not related to actual costs, enterprises are discounted in two ways. Furthermore, considering training and testing as IOC components represents a deviation from current practice, as these project components have always been considered as ICC. There is therefore the danger that, with such a decision, IOC compensation will cease to exist.

*Secretariat's comments*

24. The Secretariat has reviewed the draft proposal on the calculation of IOC as a flat percentage rate of ICC for HCFC phase-out projects in light of the analysis of incremental costs for HCFC phase-out in the foam and refrigeration manufacturing sectors<sup>13</sup> presented in document UNEP/OzL.Pro/ExCom/55/47. Some of the key conclusions of the report relevant to incremental costs indicate that:

- (a) The magnitude of ICC will depend on the choice of technology and the baseline equipment. For several applications in the foam and refrigeration sectors, retrofit of equipment and technical assistance, rather than installation of new equipment, would be needed to achieve the phase-out of HCFCs. However, if hydrocarbon technologies are chosen, ICC would be comparable to those approved for CFC phase-out;
- (b) IOC depend on the prices of chemicals and raw material (such as blowing agents, refrigerants, chemicals required for foam formulations and lubricants), which have shown major variations at the regional level and within the country. The transitional period for applying IOC is also a factor;
- (c) Increase in foam density, which is a cost penalty resulting from the additional foam material, has a significant impact on IOC. In some other cases, the thickness of the insulation foam may have to be increased to compensate for the unfavourable thermal conductivity;
- (d) It is believed that commercialisation and penetration in Article 5 countries of non-HCFC technologies in the foam sector would be assisted through the involvement and funding

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<sup>13</sup> These are the two sectors where most HCFCs are consumed in Article 5 countries.

of systems houses<sup>14</sup>. This approach would also have an impact on the calculation of ICC and IOC at the country and enterprise levels.

25. The draft proposal on calculating IOC as a flat percentage addresses important issues related to, among others, variations in prices of chemicals and raw materials, duration of IOC, and foam density. To implement this approach, however, an analysis of the ICC associated with two or more technologies would need to be provided for each project. This analysis could become more complex in cases where several enterprises are covered under umbrella or sectoral/sub-sectoral phase-out projects. In some instances, this approach might not be equitable for all enterprises. For example, in cases where the ICC is for retrofit of baseline equipment, the associated IOC would be small (i.e., US \$1,500 to US \$7,000) but much higher for enterprises selecting hydrocarbon technologies (i.e., up to US \$78,000)<sup>15</sup>. Furthermore, the resulting IOC would also depend on the baseline equipment at the enterprise level; therefore, enterprises with a lower baseline (e.g., a low pressure machine that cannot be retrofitted to the alternative blowing agent) would receive higher IOC than an enterprise with a higher level of technology. Even if the ICC calculation is based on the average cost of two or more alternative technologies (i.e., retrofit-based and hydrocarbon-based) the issue of the baseline equipment remains. In Fund projects, costs associated with training, trials and technical assistance have been considered part of the ICC and not IOC. The proposal to pay IOC to governments, would require that the lead bilateral or implementing agency for the HPMP reports back to the Executive Committee on the utilization of those resources.

26. After further analysis of the uncertainties associated with the calculation of IOC, the Secretariat has attempted to formulate alternative methodologies to determine IOC that could be used in HCFC phase-out projects in the foam and refrigeration manufacturing sectors during the first implementation stage of HPMPs. These methodologies are presented in Annex II to the present document.

27. In the case of the foam manufacturing sector, the proposed methodology has been based on the actual ICC and IOC costs that have been approved in over 500 CFC phase-out investment projects in the integral skin and rigid foam sub-sectors where HCFCs are still used. Projects were grouped by alternative technology and subsector. For each group, the average CFC consumption per plant and the IOC per kg of CFC-11 were calculated. Based on this data, the calculated unique value for IOC is US \$2.25/metric kg<sup>16</sup>. This approach has taken into consideration, among other things, prices of chemicals and raw materials from all Article 5 countries, different time durations for the application of IOC, increases in foam densities, foreign ownership and export component. Except for HFCs, global current prices of alternative blowing agents (e.g., cyclopentane, methyl formate and methylal) are comparable to that of HCFC-141b, with lower amounts being required per unit of foam produced. This could result in lower IOC if such alternative blowing agents are readily available in Article 5 countries, at prices comparable to global prices.

28. It is therefore proposed that during the implementation of the first stage of the HPMPs, the eligible incremental costs of foam projects be considered as follows:

- (a) IOC would be considered at US \$2.25/metric kg of HCFC consumption that would be phased out at the manufacturing enterprise;
- (b) For systems-house projects, IOC would be eligible only when their downstream HCFC-based foam enterprises are also part of the project, and would be calculated on the

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<sup>14</sup> Systems houses are chemical companies that are engaged in the business of bulk pre-blending of foam systems for distribution and sale to foam manufacturers. The pre-blending obviates the need for investment in in-house premixing stations and bulk purchase of several chemical components that are blended in the system.

<sup>15</sup> Based on the retrofit costs of foam enterprises presented in Table II.1 of document UNEP/OzL.Pro/ExCom/55/47.

<sup>16</sup> Due to major differences in the ODP value of the main HCFCs currently used in Article 5 countries and their relatively low ODP values, the analysis presented in this paper is based on the metric system in order to give parity with comparable CFC phase-out where one tonne metric equals one tonne ODP.

basis of the total HCFC consumption of all the foam-producing enterprises involved that would be phased-out;

- (c) The transitional period for applying IOC would be one year.

29. In the case of the refrigeration manufacturing sector, a different methodology has been suggested, since there is limited experience in the Fund in phasing out ODS in the type of refrigeration manufacturing applications where HCFCs are mainly used. The proposed methodology is based on the difference in prices between HCFC-22 and the four main alternative refrigerants used to date (i.e., HFC-410a, HFC-407c, HFC-404a and HC-290) and the difference in the cost of lubricants in compressors and other items (i.e., solenoid valve, filter dryer, and controls). Two different calculations are proposed for determining the IOC: one is based on the present global use pattern of the refrigerants (i.e., 50 per cent for R-410a; 25 per cent for R407c; 20 per cent for R-404a, and 5 per cent for HC-290); and the other is based on the potentially achievable low-GWP use pattern of the refrigerants (i.e., 25 per cent for R-410a; 15 per cent for R407c; 10 per cent for R-404a, and 50 per cent for HC-290).

30. The resulting overall IOC for all applications and the four different refrigerants is US \$8.10/kg for the present global use pattern of refrigerants and US \$5.20/kg for the low-GWP use pattern of refrigerants. It is to be noted that the low-GWP refrigerant use pattern at present trends is unlikely to occur prior to the 2015 compliance target.

31. The current duration of IOC for the commercial refrigeration sub-sector is two years. However, the duration of IOC has not been determined for the air-conditioning and chiller sub-sectors. For reference, IOC has not been paid for refrigeration systems where the refrigerant has not been supplied at the manufacturing enterprises, such as for mobile air-conditioning systems or components and compressors.

32. It is therefore proposed that eligible incremental costs of refrigeration and air-conditioning projects be considered as follows:

- (a) IOC would be considered at US \$8.10/metric kg of HCFC-22 consumption phased out at the manufacturing enterprise;
- (b) The transitional period for applying IOC would need to be established.

33. In at least 100 Article 5 countries, compliance with the HCFC phase-out controls would be achieved by addressing consumption in the servicing sector, as no HCFC-based manufacturing enterprises are present in these countries. For LVC countries, funding for CFC phase-out in the servicing sector was approved through refrigerant management plans (RMP) to meet the 2005 and 2007 CFC phase-out targets. Additional funding was approved through terminal phase-out management plans (TPMP) for the complete phase-out of CFCs. The maximum levels of funding for these types of activities were established based on the CFC baseline for compliance. In the case of non-LVC countries, the level of funding to address the CFC-based servicing sector was estimated at US \$5.00/kg of the remaining CFC consumption eligible for funding, plus an additional 10 to 12 per cent for management and monitoring and approved under national phase-out plans (NPP).

34. A methodology for establishing funding levels for HCFC phase-out in the servicing sector, based on the main components of TPMPs and NPPs, is proposed in Annex II of this document. It suggests providing a fixed amount of funding for non-investment type activities (i.e., regulations, training, awareness), additional funding for technical assistance activities, and funding for monitoring and reporting. Minimum funding of US \$100,000 is proposed for Article 5 countries needing to phase out up to 20 metric tonnes (1.1 ODP tonnes) to meet the 2013 and 2015 compliance targets. For all other Article 5 countries, where HCFC consumption levels range from 20 to 8,000 metric tonnes

(1.1 to 440.0 ODP tonnes), funding for the technical assistance component would be calculated at US \$18.00/ODP kg (US \$1.00 metric kg) of their actual level of HCFC consumption in the servicing sector<sup>17</sup>. Up to 20 per cent of approved funds should be used by the bilateral or implementing agency and/or country concerned to ensure comprehensive annual monitoring and reporting. Accordingly, funding would be provided up to the levels indicated in the table below, on the understanding that project proposals would still need to demonstrate that the relevant funding level was necessary to achieve the 2013 and 2015 phase-out targets.

Activities	US \$							
	Below 20 m. tonnes (1.1 odp t)*	Up to 100 m. tonnes (5.5 odp t)	Up to 300 m. tonnes (16.5 odp t)	Up to 500 m. tonnes (27.5 odp t)	Up to 1,000 m. tonnes (55 odp t)	Up to 5,000 m. tonnes (275 odp t)	Up to 8,000 m. tonnes (440 odp t)	Over 8000 m. tonnes (440 odp t)
Legislation	10,000	10,000	10,000	20,000	30,000	50,000	50,000	80,000
Customs training	20,000	40,000	50,000	60,000	80,000	120,000	140,000	160,000
Technicians training	30,000	60,000	70,000	100,000	160,000	240,000	300,000	400,000
Technical assistance(**)	20,000	100,000	300,000	500,000	1,000,000	5,000,000	8,000,000	11,000,000
Monitoring (***)	20,000	40,000	90,000	140,000	250,000	1,000,000	1,700,000	2,300,000
<b>Total (in US \$)</b>	<b>100,000</b>	<b>250,000</b>	<b>520,000</b>	<b>820,000</b>	<b>1,520,000</b>	<b>6,410,000</b>	<b>10,190,000</b>	<b>13,940,000</b>

(\*) Level of HCFC consumption in metric tonnes to be phased out by 2015.

(\*\*) Figures represent maximum amounts for each group. Actual amount should be prorated according to the level of HCFC consumption in the servicing sector.

(\*\*\*) Figures represent maximum amounts for each group. Actual amount should be calculated as 20 per cent of the total cost of the activities.

35. It is proposed that, for the consideration of HCFC phase-out in the refrigeration servicing sector, Article 5 countries should include in their HPMP, as a minimum:

- (a) A commitment to meet, without further requests for funding for HCFC phase-out in the refrigeration servicing sector, at least the freeze in 2013 and the 10 per cent reduction step in 2015. This shall include a commitment by the country to restrict imports, if necessary to achieve compliance with the reduction steps, and to support relevant phase-out activities;
- (b) Mandatory annual reporting on the implementation of activities undertaken in the previous year, as well as a thorough and comprehensive work plan for the implementation of the following year's activities; and
- (c) A description of the roles and responsibilities of the major national stakeholders, as well as the lead implementing agency and the cooperating agencies, where applicable.

#### *Implementing agencies' comments*

36. Responding to a request from the Secretariat, the four implementing agencies provided comments on the technical soundness of the methodologies proposed for calculating IOC. Several of these comments have been incorporated in relevant sections of the proposed methodologies. More generally, the implementing agencies expressed a concern that while using CFC phase-out experience is a good starting point for determining cost components and establishing patterns, the linkage between the costs encountered in CFC phase-out may not have a direct bearing on the costs encountered in HCFC phase-out, particularly where several alternative technologies are not mature. Furthermore, the pro-rated IOC could result in insufficient funds to support Article 5 countries with an industry base that concentrates on a sub-sector where manufacturing new equipment is more costly, or in delaying implementation of projects where the actual IOC is higher than the proposed IOC. In the views of one

<sup>17</sup> Annex IV of document UNEP/OzL.Pro/ExCom/55/47.

implementing agency, it would be preferable to gain experience from approved pilot/demonstration projects as well as initial investment projects prior to adopting guidelines.

#### Cost-effectiveness thresholds for HCFCs

37. Cost-effectiveness threshold<sup>18</sup> values for different sectors and sub-sectors were established by the Executive Committee at its 16<sup>th</sup> Meeting (March 1995), to prioritize approvals of investment projects. Since the adoption of these threshold values<sup>19</sup>, project cost-effectiveness has been assessed against the threshold value, with projects above this threshold receiving lower funding priority or partial funding.

38. Of all the cost effectiveness thresholds so far established, those for integral skin foam (US \$16.86/ODP kg), rigid polyurethane foam (US \$7.83/ODP kg), polystyrene foam (US \$8.22/ODP kg) and commercial refrigeration (US \$15.21/ODP kg), would be relevant to HCFC phase-out. It is to be noted that the two main CFCs used in these applications, i.e., CFC-11 and CFC-12, have an ODP value of one, while the ODP values of the three most commonly used HCFCs are much lower, i.e., 0.110 for HCFC-141b, 0.065 for HCFC-142b, and 0.055 for HCFC-22<sup>20</sup>.

#### *Secretariat's comments*

39. In early 1995, cost-effectiveness threshold values were established to prioritize approvals of investment projects, since the level of funding requested in submitted projects was above the level of funding available at that time in the Multilateral Fund. This permitted an equitable distribution of the available funding between the various sectors, ensuring that no sectors were left without financial support. In considering the 2009-2011 business plan of the Fund at its 57<sup>th</sup> Meeting, the Committee requested the Secretariat to prepare, for the 59<sup>th</sup> Meeting, a strategic analysis to assist the Committee in providing guidance to the agencies on how to equitably allocate, in their 2010 and 2011 business plans, funds for all eligible Article 5 countries to enable them to meet the 2013 and 2015 HCFC reduction targets, within the limits of available resources. The strategic analysis should take into consideration any decisions on HCFC costs and funding eligibility taken by the Executive Committee prior to the 59<sup>th</sup> Meeting, and present options on how funding could be allocated, taking into account countries' total HCFC consumption and the sectoral distribution of that consumption (decision 57/6 (e)).

40. The Executive Committee has already approved funding for the preparation of HPMPs in the majority of Article 5 countries. HPMPs will include, *inter alia*, thorough surveys on HCFC consumption by users, sectors and sub-sectors, comprehensive phase-out strategies, action plans and investment activities to meet the freeze and 10 ten per cent reduction based on HCFC consumption baselines. A significant proportion of the funding to be made available for implementation of HPMPs will be utilized for the conversion of foam and refrigeration and air-conditioning manufacturing plants. The application of the current cost effectiveness guidelines will continue to facilitate the equitable distribution of funding between different sectors.

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<sup>18</sup> The cost-effectiveness value is calculated as the ratio between the sum of the total incremental capital and operating costs and the total amount of ODS to be phased out, in ODP kilograms.

<sup>19</sup> At its 17<sup>th</sup> Meeting, the Committee recognized that converting domestic-refrigerator manufacturing enterprises from CFCs to hydrocarbon technology would require additional funding for safety equipment. For these projects the numerator of the cost-effectiveness formula (i.e., funding level) should be discounted by up to 35 per cent (decision 17/14(a)).

<sup>20</sup> The total consumption of HCFCs of 363,372 metric tonnes in all Article 5 countries (excluding Republic of Korea, Singapore and United Arab Emirates) in 2006 was more than two times the CFC consumption of 178,144 metric tonnes reported in 1995 when the maximum amount ever of CFCs was reported. However, the overall negative effect of HCFCs on the ozone layer (i.e., 25,765 ODP tonnes in total) is lower than that of CFCs (176,405 ODP tonnes) due to their lower ozone depleting potential.

41. Based on the above observations, it is proposed to use the current cost-effectiveness threshold values as guidelines during the implementation of the first stage of the HPMPs.

#### Technological upgrades and conversion before the end of the equipment's useful life

42. At its 18<sup>th</sup> Meeting (November 1995), the Executive Committee decided that costs associated with avoidable technological upgrades<sup>21</sup> should not be considered as eligible incremental costs, and should not be funded by the Multilateral Fund (decision 18/25). The issue was further considered at the 25<sup>th</sup> Meeting (July 1998)<sup>22</sup> and 26<sup>th</sup> Meeting (November 1998)<sup>23</sup>, in relation to the baseline conditions of enterprises, retrofit of existing equipment and equipment nearing the end of its useful life.

43. For example, in regard to the domestic and commercial refrigeration and rigid polyurethane foam sub-sectors (which are relevant to HCFC phase-out), the Committee decided, *inter alia*, that the incremental cost of providing new foam machines where they were essential for conversion and none existed in the baseline, should be based on either the difference between the cost of a low-pressure and a high-pressure foam machine where a high-pressure machine was essential, or on an agreed percentage of the cost of a low-pressure machine. Calculation of the incremental cost for foam machines nearing the end of their useful life should be based on the cost of a new machine, minus the cost of a replacement ODS-technology machine, or a proportion thereof calculated according to decision 18/25.

#### *Secretariat's comments*

44. Issues related to technological upgrades, assessment of the baseline equipment against the new equipment being proposed and the age of the equipment are usually addressed by the Secretariat and the agencies during the project review process. On this basis, the current procedures for quantifying technological upgrades and conversion before the end of the equipment's useful life could be applied for HCFC phase-out activities.

#### Applicability of the low-volume consuming (LVC) country category with regard to HCFCs

45. Most of the ODS consumed by LVC countries were CFCs (mainly CFC-11 and CFC-12), largely used for servicing refrigeration equipment. For these countries, CFC phase-out in the refrigeration servicing sector was typically addressed through RMPs (decision 31/48) and TPMP (decision 45/54). For the phase-out of HCFCs, Article 5 countries have now been categorized in two groups: countries with HCFC consumption in the refrigeration servicing sector, and countries with HCFC consumption in both the manufacturing and refrigeration servicing sectors.

#### *Secretariat's comments*

46. The guidelines for the elaboration HPMPs as agreed by the Executive Committee at its 54<sup>th</sup> Meeting (decision 54/39 (c)) are based on this classification of Article 5 countries. Accordingly, the LVC category does not apply in the context of HCFC phase-out.

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<sup>21</sup> Technological upgrade is defined as additional advantages which the enterprises may obtain, such as superior quality products, increased production capacity or flexibility, reduced energy consumption and labour and/or other advantages as a result of conversion to non-ODS (or low-ODS) technology. A methodology was developed for quantification of technological upgrades, to be used as guidance in the calculation of incremental costs (UNEP/OzL/Pro/ExCom/18/73).

<sup>22</sup> Decision 25/48.

<sup>23</sup> Decision 26/37.

### Starting point for aggregate reductions in HCFC consumption

47. In the context of the policy paper on second-stage conversions and cut-off date<sup>24</sup> submitted to the 57<sup>th</sup> Meeting, the Secretariat identified two issues related to the starting point for aggregate reductions in HCFC consumption. One issue relates to the calculation of the starting point and the other relates to when the starting point should be provided by those Article 5 countries that submit an HCFC phase-out project prior to the submission of their HPMP. Due to time constraints, the Committee was unable to clarify those issues.

48. The starting point for aggregate sustained reductions in CFC consumption was adopted three years after the CFC baselines were known (i.e., 1998), and almost two years after the CFC freeze compliance target (July 1999) entered into force. However, HCFC baselines under the Montreal Protocol (i.e., baseline for compliance) will be calculated only in late 2011, once 2010 HCFC consumption has been reported to the Ozone Secretariat. It is expected that by the time HCFC baselines are calculated, the majority of (if not all) Article 5 countries will have an HPMP (with an established starting point) approved and under implementation.

49. According to the guidelines for the preparation of HPMPs, countries with manufacturing sectors using HCFCs should *inter alia* provide starting points for aggregate reductions, together with annual reduction targets. The guidelines also provide, for countries that chose to implement investment projects in advance of completion of the HPMP, that approval of such projects should result in phase-out of HCFCs to count against the consumption identified in the HPMP (decisions 54/39 and 55/43 (b)).

50. In view of the uncertainties regarding the establishment of the starting points, the Executive Committee might wish to provide further advice on the following:

- (a) For those Article 5 countries that submitted projects in advance of completion of their HPMP, whether the starting points should be established at the first submission of an HCFC demonstration and/or investment project or when the HPMP is being submitted for consideration by the Committee;
- (b) In calculating starting points for aggregate reductions in HCFC consumption, would Article 5 countries be able to choose between the most recent reported HCFC consumption under Article 7 of the Montreal Protocol at the time of the submission of their HPMP and the average of consumption forecast for 2009 and 2010, excluding HCFC consumption from manufacturing enterprises that would not be eligible for funding as a result of the Committee's decisions on the cut-off date and second-stage conversion;
- (c) Would the agreed starting points for aggregate reductions in HCFC consumption be adjusted downward in cases where calculated HCFC baselines based on reported Article 7 data are lower.

### **Recommendation**

51. In order to allow the Executive Committee to address the outstanding issues on HCFC phase-out presented in this paper, the Secretariat has drafted the following text for a recommendation by the Executive Committee, taking into account the analysis provided for each of the issues, the proposals submitted by two Members in regard to funding for second-stage conversion projects and eligible incremental costs, as well as comments received from some other members on these proposals.

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<sup>24</sup> UNEP/OzL.Pro/ExCom/57/60.

52. In light of the mandate provided by the 19<sup>th</sup> Meeting of the Parties to the Montreal Protocol, and the information given above, the Executive Committee may wish to consider adopting the following criteria for funding HCFC phase-out in the consumption sector in Article 5 countries:

Cut off date

- (a) Not to consider any projects to convert to HCFC-based capacity installed after [2003], [2005] or [21 September 2007];

Second stage conversion

- (b) Full funding of eligible incremental costs of second-stage conversion projects would be considered in those cases where an Article 5 Party clearly demonstrates in its HPMP that such projects would be necessary to comply with the Montreal Protocol HCFC targets up to and including the [35 per cent reduction step by 1 January 2020], [67.5 per cent per cent reduction step by 1 January 2025], and/or are the most cost-effective projects that the Party concerned could undertake in order to comply with the Montreal Protocol HCFC targets up to and including the [35 per cent reduction step by 1 January 2020] [67.5 per cent per cent reduction step by 1 January 2025];
- (c) Funding for all other second-stage conversion projects not covered under paragraph (b) above, would be limited to reimbursing the difference between the cost of HCFC-based equipment and non-HCFC-based equipment, [and providing funding for installation, trials, training and IOC];

Starting points for aggregate reductions in HCFC consumption

- (d) For those Article 5 countries that submitted projects in advance of completion of their HPMP, the starting points for aggregate reductions in HCFC consumption should be established [at the first submission of an HCFC demonstration and/or investment project] [when the HPMP is being submitted for consideration by the Executive Committee];
- (e) In calculating starting points for aggregate reductions in HCFC consumption, Article 5 countries would be able to choose between the most recent reported HCFC consumption under Article 7 of the Montreal Protocol at the time of the submission of the HPMP and the average of consumption forecast for 2009 and 2010, excluding HCFC consumption from manufacturing enterprises that would not be eligible for funding;
- (f) The agreed starting points for aggregate reductions in HCFC consumption [would] [would not] be adjusted downward in cases where calculated HCFC baselines based on reported Article 7 data are lower than the starting points.

Eligible incremental costs of HCFC-phase out projects

*Option I*

- (g) IOC would be calculated at a flat percentage rate of [5 to 10 percent] of the lowest eligible agreed ICC of the HCFC phase-out project, or the average of agreed ICC associated with the HCFC sector concerned;
- (h) The IOC calculated according to the above paragraph (g) would be provided directly to Article 5 governments for designing country-appropriate policies and/or programmes to encourage climate-friendly HCFC phase-out. For those Article 5 governments that are

unable to receive the calculated IOC, only IOC associated with training and testing the new alternative technology would be paid directly to the manufacturing enterprise, without including any payment for the purchase of alternative chemicals;

*Option II*

- (i) For the first stage of HPMP implementation to achieve the 2013 and 2015 HCFC phase-out compliance targets, to apply the following principles in regard to eligible incremental costs of HCFC-phase out projects:

- (i) To request bilateral and implementing agencies, when preparing HCFC phase-out projects in the foam, refrigeration and air-conditioning sectors, to use as a guide the technical information contained in document UNEP/OzL.Pro/ExCom/55/47;

HCFC phase-out in the foam sector

- (ii) IOC would be considered at US \$2.25/metric kg of HCFC consumption that would be phased out at the manufacturing enterprise for a transitional period of one year;
- (iii) For group projects linked to systems house, the IOC should be calculated on the basis of the of the total HCFC consumption of all downstream foam enterprises that would be phased out;

HCFC phase-out in the refrigeration and air-conditioning manufacturing sector

- (iv) IOC would be considered at US \$8.10/metric kg of HCFC-22 consumption that would be phased out at the manufacturing enterprise;
- (v) Consistent with decision 31/45, IOC would not be considered for enterprises categorized under the assembly, installation and charging of refrigeration equipment sub-sector;
- (vi) IOC would be applied for a transitional period of [xx months];

HCFC phase-out in the refrigeration servicing sector

- (vii) Article 5 countries should include in their HPMP, as a minimum:
- a) A commitment to meeting, without further requests for funding at least the freeze in 2013 and the 10 per cent reduction step in 2015 in the refrigeration servicing sector. This shall include a commitment by the country to restrict imports of HCFC-based equipment if necessary to achieve compliance with the reduction steps and to support relevant phase-out activities;
- b) Mandatory annual reporting on the implementation of activities undertaken in the refrigeration servicing sector in the previous year, as well as a thorough and comprehensive work plan for the implementation of the following year's activities; and
- c) A description of the roles and responsibilities of major stakeholders, as well as the lead implementing agency and the cooperating agencies, where applicable.

(viii) Funding would be provided as follows on the understanding that project proposals would still need to demonstrate that the funding level was necessary to achieve the 2013 and 2015 phase-out targets:

- a) For Article 5 countries that would need to phase-out up to 20 metric tonnes (1.1 ODP tonnes) of HCFCs, a fixed amount of up to US \$100,000;
- b) For Article 5 countries that would need to phase-out over 20 metric tonnes (1.1 ODP tonnes) and up to 8,000 metric tonnes (440.0 ODP tonnes), a fixed amount for non-investment type of activities as shown in the table below, plus technical assistance activities calculated at US \$1.00/metric kg (US \$18.20/ODP kg) of HCFC consumption in the refrigeration servicing sector, and an additional 20 per cent of the resulting amount for implementation, monitoring, and reporting;

Up to 100 m. tonnes (5.5 odp t)	Up to 300 m. tonnes (16.5 odp t)	Up to 500 m. tonnes (27.5 odp t)	Up to 1,000 m. tonnes (55.0 odp t)	Up to 5,000 m. tonnes (275 odp t)	Up to 8,000 m. tonnes (440 odp t)
110,000	130,000	180,000	270,000	410,000	490,000

- c) For Article 5 countries that would need to phase-out over 8,000 metric tonnes (440.0 ODP tonnes) of HCFCs, a fixed amount of up to US \$13,490,000;
- (ix) The Article 5 government concerned would have flexibility in utilizing the resources available under the refrigeration servicing sector to address specific needs that might arise during project implementation to facilitate the smoothest possible phase-out of HCFCs;

HCFC phase-out in the aerosol, fire extinguisher and solvent sectors

- (x) To consider on a case-by-case basis the eligibility of the incremental capital and operating costs for HCFC phase-out projects in the aerosol, fire extinguisher and solvent sectors.

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## Annex I

### **PART A: REPORT OF THE INFORMAL MEETING OF EXECUTIVE COMMITTEE MEMBERS ON OUTSTANDING HCFC POLICY ISSUES**

#### **Background**

1. At its 57<sup>th</sup> Meeting, the Executive Committee considered a paper on second-stage conversions and determination of the cut-off date for installation of HCFC based manufacturing equipment (document UNEP/OzL.Pro/ExCom/57/60), which had been prepared in response to decision 56/65. The paper also raised issues regarding the starting point for aggregate reductions in HCFC consumption.

2. During the discussion, some Members expressed their views on the selection of a specific cut-off date while other Members indicated that a decision on the cut-off date could only be made in the context of other outstanding issues including: second-stage conversions, the starting point for sustained aggregate reductions in HCFC consumption, eligible incremental costs, cost-effectiveness thresholds for HCFCs, technological upgrades and conversion before the end of the equipment's useful life, and the applicability of the low-volume consuming country category with regard to HCFCs. Given the importance of providing countries with a clear idea of scope of the Fund's assistance for HCFC phase-out, an attempt would be made to consider all cost parameters as a package in order to make the required policy decisions. The Chair therefore called for Executive Committee Members, with assistance from the Secretariat, to meet in the margins of the Meeting to discuss the list of outstanding issues mentioned above, taking into account the comments made during the discussion.

#### **Convener of the informal meeting**

3. The informal meeting of Executive Committee Members, with the assistance from the Secretariat, was held on Thursday 2 April 2009, from 2:00 to 3:30 pm. The Convener of the informal meeting was Sweden (Mr. Paul Krajnik). In his opening remarks, the Convener referred to the list of six outstanding issues that were considered during the plenary session of the Executive Committee (i.e., cut off date, second-stage conversion, starting point for aggregate reductions in HCFC consumption, eligible incremental costs and cost-effectiveness thresholds, technological upgrades and conversion before end of useful life, definition of LVC in the context of HCFC phase-out, and funding of institutional strengthening post 2010). He also indicated that in their deliberations, Members should also consider the issue of funding for institutional strengthening projects beyond 2010.

4. During the deliberations, two approaches on dealing with some of the outstanding issues were proposed by two Members. The text of their approaches, as submitted to the Secretariat, is presented below.

#### **HCFC phase-out: Opportunity to achieve broader environmental benefits (submitted by the United States of America)**

5. In adjusting the HCFC phase-out at the 19<sup>th</sup> Meeting, the Parties directed the ExCom to "promote the selection of alternatives...that minimize environmental impacts, in particular...on climate." (decision XIX/6, para. 9). The Parties also asked the ExCom, when developing and applying funding criteria, to "give priority to cost-effective projects and programmes which focus on substitutes...that minimize impacts... on the climate, taking into account global-warming potential, energy use and other relevant factors." (decision XIX/6, para 11(b)).

### Incentives for climate-friendly choices

6. These mandates to address climate change will require new approaches in Multilateral Fund for assisting Article 5 countries with the HCFC phase-out. An issue before the ExCom is how to develop cost-effective incentives for climate-friendly technology choices. These incentives for the choice of climate-friendly technology might be directed at an enterprise level or directed at a government level. Another approach might be for the ExCom to adopt specific guidelines that direct the Committee on how to approve projects and programmes; giving priority to climate benefits. The ExCom should consider at what level the incentives should be directed for a cost-effective HCFC phase-out that minimizes climate impacts.

### Avoiding unintended incentives

7. In hindsight, through the Fund's evaluations of the CFC funding framework by the Senior Monitoring and Evaluation Officer, the ExCom has learned that some guidelines created unintended incentives that influenced technology choices by enterprises. The CFC funding model included, amongst many different parts, the direct cash payments to enterprises of funds calculated as being eligible incremental operating costs (IOC). The way incremental operating costs for CFCs was funded is the only component of assistance provided by the Fund that is given as a direct cash payment to enterprises.

8. The direct cash payment to enterprises of the calculated IOC influenced enterprise's choice of technology because they sought to maximize this cash payment. Enterprises often chose the technology that would give the highest amount of IOC payment without regard for the long-term availability of the substitute chemical or the long-term competitiveness of the company with the chosen technology. Enterprises sometimes found the long-term costs of the new alternative chemical too expensive, or the chemical was too difficult to obtain.

9. There were unintended environmental consequences from the hidden incentive built into the CFC funding model. The funding model encouraged enterprises to maximize the direct cash payment of IOC which sometimes meant the choice of alternatives detrimental to the ozone layer and/or the climate system.

### Developing new flexible incentive programmes

10. For HCFCs, the Parties have asked the ExCom to create incentives that will encourage climate-friendly choices. The ExCom now needs to develop a new model that will encourage climate-friendly technology choices instead of the old framework on agreed eligible operating costs. The current model of calculating and distributing incremental operating costs, if applied to HCFCs would actually promote less friendly climate technologies choices because enterprises would be encouraged to choose high-GWP alternatives.

11. Clearly, the HCFC funding model should, if possible, promote adoption of climate friendly alternatives and, at the very least, should be technology-neutral. Because local energy markets, energy efficiency standards, and building codes vary so widely from country-to-country, the transition from HCFCs to climate-friendly technologies may need to be tailored to national circumstances. A funding model that is responsive to unique climate challenges in each country could provide Multilateral Fund resources to the government for development of locally-appropriate incentives that link to national policies, programmes and circumstances. The development of country-appropriate incentives for a climate-friendly HCFC phase-out could be designed best by each national government, with assistance from bilateral and implementing agencies. Fund resources would then be used to create locally-appropriate policies and programmes that promote a transition from HCFCs that also achieves climate benefits based on their local circumstances.

12. The ExCom should consider adopting an HCFC funding model that provides the Article 5 government (i.e., provides the National Ozone Unit) with the agreed incremental operating costs that are calculated on a flat percentage rate based on the eligible agreed costs of the HCFC conversion project or sector plan, such as 5-10 percent of the estimated capital cost of the projects in that sector. The payment could be calculated on the basis of the lowest capital cost or, some have suggested, an average of the capital costs associated with this sector. This approach of providing resources to the government would allow for the design of country-appropriate national policies or programmes to encourage climate-friendly HCFC phase-out. By calculating the eligible incremental operating costs as a fixed percentage of the lowest capital cost for the sector the ExCom would create a framework that is neutral for the choice of technology, without any unintended incentive.

13. We understand that some Article 5 governments do not want to receive (or cannot receive) the calculated eligible incremental operating costs to use in designing a country-appropriate climate incentive programme. In those instances, the ExCom might consider providing incremental operating costs only for training and testing associated with the new alternative technology directly to the enterprise, without including any payment to the enterprise for the purchase of the chemical. This would be a technology-neutral HCFC funding model for eligible incremental operating costs.

#### **Strategy for second-stage conversion (submitted by Australia)**

14. The possible role of the MLF in providing assistance to enterprises which already received funding from the MLF to convert from CFCs to HCFCs (i.e. second conversions) has been debated at several ExCom meetings. It is clear that some ExCom members believe that, pursuant to Decision XIX/6 of the Parties, all second conversions should be fully funded, while other ExCom members support only some partial level of assistance in light of the fact that the enterprises concerned committed to phase out HCFCs without further assistance from the Fund.

15. In an attempt to find a compromise on this issue, Australia proposes to carefully examine the language of Decision XIX/6, as it pertains to second conversions, in order to determine if this language suggests a way forward on this issue.

#### Discussion

16. It should first of all be noted that Decision XIX/6 of the Parties does not request the ExCom to provide full funding for all second stage conversions, but rather directs the ExCom to revise its current policy in this regard. Furthermore, in our view, the fact that HCFCs were already controlled when the enterprises concerned agreed to undertake a second conversion from HCFC to alternatives without additional MLF assistance, does not support the case for full funding for all second stage conversions. However, it is evident that the Parties would not have requested the ExCom to change the eligibility criteria related to second stage conversions, unless the intention was to provide at least partial MLF funding.

17. The challenge, therefore, is to agree on a funding modality for second stage conversions, which allows for some level of funding, in the spirit of Decision XIX/6. The decision refers to the need to enable Article 5 Parties to comply with the accelerated phase-out, and based on that understanding, to direct the ExCom to make necessary changes to the eligibility criteria related to the post-1995 facilities and second stage conversions. One option for a way forward, therefore, might be to determine what is required to enable Article 5 Parties to comply.

#### What is needed to comply?

18. Considering a life-time of 15-20 years for manufacturing equipment (as per chapter 7.3 of the report: *Supplement to the May 2008 TEAP Replenishment Report*, by the Technology and Economic

Assessment Panel), and the fact that most conversion projects to HCFCs financed by the MLF were completed prior to 2005, it may be assumed that Article 5 Parties with a large proportion of their HCFC consumption resulting from such conversions may have to replace some of the related HCFC-based equipment prior to its end-of-life in order to comply with HCFC phase-out targets up to the 2020 35% reduction step.

19. In those cases, it can be argued that it is necessary for the MLF to provide funding for the costs associated with replacing such equipment in at least some of the enterprises in the Parties concerned, in order to enable such Parties to comply. Thus, if the HCFC phase-out strategy and action plan of a Party demonstrated that the Party concerned would be unable to comply with HCFC phase-out targets up to and including the 2020 35% reduction, unless it undertook a number of second stage conversions, the MLF would pay the full incremental costs associated with the conversion of those enterprises which need to be converted in order to achieve compliance. (The level of such incremental costs is of course dependent on whatever decisions on incremental costs the ExCom will take in the case of HCFCs. It should be noted that, at this point, incremental capital and operational costs are still to be agreed).

20. On the other hand, second stage conversions which are not needed to comply with targets up to 2020 would not be funded to the same extent, because by the time of the 2025 target, the enterprises will need to change their manufacturing equipment anyway as it would have reached its end-of-life by then. Therefore, in those cases, it could be argued that what is necessary for Parties to comply is for the MLF to pay only the differential costs between HCFC-based equipment and the selected non-HCFC based equipment (assuming that the latter is more expensive), and taking into account existing policies on avoidable technology upgrade and capacity increase.

21. Therefore, one option for second conversions would be for the MLF to pay the full incremental costs associated with those enterprises whose conversion is necessary for a Party to comply with phase-out targets up to 2020, and funding for differential capital costs to other enterprises.

#### Cost-effectiveness of projects

22. It may be recalled that Decision XIX/6, paragraph 11, also requests the ExCom to give priority to “cost-effective” projects and phasing out those HCFCs with “higher ozone-depleting potential (ODP)”. Since second stage conversions would involve the phase-out of HCFC-141b, which has the highest ODP of the main HCFCs used, and is generally more cost-effective to phase out than other HCFCs, the ExCom may also want to consider further expanding the approach suggested above. That is to say, the ExCom may want to consider providing full incremental costs funding for second conversions not only when such conversions are needed for countries to comply with targets up to 2020, but also when they are shown to be the most **cost-effective** way for countries to comply with HCFC targets up to 2020.

#### Proposal for a decision

23. In light of the above, it is proposed that the Executive Committee could decide that:

- (a) The Multilateral Fund will provide full funding for second-stage conversions, at a level based on the Executive Committee’s final decisions with respect to HCFC incremental costs, in those cases where an Article 5 Party clearly demonstrate that such second-stage conversions:
  - (i) Will be necessary for the Party concerned to comply with the Montreal Protocol HCFC targets up to and including the 2020 35% reduction step, and/or
  - (ii) Are the most cost-effective projects that the Party concerned could undertake in order comply with the Montreal Protocol HCFC targets up to and including the

2020 35%-reduction step.

- (b) The provision of assistance by the Multilateral Fund to all other enterprises subject to the policy on second-stage conversions will be limited to reimbursing the differential cost between HCFC-based equipment and non-HCFC-based equipment, taking into account existing policies on avoidable technology upgrade and capacity increase.

### **Issues raised and opinions expressed during the discussion in the informal meeting**

24. The discussion by Executive Committee Members focussed mainly in the oral proposal presented by the representative of the United States of America. Relevant issues raised and opinions expressed by the Members included:

- The need to consider all outstanding issues on HCFC phase-out as a package (i.e., cut off date, second-stage conversion, starting point for aggregate reductions in HCFC consumption, eligible incremental costs and cost-effectiveness thresholds, technological upgrades and conversion before end of useful life, definition of LVC in the context of HCFC phase-out, and funding of institutional strengthening post 2010);
- The new approach for calculating incremental operating costs and redirecting those costs to governments instead of the enterprise could possibly be applied in the long term. However, there is an urgent need to adopt a solution for the short term. To achieve the initial stage of compliance (i.e., 10 per cent reduction in HCFC consumption by 2015) during the preparation of their HPMPs, countries should choose the best approach to follow;
- The new approach may provide a disincentive to convert to non-HCFC alternatives especially for enterprises using equipment which has a significant remaining useful life. Furthermore, payment of incremental operating costs directly to Ozone Units raises issues on the Ozone Unit's capacity to handle and allocate additional funding from incremental operating costs. Thus, it would be better to continue paying operating costs to industry as an incentive for their involvement in the HCFC phase-out programme;
- The methodology for the calculation of the incremental operating costs should not only be based on the capital cost of the alternative technology, but should also take into account costs associated with its implementation;
- How to apply cost effectiveness thresholds for the new approach proposed in relation to calculating capital costs.

25. Funding for institutional strengthening projects post 2010 was included in the list of issues to be addressed by the informal group. However, due to time constraints, the issue was not fully discussed by Members.

### **Report of the convener of the informal group and decision by the Executive Committee**

26. In its report to the Executive Committee, the convener of the informal group (Sweden) indicated that Members discussions centred on the general principles and future guidelines and strategies for HCFC conversions. He reported on the new approaches proposed by two Members (one on redirecting payment of incremental operating costs and the other on second-stage conversions). The group briefly discussed the issue of funding for institutional strengthening projects after 2010, and concluded that funding renewals for these projects should be supported up to the beginning of 2011.

## PART B: COMMENTS RECEIVED FROM EXECUTIVE COMMITTEE MEMBERS

### COMMENTS FROM BOLIVIA

**{Note by the Secretariat: Part of the following text was submitted in Spanish. The text in italics has been translated into English for ease of reference.}**

*Dear Ms. Maria Nolan,  
Chief Officer of the Multilateral Fund*

*Herewith are our comments on the HCFC phase-out document sent to members of the Executive Committee for review.*

*The following bullets summarises the main concerns about the document and after that there are a comprehensive text that contains the comments in full.*

- Enterprises' decision to undertake industry conversion by substituting CFCs was based on environmental benefits, within the limits of the Multilateral Fund, because hydrocarbon technologies were considered but funding restrictions did not make it possible. We do not think it is appropriate to consider that enterprises only take into account the economic resources associated with incremental operating costs when selecting technologies.*
- Similarly, it is important to take into account the potential effectiveness of government intervention in the administration of resources linked to incremental operating costs, seeing as the timely and truly effective transfer of the support intended in the form of said resources is a very significant element in obtaining a commitment from enterprises.*
- The ExCom might consider setting GWP limits in the guidelines for calculating the breakdown of incremental operating costs for HCFC phase-out, as a means of limiting possible perverse incentives.*
- We do not think it is healthy to change the existing rules for the distribution of incremental operating costs, mainly because direct payments to beneficiary enterprises has given them access to, and encouraged their effective participation in the process. Adding procedures that involve the government of each country could act as a disincentive, with a negative impact on project implementation. Some countries in the region have tried to develop national incentive programs for enterprises, but they have not managed to maximize resources, which are better utilized by enterprises than by Governments.*
- Regarding the IS issues, on one side there is a proposal to cut funding for the Institutional Strengthening projects in 2011, but on the other side, according to what is described in the document, the NOUs would have an extra work load if they have to manage the IOC funds and do the proposed selection of companies that could be benefited by the projects, among other issues. We find this contradictory because cutting the resources allocated for IS projects would introduce weaknesses for the NOU's and they will not be able to cover additional responsibilities.*

## **HCFC phase-out: Opportunity to achieve broader environmental benefits (submitted by the USA)**

### **Incentives for climate-friendly choices**

The USA states that the MOP requirement to address climate change will require new approaches in the Multilateral Fund for assisting Article 5 countries with the HCFC phase-out. There are early ExCom decisions that indicate a presumption against HCFCs as well as methylene chloride. From this, and the fact that both technologies have been used anyway, one can conclude that while environmental issues other than ODS have been considered, other factors, such as cost-effectiveness, performance and availability have played major roles in final considerations.

The need for new approaches can therefore not be based on just the emphasis of MOP decision XIX (6) on other environmental issues and certainly not on climate change only.

*1. Decisions made by enterprises during the industrial conversion away from CFCs were based on funds received from the Multilateral Fund. Meanwhile, their choice of technology was not determined by the fact that enterprises received the resources directly, without the Government acting as an intermediary. Nor were their decisions made solely with the intent of maximizing payments for incremental operating costs, regardless of competitiveness or the existence of alternative chemicals, as stated in paragraph 7.*

*2. The premise in paragraph 8 to the effect that the direct payment of incremental operating costs created perverse incentives for the environment is false. The only reason that enterprises did not make more environmentally friendly decisions that maximized climate benefits, is because there was no funding from the Multilateral Fund to maximize said benefits. As we know, HC technology was already available back then, and its environmental benefits had already been recognized. Meanwhile, the ExCom made the policy decision to not finance conversion to HC technology because of high additional costs linked to the required safety measures for using said chemical substances.*

*3. In order to avoid perverse incentives in relation to climate change when funding HCFC alternative technologies, ExCom could establish GWP (global warming potential) limits within existing rules for calculating and distributing incremental operating costs.*

*4. There should furthermore be no proposed changes to the current rules for calculating and distributing incremental operating costs. The current direct-payment model is a necessary incentive to get industry involved in national ODS phase-out programs, and has reached a satisfactory level of efficiency after many years of constant improvement. Some countries have attempted to develop national incentive programs for enterprises. However, they have not managed to maximize resources, which are better used by enterprises than by governments. The model proposed by the United States did not work in those cases, and is not considered a viable option for HCFC phase-out.*

*5. Given the accelerated phase-out schedule for HCFC phase-out, and the short amount of time available to phase out 10% of consumption and production, we cannot afford the luxury of investing in a new model with regard to which we have no experience. The proposal in paragraph 11 would have to be analyzed and negotiated at length, which would postpone an urgent decision on funding and on Article 5 country commitments for 2013 and 2015.*

*6. One potential way of improving the existing model for funding incremental operating costs would be to increase the National Ozone Units' participation in the implementation process. The Ozone Unit should not decide on the best technology for national enterprises, but it could monitor each company's choice, with the help of the implementing agency.*

*Generally speaking, we feel that the proposal has merit, but that it is based on an assumption that we consider false. In any event, it contains elements regarding which we would like clarification, and which could possibly become part of an agreement on the environmental benefits of technology chosen as a substitute to HCFC use.*

### **Avoiding unintended incentives**

The Protocol states that funding should be given on the basis of agreed “incremental costs”, but the Parties did not define this term, or suggest how it should be applied to projects as diverse as the ones covered by the MP. Over time, the Fund developed a clear definition of incremental cost, which, by and large, ensured that the entity undertaking the project at issue was left, at completion, in a financial sense, equivalent to where it was before the project was started.

While the use of this concept had to be adapted to address different types of activities, this innovative definition of incremental cost was soon a part of other environmental treaties, and the ground breaking work performed by the Fund became used extensively in contexts such as in the Global Environment Facility.

The paper mentions “unintended incentives” created by IOCs and the need to avoid these. The ExCom and the MPMF secretariat have been very diligent in limiting benefits that would exceed compensation for IOCs by assuring that chemical prices were realistic and the period through which IOCs were granted was constantly reduced (10, 4, 2 and 0.5 years). It is therefore difficult to see these payments as “unintended incentives”.

Where new technologies were more expensive in operation than previous ones, there was a dis-incentive to change voluntarily and the cash payment had the intention to cover the increased cost for up to four years. As operating costs for alternatives kept coming down, IOCs have been reduced in period covered as well in amount. Therefore, it doesn't seem an incentive but rather the (partial) removal of a dis-incentive.

The assumption that Companies look beyond the limited period for which IOCs are granted and focus on long term benefits such as better technology and even future environmental compliance. The underlying assumption that A5 companies, would select a technology based on an expected IOC payment and were only short-term, profit driven is an unsubstantiated statement and, implicitly questions the review by the MLF bodies.

The choice of environmentally inferior technologies has been based on cost-effectiveness and supply considerations (availability of the technology and alternative in the country), applicability of the technology to the local conditions of the plant (its location, size), market acceptance and, in some instances, based on the technical capacity of smaller companies to cope with technically complicated alternatives. Because of the high cost of some environmentally superior alternatives, recipients—in particular smaller ones—were not allowed these technologies and forced to use lower cost, but environmentally inferior options. The amount of IOC did not play major role in this decision.

The need for a new approach based on unintended incentives and unintended environmental consequences is therefore not evident and labelling IOCs and short term profit seeking as such is inconsistent with the very base of MLF funding model: compensation for reasonable incremental costs.

It is stated that “Enterprises sometimes found the long-term costs of the new alternative chemical too expensive, or the chemical was too difficult to obtain”. We fully agree with this statement and it is very much or even more valid now, when the long-term alternatives (both refrigerants and foaming agents) are

not well defined yet and the available ones are very expensive, not readily available, not fully mature or have one or several drawbacks, like: high GWP or flammability or lower technical performance or large investments.

The alternative technologies have been always more expensive and less perfect than the one they are replacing. The new products require extensive marketing to ensure timely market penetration and wider acceptance. Thus, the conversion itself is associated with long-term negative financial implication. The aim of the IOC has been to prevent market distortion and provide incentive to enterprises to implement projects not waiting for the competitors.

1. *In paragraph 7 of the document, it is stated that, taking into account the CFC funding framework evaluations conducted by the Monitoring and Evaluation Officer, some criteria established by the Executive Committee created unintended incentives that influenced enterprises' technology choices.*
2. *Also, in paragraph 8 of the document, it is mentioned that the direct payment of incremental operating costs (IOC) to enterprises influenced the technology choice of enterprises that sought to maximize the cash payment by selecting the most expensive technology, without taking other factors into account.*
3. *At the time of the technology change, HCFCs were the best economic available option, because other technology (e.g. cyclopentane) involved higher incremental capital costs (ICC) given the security conditions for their use. Enterprises could not afford those higher ICC, which means that, in practice, there was no option to "choose" the technology with the best chance of cash payments for IOC. In fact, for example in Colombia, only one company (AJOVER), made the decision to use hydrocarbons. It had to pay the associated capital costs, and did not receive compensation for IOC.*

*If the impact of chosen technologies has not been the best for the ozone layer and climate, that is due more to the market availability of alternatives for enterprises in developing countries, characterized by the technological bias in developed countries, than on a supposed unintended incentive on the part of the Multilateral Fund.*

### **Developing new flexible incentive programs**

While the need for incentives to choose environmentally superior alternatives is recognized, it has to be pointed out that these should be considered in the framework of total incremental costs—not just IOCs. The underlying assumption that IOCs are cash incentives is just plain wrong as has been argued before. The ExCom always has used cost threshold limits that are based on full cost to the MLF—ICCs as well as IOCs. Therefore it is unclear how only the IOCs could constitute an incentive for high GWP options.

It is suggested to change the beneficiary of the IOC to the government to “allow for the design of country-appropriate national policies or programmes to encourage climate-friendly HCFC phase-out”. This approach - at least at the initial stages of the HCFC phase out – will reduce the willingness of enterprises to come forward and volunteer the conversion process considering the strong likelihood of losing their competitiveness since they will have no financial means to compensate for the higher operating costs. On top of this, most probably, channelling funding through the Governments and seeking for a national determination of the environmental effects will mean higher costs and almost certainly lead to delays that will make the “freeze +10%” deadline unattainable.

It will add a lot of bureaucracy, not only from the administrative point of view, but in agreeing this policy at national level between several organizations. It will be not only a costly, time-consuming approach

requiring locally applied special expertise but it will create a “Fund under a Fund” by funding through the Government.

The proposal to fund IOCs based on a flat percentage—without obviously taking into account that all technologies have different IOCs attached—violates the principle of funding based on actual incremental costs. Since eligible costs are not defined yet, this consideration seems premature. In addition, alternatives may have high capital/low operating costs or vice versa. By taking the lowest ICC and a fixed percentage IOC—unrelated to actual costs—the recipients are discounted in two ways. As the proposal will not lead to compensation of actual costs on recipient level, we understand the proposal contradicts MOP XIX (6), par. 5.

The proposal to link, in case of countries that cannot manage central funding, IOCs to training and testing defies the character of IOCs. This approach is a major deviation from the current praxis because the training and testing have been always part of the incremental capital cost and not of the IOC and the aim of the IOC has been to compensate the eligible incremental operating cost. The chemicals have always been the major component of the IOC. Thus, there is a danger that with such decision the IOC compensation will cease to exist. It would mean that countries that cannot manage the proposed funding model will not receive IOCs.

*Taking the above into account, we do not share the view that the only reason to change the current framework for agreed incremental operational costs is that enterprises might be encouraged to select alternatives with high global warming potential (GWP). We think, rather, that it is necessary to revise the IOC regime because ozone layer protection factors and the selection of alternatives with environmental benefits cannot be taken as a whole, given the various different elements that must be considered, such as energy efficiency.*

*The proposal to establish a funding model to provide the Governments of Article 5 countries with the resources required to cover IOC for HCFC phase-out, while possibly appropriate for taking into account national circumstances in selecting the best technology for the ozone layer and climate, could also cause certain administrative difficulties linked to national regulations for the allocation of resources that are under the national budget, or are administered by United Nations agencies.*

*In any event, the proposal to calculate IOC based on a fixed percentage of the lowest capital cost for each sector would not be ideal, if such a mechanism were adopted. An average of capital costs, rather than the lowest capital cost, would be fairer. Furthermore, if the National Ozone Unites are put in charge of the resources, then they should be considered separately from institutional strengthening resources.*

### **Strategy for second-stage conversion (submitted by Australia)**

The Australian proposal assumes that all enterprises that converted to HCFC are committed to phase out HCFCs without further assistance of the Fund, since most recipients committed themselves to a self-paid residual ODS phase-out. However, this commitment was made in the context of a phase out by 2040 in mind—being the MP requirement. This was true in the context of the old control measures for HCFCs, but now the rules of the game have changed so this issue should not be taken into account.

Now that an accelerated phase-out was agreed upon, conditional by many countries to proper funding, the conditions have been changed and it appears unreasonable to impose a self-pay requirement upon second conversions based on an accelerated phase-out plan.

The language of MOP XIX (6) par. 5 states that “To agree that the funding available shall be .... sufficient to meet all agreed incremental costs to enable Article 5 Parties to comply with the accelerated phase-out schedule ...”. Therefore the decision includes ALL costs related to secondary conversions.

Australia considers a “life-time of 15-20 years for manufacturing equipment”. This issue was contested several times in the context of A5 countries. This assumption could be valid for developed countries, but in developing countries equipments are repaired and used for very long time frames. Since the life-time of 15-20 years is too short for A5 countries, we suggest to change the recommendation in Paragraph 23 (a) (i) to state 2025 and 67,5% until which, “the MLF would pay the full incremental costs associated with the (second) conversion of those enterprises which need to be converted in order to achieve compliance”.

This is very difficult to assess, and means a Party would have to select which companies could be funded and eliminates the possibility of dealing with a whole sector considered by the Party to be essential for compliance. If only part of a sector is funded, then a very dangerous market distortion can be promoted and some enterprises will not be able to compete and will have to close, which is unsustainable in any developing country.

Recommendation in Paragraph 23 (b) contains a proposal of Australia according to which the maximum obligation of the MLF is “to pay only the differential costs between HCFC-based equipment and the selected non-HCFC based equipment (assuming that the latter is more expensive), and taking into account existing policies on avoidable technology upgrade and capacity increase”. It doesn't seem to be logical to us. We propose to modify it as follows:

The provision of assistance by the Multilateral Fund to all other enterprises subject to the policy on second-stage conversions will be limited to reimbursing the differential cost between HCFC-based equipment and non-HCFC-based equipment, ITS INSTALLATION COSTS AND ANY EXTRA MODIFICATION NEEDED, SUCH AS NEW SENSORS, SAFETY EQUIPMENT ETC, taking into account existing policies on avoidable technology upgrade and capacity increase. AND DIFFERENTIAL COSTS ASSOCIATED WITH NEW CHEMICALS FOR XXXX YEARS.

*Despite the fact that it advances the discussion on a fundamental issue linked to Decision XIX/6 about which there was no consensus, it is possible to contest the premise of the Australian proposal. We do not think that enterprises may not receive funding for a second conversion because they committed to finding substitutes for HCFCs without assistance from the Multilateral Fund, as argued in paragraph 15. Decision XIX/6 changed the phase-out schedule, thus changing the rules. Article 5 countries had committed to replacing HCFCs with other substances without assistance from the Multilateral Fund when the deadline for HCFC phase-out was 2040. The change in the phase-out schedule adopted by the Parties at MOP-19 should be accompanied by a change in the funding rules, as set forth in Decision XIX/6.*

*Finally, it is important to point out that the part in line (b) proposed in paragraph 22 establishes an unfair rule for small enterprises. There should be an incentive developed for enterprises phasing out less ODP.*

*With regard to Decision XIX/6, we must indicate very clearly what we pointed out at the Meeting of the Parties, namely that the political commitment that Article 5 countries made to accelerate HCFC phase-out was based on the fundamental notion that all enterprises that had received support from the Multilateral Fund to phase out CFCs initially would be eligible for funding for HCFC phase-out. That was the understanding during the negotiations that finally led to the agreement to change the HCFC phase-out schedule. On that basis, the Government obtained a commitment from enterprises prior to the XIXth Meeting of the Parties, in order to be able to express, at that meeting, its political will to move toward accelerated phase-out.*

*We understand that it is necessary to establish criteria to deal with situations like the end of equipment's useful life and other factors. However, it is not acceptable to propose that some enterprises, having received initial funding from the Multilateral Fund to phase out CFCs, may be left without funding at this stage because of unclear cost-effectiveness considerations that were not among the topics discussed during the negotiations that led to the agreement reflected in Decision XIX/6, and which would amount to creating circumstances that differ from those that led to the agreement.*

*The above could be understood to mean that some, if not all, Article 5 countries would find themselves in the situation of having to fulfill their accelerated HCFC phase-out commitments with partial assistance or – even worse -- no assistance from the Multilateral Fund. That does not reflect the spirit that led to the adoption of Decision XIX/6.*

*Our initial reaction to the proposed Decision is that the wording in paragraph b) of said decision is unacceptable, insofar as it would mean that the Multilateral Fund will not fund costs linked to security if the selected alternative technology is hydrocarbon-based.*

### **Report of the convener of the informal group and decision by the Executive Committee**

In paragraph 26 the convener of the informal group (Sweden) indicates that the group briefly discussed the issue of funding for institutional strengthening projects after 2010, and concluded that funding renewals for these projects should be supported up to the beginning of 2011.

We have a different understanding of the conclusion. What was discussed was how to fund IS projects that are presented in the next meetings until new guidelines were approved. In this context it was said by some A2 Parties, that the MPMF Secretariat could continue approving IS projects which included support up to 2011 for the time being. This does not mean that IS will be supported ONLY up to 2011.

It has been said several times that one of the main issues that support the success of the Montreal Protocol in phasing out CFC consumption in Article 5 countries is the funding of the NOUs through the Institutional Strengthening Projects. This allowed the creation of offices and hiring staff whose objectives were to deal specifically with all the issues related to the Montreal Protocol control measures in those countries.

Having said that, we think that the funding for the Institutional Strengthening Projects should continue at least till to 2015, in order to help Article 5 countries to comply with the work load specifically associated with the first measures to phase out HCFC consumption: HPMP preparation, fixing the consumption baseline and achieving the 10% reduction.

Also, if on top of discontinuing IS at the end of 2010, the lack or partial funding for second conversions is added, Article 5 parties will face very tough challenges to achieve the new consumption targets, with a real risk of not compliance.

“As a general comment, on one side there is a proposal to cut funding for the Institutional Strengthening projects in 2011, but on the other side, according to what is described in the document, the NOUs would have an extra work load if they have to manage the IOC funds and do the proposed selection of companies that could be benefited by the projects, among other issues.

That said, it looks like a contradiction to propose cutting the funding for the NOUs and also asking them to accept extra burdens”

As a general comment, we would like to express our concern on the fact that while we are still discussing issues requested by Parties, and the ones added by A2 members, we have entered the freeze reference period and still do not know under what policies projects that will have to achieve this freeze will be considered. Most countries have started on the preparation of their HPMPs which needs to include a full chapter (ref. decision 54/53) on cost calculations and have not been presented with any guidelines. Under such circumstances, achieving the freeze + 10% reduction will be very difficult.

## COMMENTS FROM CHINA

Dear Ms. Maria Nolan

Thank you for the information with regard to HCFC policy proposal as a follow-up of the 57<sup>th</sup> ExCom. We hereby have the pleasure to submit the comment from China based on the USA and Australia proposals. The comment is attached below. I look forward to having further constructive discussions in July this year.

### HCFC phase-out

The new incentive programme proposed by USA does not have a clear description on how the ICC and IOC can be calculated. Though it does mention that IOC can be calculated as 5-10% of the ICC, how lowest ICC or average ICC can be calculated is not explained in the proposal. The proposal does not layout how to achieve technology neutrality; shall it include all the technologies existing in the global market or the local markets, or the major technologies, or only climate-friendly technologies in these markets?

There are different technologies for HCFC phase-out in one sector to fit many different applications. ICC levels for different technologies can vary in a wide range. The lowest or the average capital cost of the technologies does not reflect the actual cost demand of the HCFCs phase-out and the cost need for climate-friendly technologies. An arbitrary allocation of 5-10% of the ICC does not reflect the enterprise's loss in any circumstances. We are not sure about the implications of the incentives created by only 5-10% of the ICC for funding. That means, with this model, the country and the multilateral fund would face big risks for the compliance obligations under the Montreal Protocol or the commitment to environmental protection, especially to climate change. In addition, it is impossible to find out a one-for-all model for all the A5 countries for ICC calculation due to varied differences in geographical spread and national practices, technologies used in Latin America may not be suitable for Asian countries.

In the explanation of the new proposal by USA, it states that "*direct cash payment to enterprises of the calculated IOC influenced enterprise's choice of technology because they sought to maximize this cash payment*". As shown in the past approvals of the sector plans, the selection of technology was governed by:

- (1) Availability of the technology and alternative in the country,
- (2) Applicability of the technology for the local conditions of the plant, e.g. its location, size etc.
- (3) Technical capacity of the enterprise,
- (4) Market acceptance, etc.

One example: In China, the selection of hydrocarbon foaming agent was almost exclusive in the domestic refrigeration sector. HCFC-141b was selected only by a very small number of enterprises, where they felt they were not in a position to introduce cyclopentane due to the location of the plant in the vicinity of densely populated living area (e.g. Hualing in Guangzhou).

The alternative technologies have been, in most cases, more expensive and less perfect than the one they are replacing. The new products require extensive marketing to ensure timely market penetration and wider acceptance. Thus, the conversion itself is associated with long-term negative financial implication. The aim of the IOC has been to prevent market distortion and provide incentive to enterprises to implement projects not waiting for the competitors. The new proposal suggests to change the beneficiary to the national governments to *"allow for the design of country-appropriate national policies or programmes to encourage climate-friendly HCFC phase-out"*. China thinks that this approach - at least at the initial stages of the HCFC phase out - will reduce the willingness of enterprises to come forward and volunteer the conversion process considering the strong likelihood of losing their competitiveness (they will have no financial means to compensate for the higher operating costs). Furthermore, as pointed out by some co-opted members of the China delegation, some AS countries cannot receive the incremental cost on behalf of enterprises.

Historically, the MLF has worked on an objective model of calculating incremental capital and operating costs for CFC phase-out, which has contributed greatly to the success of the Montreal Protocol so far because:

- (1) In most cases, the incremental capital and operating costs (along with necessary adjustments to reflect enterprise or country sizes, various technical factors on account of differences in technologies and end-product applications, age of equipment, wastage and losses, etc), were calculated in a way that largely represented the reality of the industrial conversions on the ground. One of the reasons this could be achieved was through timely and independent advice to the Executive Committee from technical experts from the implementing agencies and the secretariat, as well as expertise from TEAP and other experts from non-AS countries, which was based on hands-on and demonstrated experience of such conversions and technologies. Such advice was translated by the Executive Committee into relatively uncomplicated policy decisions on eligibility of incremental costs.
- (2) This acted as a strong incentive to the CFC-consuming enterprises, who considered the concept of incremental costs, as a fair and objective way to account for the disruptions, uncertainties and losses caused by the transition to non-CFC alternative technologies.
- (3) Further, all incremental costs were committed by the Executive Committee in one single package for a particular project or sector plan, which demonstrated the commitment of the MLF to assist the industry in AS countries, to achieve the phase-out.
- (4) This was supported by a robust and transparent monitoring and evaluation process, with clearly defined indicators. The concept of incremental costs and the fair and transparent manner, in which they were calculated, supported by a necessary oversight and control framework, in fact was a unique feature of the Montreal Protocol led to its success.

Considering the limited time that AS countries have in starting HPMP development and funding requests, the past model for compensation calculation based on incremental cost in each and different sector should be fully utilized as one of the successful experiences. If any inappropriate selections of technologies are proposed for the purpose of maximizing IOC funding request, it is the right of the Executive Committee not to approve such requests. In other words, proposing a one-for-all model for all AS countries is not a solution to address the current pending issue, instead, the past practice of submitting sector plans based on each country's own situation and technology selection is the right move forward.

The challenges arising due to the accelerated phase-out schedule for HCFCs are even greater. In volumetric terms, the amount of HCFCs reductions needed to be achieved for compliance with the first control milestone of 2013 (i.e. within only 4 years), is comparable to the volumetric CFC phase-out

achieved over many years. In addition, HCFC consumption has grown significantly faster in the past few years. In this situation, it would be advisable to not only continue with the model of incremental costs proven successful in CFC phase-out, but this model needs to be further strengthened to account for the additional uncertainties caused by lack of mature and fully environment-friendly HCFC alternatives, in line with MOP Decision XIX/6. This would minimize the risks for non-compliance with the adjusted phase-out schedule.

An efficient and clearly-directed model can ensure that the foundation of the success of the Montreal Protocol be not compromised, the credibility of the Montreal Protocol mechanism continues and the momentum of CFC phase-out achieved so far is maintained by the Article-5 industry for HCFC reductions.

Following the MOP Decision XIX/6 of the Parties, AS countries will promote the climate friendly technologies for the HCFC phase-out with the utmost commitment to the overall environmental benefits. Technology selections, related cost analysis and their justifications will be provided in the HPMP documents. The Executive Committee can develop further guidelines/criteria on this issue when the detailed plans and experiences on the cost issue are available.

China is open to discuss any new methodologies in the future provided that such methodologies can give clear directions to the feasible solutions to the AS countries for future HCFC phase-out with sufficient and stable funding.

### Second Conversion

China appreciates the proposal by Australia as a way to move forward on second conversion issue and believes that it will be helpful for the HPMP preparation. The general text of the proposal is constructive; however, we have three concerns.

First, considering the *"life-time of 15-20 years for manufacturing equipment"*, 2020 (35% reduction) may not be a year for the current proposal for the second conversion funding if new equipment is built after 2005 (they may be in use after 2020 till 2025), in this case, 2025 (65% reduction) may be included as a timeline for second-stage conversion funding. In some cases in some A5 countries, the lifetime of manufacturing equipment can be longer than 15-20 years.

Second, generally speaking, we need to consider many factors when choosing eligible enterprises for conversion projects. They include: the willingness from the enterprises for the conversion, the financial situation of the enterprises, their conversions plans and the technology selection for the conversion, the size of the enterprises, the market share of the enterprises, the geographical location of the enterprises, etc. In other words, selecting enterprises for the HCFC phase-out in China will be based on the above factors not on whether these are second-stage conversion enterprises or not. Justification for the funding necessity for both second conversion projects and non-second conversion projects will include all the above factors.

Third, we would like to point out that funding for second-stage conversion for other enterprises should also include those costs for training, testing, IOC and the capital costs of the differences, not limited only to the differences between HCFC and non-HCFC equipment.

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## Annex II

### **Proposed methodology for calculating incremental operating costs (IOC) for HCFC phase-out in the foam and refrigeration manufacturing sectors and for incremental costs in the refrigeration servicing sub-sectors**

#### **Background**

1. At its 55<sup>th</sup> Meeting, the Executive Committee considered an analysis of relevant cost consideration surrounding the financing of HCFC phase-out<sup>1</sup>, particularly in the foam and refrigeration manufacturing sectors. Relevant observations pertaining to the ICC and IOC of HCFC phase-out projects as presented in the paper submitted to the 55<sup>th</sup> Meeting and updated on the basis of new information, are summarized below:

- (a) The magnitude of ICC for phasing out HCFC-141b in the foam sector will depend mainly on the choice of technology. For enterprises that installed new foaming machines when they converted from CFC-11 and where the chosen technology is liquid HFC-based, water-based systems, methyl formate or methylal, the ICC would be modest (in most cases it would relate to technical assistance, trials and training; in some cases retrofit of some equipment items in the baseline might be required or the introduction of safety related elements when using methyl formate). However, IOC could be significant, in particular for liquid HFC-based technologies, mainly due to the higher cost of the replacement chemicals;
- (b) ICC related to conversion from HCFC to hydrocarbon technology would be similar to that for conversion from CFC technology (provision of new processing and safety equipment). IOC cannot be fully quantified since actual prices of hydrocarbons would depend on their availability and purity at the country level, polyol formulations would need to be modified and safety related features for handling flammable substances would need to be added;
- (c) Increase in foam density, which is a cost penalty resulting from the cost of additional foam material, has a significant impact on the IOC, representing 50 per cent or more of the total operating costs in some cases. In some other cases, the thickness of the foam insulation may have to be increased to compensate for the unfavourable thermal conductivity owing to reduced insulation performance of alternative blowing agents;
- (d) Most foam enterprises rely on polyols commercially premixed with the blowing agent and other essential ingredients (premixed polyols) that are provided by systems houses. While enterprises with premixers on site have the flexibility to vary their foam formulations to meet their customers' end-product requirements, SMEs have to rely on systems houses to meet their customers' requirements;
- (e) For the replacement of HCFC-22 used in the manufacture of refrigeration equipment, mainly HFCs (i.e., HFC-404a, HFC-407c, and HFC-410a) and, to a lesser extent hydrocarbons represent the technology choices that are likely to be available to address the 2013 and 2015 control targets. The use of low GWP substances, in particular hydrocarbons, involves safety issues, resulting in higher ICC. HFC refrigerants require the use of different compressor lubricants as compared to HCFC-22, to ensure satisfactory operation and durability, and modifications to other components such as valves, dryers and systems controls. Both the alternative refrigerants and compressor

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<sup>1</sup> UNEP/OzL.Pro/ExCom/55/47.

lubricants are more expensive than those used for HCFC-22-based systems, which represents higher IOC than was typical for CFC phase-out projects;

- (f) There is currently limited technical and cost-related information available in the Multilateral Fund in regard to alternative foam blowing agents (e.g., methyl formate and methylal<sup>2</sup>) and alternative refrigerants (e.g., HFC-410a).

2. Prices of chemicals are influenced by many factors including the size of the packages, quantities imported into a country, and whether import, export, excise and other taxes are included. Prices of chemicals in Multilateral Fund projects have historically varied significantly among regions and even within countries<sup>3</sup>. These variations still remain as shown in Table II.1 below:

**Table II.1. Prices of chemicals reported by 21 Article 5 Parties for 2007\***

Value <sup>4</sup>	CFC-12	HCFC-141b	HCFC-142b	HCFC-22	HFC-134a	HFC-245fa	Isobutane	Propane	HFC-404a	HFC-407c	HFC-410a
Countries	20	7	3	19	18	2	3	3	7	8	7
Minimum	2.73	1.72	2.07	1.60	4.16	5.87	2.86	2.94	5.46	4.89	5.43
Maximum	35.00	8.00	8.00	10.20	15.00	9.00	35.00	29.00	20.00	21.00	20.00
Mean	11.47	3.80	5.46	4.48	9.52	7.44	13.60	13.99	11.34	13.69	15.01
Median	11.23	3.80	6.30	4.00	9.57	7.44	2.94	10.04	10.44	13.21	18.00

(\*) Progress report on the implementation of the country programme for 2008 of the 21 Article 5 with the highest HCFC levels of consumption.

### IOC for HCFC phase-out in the foam sector

3. In light of the above background, and in order to reduce the uncertainties associated with the calculation of IOC, the following methodology is proposed to calculate IOC for HCFC phase-out foam projects. The methodology is based on the actual ICC and IOC that have been approved in over 500 CFC phase-out investment projects<sup>5</sup>.

4. Foam projects were selected from the integral skin and rigid foam sub-sectors for which HCFCs are still used. As in the majority of Multilateral Fund projects, the foam insulation in domestic and commercial refrigerators is considered as part of the refrigeration projects and therefore excluded from the analysis (there is no differentiation of the ICC and IOC associated with the refrigerant component and the foam component). Extruded polystyrene insulation foam boardstock in the construction industry where HCFC-142b/HCFC-22 is used has not been included, as this sub-sector has never used CFC-11 as

<sup>2</sup> At its 57<sup>th</sup> Meeting, the Executive Committee approved two projects for the validation and optimization of methyl formate as a blowing agent. A project for the validation and optimization of methylal as a blowing agent has been submitted to the 58<sup>th</sup> Meeting.

<sup>3</sup> At its 12<sup>th</sup> Meeting (March 1994), the Committee decided to disallow the use of either positive or negative growth projections in determining operational costs and benefits, and further recommended that national pricing be used, except where it was higher than 20 per cent from the regional border price. On the basis of a paper on prices of chemicals (UNEP/OzL.Pro/ExCom/23/64), the Committee approved a methodology to calculate prices of chemicals and decided to consider at a subsequent meeting a simplified methodology (decision 23/52). The methodology proposed that regional/sub regional prices of chemicals will be calculated and applied to countries within the region/sub region for Fund projects. Any variance from the pricing has to be justified and be within 20 per cent of this regional/sub regional price. Regional/sub regional price is the CIF (cost plus insurance plus freight) border price for imported substances, or the FOB (free on board) border price for exported substances. A simplified methodology was never considered.

<sup>4</sup> The mean is the most commonly-used measure of central tendency and is calculated as the sum of the values divided by the total number of items in the set. The median is determined by sorting the data set from lowest to highest values and taking the data point in the middle of the sequence (i.e., there is an equal number of points above and below the median).

<sup>5</sup> Projects approved between the 5<sup>th</sup> Meeting (November 1991) and the 48<sup>th</sup> Meeting (April 2006).

blowing agent and, therefore, the Multilateral Fund has no experience in funding conversions from ODS in this sub-sector.

5. The selected projects were grouped by alternative technology (i.e., HCFC-141b, HCFC-22, water based systems and hydrocarbons<sup>6</sup>), by subsector and by the level of CFC consumption as shown in the Table II.2 below. For each group, the average CFC consumption per plant (column e) and the IOC per kg of CFC (column f) were calculated. A unique IOC was calculated by prorating the IOC of each technology and subsector (column h) according to its level of CFC consumption as compared to the total CFC consumption (column g).

**Table II.2. Calculation of the IOC for HCFC-phase-out in the foam sector (\*)**

Sub-sector	No projects (**)	CFC range (ODP t)	Total CFC (ODP t)	CFC/plant (ODP t)	IOC (\$/kg)	% CFC consumption	Prorated IOC (\$/kg)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
<b>HCFC-141b</b>							
Integral skin	35	15-40	605.6	17.3	1.57	3.2%	0.05
Rigid	178	3-20	2,321.3	13.0	1.88	12.3%	0.23
Rigid	84	20-50	2,698.1	32.1	2.26	14.3%	0.32
Rigid	51	50-100	3,404.8	66.8	2.69	18.0%	0.48
Rigid	12	100-180	1,591.3	132.6	2.71	8.4%	0.23
Rigid	6	200-900	2,802.0	467.0	2.47	14.8%	0.37
<b>HCFC-22</b>							
Rigid	10	8-65	172.0	17.2	2.59	0.9%	0.02
<b>Water based</b>							
Integral skin	49	5-20	652.4	13.3	3.07	3.5%	0.11
Integral skin	33	20-95	1,292.3	39.2	3.42	6.8%	0.23
Rigid	17	10-40	353.6	20.0	2.82	1.9%	0.05
Rigid	7	51-95	521.4	74.5	1.26	2.8%	0.03
<b>Hydrocarbon</b>							
Integral skin	4	23-50	164.6	41.2	(1.83)	0.9%	(0.02)
Rigid (cyclopentane)	10	45-190	943.1	94.3	1.41	5.0%	0.07
Rigid (pentane)	15	35-120	1,375.4	91.7	0.73	7.3%	0.05
Total	511		18,897.9	37.0	2.24	100.0%	2.24

(\*) Data extracted from the Inventory of approved projects database.

(\*\*) Including umbrella projects covering two or more enterprises.

6. The resulting unique IOC is US \$2.25/kg (i.e., the sum of the IOC value of each technology and subsector under column h in Table II.2 above).

7. The above analyses have taken into consideration, among other things, differing time durations for the application of IOC, prices of chemicals and raw materials from all Article 5 countries, increases in foam densities, and foreign ownership. Although the chemicals and raw materials for replacing CFC-11 were different, global current prices of alternative blowing agents (e.g., cyclopentane, methyl formate and methylal) except for HFC-245fa, are comparable to that of HCFC-141b, with lower amounts being required per unit of foam produced due to their lower molecular weight as compared to HCFC-141b. Furthermore, several non-HCFC technologies currently on the market are already mature and proven; initial indications are that other low-GWP technologies now appearing in the market (such as methyl formate and methylal) have good performance in various applications. This could result in lower IOC if the prices of blowing agents in Article 5 countries are comparable to the global prices.

<sup>6</sup> Hydrocarbon foam blowing agents were selected in less than 30 projects (i.e., less than 6 per cent of the total); however, hydrocarbons were a prevalent option for foam insulation in refrigeration conversion projects not included in this analysis.

### IOC for HCFC phase-out in the refrigeration sector

8. For the refrigeration manufacturing sector, a different methodology is suggested, since there is limited experience in the Fund in phasing out ODS in the refrigeration manufacturing applications where HCFCs are mainly used. IOC in CFC-12 phase-out projects in the refrigeration manufacturing sector were largely related to the difference in prices between the refrigerants (i.e., CFC-12 vis-à-vis HFC-134a), the different lubricants in compressors and accessories, such as filter dryers.

9. Currently available non-HCFC alternatives for applications using typically HCFC-22 in the refrigeration and air-conditioning manufacturing sector are HFC-410a, HFC-407c, HFC-404a and to a lesser extent HC-290<sup>7</sup>. Using the information presented in document (UNEP/OzPro/ExCom/55/47) on cost analysis, the proposed methodology for calculating IOC in the refrigeration air conditioning sector makes use of the difference in prices between HCFC-22 and the four alternative refrigerants used to date. The methodology considers the median price of the refrigerants in the 21 largest HCFC consuming Article 5 countries (Table II.1 above), the difference in price of lubricants used in the compressors (estimated at US \$3.00<sup>8</sup>) and the price of minor components (calculated at 10 per cent of the incremental price of the refrigerant).

10. Two different calculations of IOC are proposed based on two global use patterns of the different refrigerants (Table II.3 below):

- (a) One calculation is based on the present global use pattern of the refrigerants. IOC cost is calculated considering the approximate prevalence of each refrigerant (i.e., 50 per cent for HFC-410a; 25 per cent for HFC-407c; 20 per cent for HFC-404a; and 5 per cent for HC-290) and the amount used in a system when replacing HCFC-22;
- (b) Another calculation is based on an estimate of the potentially achievable low-GWP use pattern of the refrigerants. IOC cost is calculated considering the prevalence of each refrigerant (i.e., 25 per cent for HFC-410a; 15 per cent for HFC-407c; 10 per cent for HFC-404a; and 50 per cent for HC-290) and the amount used in a system when replacing HCFC-22.

**Table II.3. Calculation of IOC for different HCFC-alternatives in the refrigeration sector**

Description	HFC-404a	HFC-407c	HFC-410a	HC-290
Refrigerant mass ratio (to HCFC-22)	100%	95%	90%	50%
Refrigerant	5.47	5.83	5.46	0.50
Lubricants	2.50	2.38	2.25	0.20
Accessories (*)	0.55	0.58	0.55	1.20
Total incremental costs	8.52	8.79	8.26	1.90
<b>Application rate of refrigerant</b>				
Option I: Present global use pattern (%)	20%	25%	50%	5%
Prorated IOC per refrigerant (global)	1.70	2.20	4.13	0.10
Option II: Low-GWP scenario (%)	10%	15%	25%	50%
Prorated IOC per refrigerant (low-GWP)	0.85	1.32	2.06	0.95

(\*) Components such as solenoid valve, filter dryer, and controls.

<sup>7</sup> There are several other refrigerants, such as HFC-417a, HFC-422a and HFC-422d which have been recently developed but with limited practical experience. Although ammonia and carbon dioxide are known and being used as refrigerants for a long period of time, however they have presently only a limited market share in HCFC-22 based commercial and air-conditioning refrigeration applications.

<sup>8</sup> As in the case of CFC phase-out, conversion of compressor manufacturing enterprises will be funded through the Fund. To avoid double counting of downstream end-users, the IOC associated with compressors is based on the incremental cost of the lubricant.

11. The resulting unique IOC is US \$8.10/kg for the present global use pattern of refrigerants (i.e., the sum of the IOC value of each alternative refrigerant under the row “prorated IOC per refrigerant (global)”) in Table II.3 above and US \$5.20/kg for the low-GWP use pattern of refrigerants (i.e., the sum of the IOC value of each alternative refrigerant under the row “prorated IOC per refrigerant (low-GWP)”).

12. The sub-sector for assembly, installation and charging of refrigeration equipment established under decision 31/45 could have a major role in HCFC consumption in several Article 5 countries. This sub-sector includes enterprises involved in the assembly or installation of prefabricated refrigeration systems in cold rooms or trucks, or the installation of air-conditioning systems obtained from specialized suppliers for trucks or buses; where the installation is outside the premises of the refrigeration equipment manufacturer or may be undertaken by a branch, agency or independent contractor; the individual installation may be non-HCFC, based on the refrigerant specified by the manufacturer of the refrigeration unit or based on the choice of the customer; and there is no consumption for manufacturing as intermediate goods. Funding for the conversion of these enterprises to non-HCFC alternative refrigerants would be based only on ICC.

13. Enterprises involved in the design and manufacture of completed refrigerated systems (including the foam component) in their own central facility and under their own trade name, with production capacity established prior to the cut-off for HCFC phase-out projects, where consumption can be established through stable production and HCFC consumption records for a three-year period and satisfactory guarantees can be provided that HCFC-based production will cease after conversion, can be considered under the funding rules pertaining to commercial refrigeration.

#### **Levels of incremental costs for HCFC phase-out in the refrigeration servicing sector**

14. HCFC-22 and to a lesser extent HCFC-blends are used in all Article 5 countries for servicing commercial refrigeration and air-conditioning systems. In the 100 or so countries that do not have HCFC-based manufacturing enterprises, compliance with the HCFC phase-out controls will need to be achieved by addressing consumption in the servicing sector.

15. The costing of HCFC phase-out plans in the refrigeration servicing sector would be influenced by the prevailing circumstances at the country level, such as: population size; geographical distribution of the main economic activities; the types and capacities of refrigeration and air-conditioning systems in operation; the characteristics of the servicing sector service workshops; and the technical skills of servicing technicians. Acknowledging the limitations in availability of information on the HCFC-servicing sector, the funding needs for the servicing sector up to the 2015 reduction step can still be estimated with an acceptable level of confidence based on the Fund’s experience in CFC phase-out activities in the servicing sector<sup>9</sup>. Using the main components of TPMPs and NPPs, funding is proposed for: reviewing ODS legislation and licensing systems; training and awareness of major stakeholders (i.e., customs officers, refrigeration technicians, code of good practices, certification schemes, establishment of technicians associations); implementing technical assistance activities (e.g., basic tooling kits for technicians, a few additional recovery/recycling machines and introduction of non-HCFC refrigerants); and monitoring and reporting (typically at about 20 per cent of the total cost).

16. Article 5 countries have been grouped according to HCFC consumption in the servicing sector that would need to be phased out to achieve the freeze (2013) and the 10 per cent reduction (2015) of their baseline (i.e., HCFC consumption in the manufacturing sector is excluded). For each group, a fixed

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<sup>9</sup> Phasing out CFC use in the refrigeration servicing sector has been one of the Committee’s priorities. As early as 1991, training programmes for refrigeration technicians, and recovery and recycling projects have been funded in several Article 5 countries. Since then, recovery and recycling projects and stand-alone training programmes have been replaced by RMPs and TPMPs for LVC countries, and national phase-out plans (NPPs) for non-LVC countries.

amount for the non-investment type of activities (i.e., regulations, training, awareness) is proposed, as well as an upper maximum level of funding for technical assistance activities calculated at US \$1.00/metric kg (US \$18.20/ODP kg) of HCFC consumption in the refrigeration servicing sector. Funding for monitoring and reporting would be adjusted accordingly. The proposed levels of funding are shown in Table II.4 below.

**Table II.4 Funding to achieve the 2013 and 2015 phase-out targets in the refrigeration servicing sector (\*)**

Activities	US \$							
	Below 20 m. tonnes (1.1 odp t)*	Up to 100 m. tonnes (5.5 odp t)	Up to 300 m. tonnes (16.5 odp t)	Up to 500 m. tonnes (27.5 odp t)	Up to 1,000 m. tonnes (55odp t)	Up to 5,000 m. tonnes (275 odp t)	Up to 8,000 m. tonnes (440 odp t)	Above 8,000 m. tonnes (440 odp t)
Legislation	10,000	10,000	10,000	20,000	30,000	50,000	50,000	80,000
Customs training	20,000	40,000	50,000	60,000	80,000	120,000	140,000	160,000
Technicians training	30,000	60,000	70,000	100,000	160,000	240,000	300,000	400,000
Technical assistance(**)	20,000	100,000	300,000	500,000	1,000,000	5,000,000	8,000,000	11,000,000
Monitoring (***)	20,000	40,000	90,000	140,000	250,000	1,000,000	1,700,000	2,300,000
<b>Total (in US \$)</b>	<b>100,000</b>	<b>250,000</b>	<b>520,000</b>	<b>820,000</b>	<b>1,520,000</b>	<b>6,410,000</b>	<b>10,190,000</b>	<b>13,940,000</b>

(\*) Level of HCFC consumption in metric tonnes to be phased out by 2015.

(\*\*) Figures represent maximum amounts for each group. Actual amount should be prorated according to the level of HCFC consumption in the servicing sector.

(\*\*\*) Figures represent maximum amounts for each group. Actual amount should be calculated as 20 per cent of the total cost of the activities.

17. Lessons learnt from the implementation of TPMP<sup>10</sup> shows that early CFC phase-out has generally been achieved through the strict implementation of an efficient licensing and quota systems and the development of market conditions rather than through investment activities. Retrofit CFC-based refrigeration systems was a sustainable option when prices of CFCs increased and that of alternative refrigerants remained stable and where alternative refrigerants were available. Considering the ample supply of HCFC-22 and its much lower price as compared to other alternative refrigerants in the majority of Article 5 countries, it is proposed to limit the retrofit of HCFC-based refrigeration systems to those cases where its technical viability and economical sustainability is demonstrated.

18. Minimum total funding of US \$100,000 is proposed for all Article 5 countries that would need to phase out up to 20 metric tonnes to achieve the 2013 and 2015 compliance targets. For all other Article 5 countries where the HCFC phase-out requirement ranges from 20 to 8,000 metric tonnes, funding for the technical assistance component would be calculated at US \$18.00/ODP kg of the actual level of HCFC consumption. As was the case for the CFC-phase out in the servicing sector, Article 5 countries would have flexibility in utilizing the resources available to address specific needs that might arise during project implementation to facilitate the smoothest possible phase-out of HCFCs.

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<sup>10</sup> Final report on the evaluation of terminal phase-out management plans (UNEP/OzL.Pro/ExCom/58/8).