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EXECUTIVE COMMITTEE OF
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OPTIONS FOR ADDRESSING THE SITUATION OF COUNTRIES REFERRED TO IN DECISION XVII/14 OF THE SEVENTEENTH MEETING OF THE PARTIES (FOLLOW-UP TO DECISION 49/33)

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BACKGROUND

1. At their Seventeenth Meeting, the Parties to the Montreal Protocol discussed the difficulties faced by some Article 5 Parties with respect to the phase-out of CFCs used in the manufacture of metered-dose inhalers (MDIs). In decision XVII/14 (see Annex I for full text), the Parties expressed their concern that Article 5 Parties which manufacture CFC-MDIs might find it difficult to phase out these substances without incurring economic losses to their countries. There was the further serious risk that, for some Article 5 Parties consumption levels in 2007 of CFCs for MDIs might exceed the amounts allowed under the Protocol. Subsequently the Parties decided, among other things, to consider at their Eighteenth Meeting a possible decision addressing the difficulties that some Article 5 Parties may face in relation to MDIs, and requested the Executive Committee to examine situations such as these and consider options that might assist this potential situation of non-compliance.

2. At its 49th Meeting, the Executive Committee considered a policy paper prepared by the Fund Secretariat on options for addressing the situation of countries referred to in decision XVII/14 (document UNEP/OzL.Pro/ExCom/49/39). The paper examined the specific circumstances of some Article 5 Parties with manufacturing plants for MDIs that might be at serious risk of not meeting the 85 per cent reduction in CFC consumption in 2007. Subsequent to a discussion, the Executive Committee decided, among other things, to request the Fund Secretariat to update document UNEP/OzL.Pro/ExCom/49/39, taking into account any new information that might come to light and the implications of decisions to be taken at the Eighteenth Meeting of the Parties, and to present the revised paper to the Committee at its 51st Meeting (decision 49/33).

3. At their Eighteenth Meeting, the Parties to the Montreal Protocol specifically requested the Executive Committee:

(a) To consider as a matter of urgency the funding of projects in relation to those Article 5 Parties that experience difficulties due to high consumption of CFCs for manufacturing MDIs, in order to facilitate the transition from CFC-based MDIs;

(b) To consider within the context of the existing Fund guidelines to review its decision 17/7 with regard to the existing cut-off date for consideration of MDI conversion projects consistent with the reality of the pace of technological advances in the MDI sector; and

(c) To consider including on the agenda of UNEP's thematic regional workshops, information to clarify the steps required to advance the transition from CFC-MDIs (decision XVIII/16).

Scope of the paper

4. In response to the above-mentioned decisions, the Secretariat has updated the policy paper submitted to the 49th Meeting[1] taking into account new information gathered since then.

[1] For preparation of the paper submitted to the 49th Meeting, the Secretariat hired an industry expert who has been actively involved in pharmaceutical and aerosol research and development of inhalation technology; has been a member of the UNEP Medical Technical Options Committee since 1996; and has assisted the Secretariat in the preparation of draft guidelines for MDI projects (UNEP/Ozl.Pro/ExCom/37/58).

The paper re-examines the specific circumstances of all Article 5 Parties with MDI manufacturing plants that might be at risk of not meeting the control measures on CFC consumption in 2007 and 2010.

5. The questionnaire that the Secretariat developed for the paper submitted to the 49th Meeting was sent[2] once again to 138 Article 5 Parties.[3] Relevant information extracted from the returned questionnaires has been reflected in this paper.[4] Other sources of information were also used to describe the MDI sub-sector in Article 5 Parties (i.e., national phase-out plans under current implementation, reports submitted by Article 5 Parties to the Ozone Secretariat pursuant to decision XIV/5,[5] the May 2006 Progress Report of the Technology and Economic Assessment Panel (TEAP), and industry sources and databases).

Outline

6. This paper consists of the following sections:

Section I:	Introduction
Section II:	Relevant issues associated with the manufacturing of MDIs
Section III:	An overview of the MDI sub-sector in Article 5 Parties
Section IV:	Issues to be addressed in relation to the MDI sub-sector in Article 5 Parties
Section V:	Conclusions and recommendations

7. Relevant information used for the preparation of this paper is contained in the following three annexes:

Annex I:	Full text of relevant decisions on the MDI
Annex II:	Industrial processes involved in the manufacturing of MDIs
Annex III:	Summary report on the MDI sub-sector in Article 5 Parties with nationally owned MDI manufacturing companies

I. INTRODUCTION

8. The MDI is a complex system designed to provide a fine mist of medication (the active ingredient) for inhalation directly into the airways to treat respiratory diseases such as asthma or chronic obstructive pulmonary disease (COPD). Historically, the propellants used in MDIs are

[2] The Secretariat expresses it appreciation to UNEP CAP (in Paris and at its Regional Offices) for the assistance provided in distributing the questionnaire through its CAP regional staff and providing subsequent follow-up.

[3] The following Article 5 countries that have agreed or were urged not to seek assistance from the Multilateral Fund have not been considered in this paper: Republic of Korea, Saudi Arabia, Singapore, South Africa and United Arab Emirates. It is to be noted that South Africa manufactures MDIs.

[4] Information was submitted to the Secretariat by the following countries: Antigua and Barbuda, Argentina, Bahrain, Bangladesh, Belize, Bolivia, Chile (indicating that more time was needed to gather the information), Croatia, Ethiopia, Georgia, Ghana (indicating that more time was needed to gather the information), India, Iran, Jordan (where the production is for a pharmaceutical aerosol rather than an MDI), Kyrgyzstan, Macedonia, Mexico, Nicaragua (which had submitted a transition strategy), Pakistan, Saint Vincent and the Grenadines, Thailand, Turkey and Turkmenistan.

[5] The 22 Article 5 Parties that have submitted data pursuant to decision XIV/5 are: Argentina, Belize, Bosnia and Herzegovina, Brazil, China, Croatia, Cuba, Eritrea, Georgia, Guyana, India, Indonesia, Jamaica, Macedonia, Malaysia, Mauritius, Moldova, Namibia, Oman, Romania, Sri Lanka, and Uruguay.

CFC and with HFC-134a[6] and HFC-227ea being introduced in 1995 (in the pharmaceutical sub-sector, HFC is referred to as HFA).

9. The use of HFA-134a as a propellant required the development of a new product. A new formulation needed to be developed to address incompatibility issues with surfactants and co-solvents that worked well with CFC propellants. Similarly, most of the mechanical components (i.e., the canister, elastomers, valve, and actuator) were found to interact with the new propellants and thus required modification to enable use of HFC propellants.[7]

10. As of today, there is at least one HFA-MDI approved and marketed in more than 110 countries,[8] and it is anticipated that there will be little need for CFC-MDIs in non-Article 5 Parties by the end of 2008.[9] There are only a limited number of CFC-MDIs that do not yet have suitable alternatives developed or will not be reformulated to an HFA-MDI. In these cases the volumes are usually small and there are medically suitable alternatives available (such as DPIs).

Transition to non-CFC-MDI alternatives

11. Despite widespread educational initiatives in non-Article 5 Parties, transition to non-CFC-MDIs does not appear to have a high priority among many healthcare providers, who are generally the main point of contact with patients. Thus, educational and marketing endeavours of pharmaceutical companies have, for the most part, been the driving force in the uptake of non-CFC alternatives. This is also likely to be the case in many Article 5 Parties.

12. Based on the experience in non-Article 5 Parties, Article 5 Parties that do not have an MDI manufacturing plant, or where MDIs are locally manufactured but predominantly by multi-national companies, national transition approaches may not have a large impact in the absence of support from the multi-national MDI manufacturers or importers.[10] Multi-national pharmaceutical companies might switch their CFC products by introducing HFA-MDIs, evaluating their acceptance in the marketplace and then ceasing the supply of the corresponding CFC product. Furthermore, as pharmaceutical-grade CFCs become less available, multi-national companies will need to rapidly introduce already-developed non-CFC alternatives in Article 5 Parties. In the absence of any government-driven legislation, this would be a very effective approach for the adoption of non-CFC-MDIs. This transition has already been introduced in some Article 5 countries where the MDIs available in the market are based on HFA propellants.

13. Transition strategies to non-CFC-MDI alternatives would need to be developed with the participation of major stakeholders (i.e., relevant authorities of the ministries of health and environment, physician and patient groups, MDI manufacturers, and CFC importers). Such a strategy should ensure adequate supplies of inhaled therapy throughout the transition period,

[6] 3M introduced the first salbutamol HFA-MDI in the United Kingdom in March 1995.
[7] Information extracted from IPAC Web site.
[8] More recently available HFA-MDIs include: beclomethasone, budesonide, fluticasone, di-sodium cromoglycate and nedocromil sodium. Table 1 in Annex II shows the availability of non-CFC-based asthma and COPD medications worldwide.
[9] According to the International Pharmaceutical Aerosol Consortium (IPAC). The member companies of IPAC are: AstraZeneca, Boehringer Ingelheim, Chiesi Farmaceutici, GlaxoSmithKline, Inyx, Inc., and Sepracor.
[10] Experience in non-Article 5 countries, where supply of CFC-MDIs comes primarily from multi-national companies, is that CFC-free alternatives (MDIs or DPIs) can be introduced promptly within the regulatory framework of the country, and the corresponding CFC-MDIs phased out.

including adequate supplies of pharmaceutical-grade CFCs where appropriate as well as of CFC-free alternatives.

14. Relevant issues related to industrial processes involved in the manufacturing of MDIs, including technology transfer and costs, are discussed in greater detail in Annex II to the present paper.

II. ISSUES ASSOCIATED WITH THE MANUFACTURING OF MDIs

15. The most relevant issues associated with the conversion of locally-owned CFC-MDI manufacturing plants in Article 5 Parties are the availability of pharmaceutical-grade CFC propellants and, to a lesser extend, access to skilled technical consultants with the expertise to develop and manufacture HFA-MDIs.[11] Between 2007 and 2009, CFC production will be limited to a few Parties to satisfy the basic domestic needs of Article 5 Parties, and for any exempted uses in non-Article 5 countries[12] (e.g., laboratory and analytical uses, and production of MDIs[13]). Limitations on CFC production up to 2010 can be assessed as follows:

(a) CFC production in Article 5 Parties will be limited to: Argentina[14] (annual production of 686 ODP tonnes between 2007 and 2009), China (production of 6,100 ODP tonnes in 2007; production will be reduced to 800 ODP tonnes for MDI and pharmaceutical aerosol uses in China), and India (annual production of 3,389 ODP tonnes between 2007 and 2009);

(b) CFC production levels established by the Government of the United States to satisfy basic domestic needs of Article 5 Parties are just over 51.8 metric tonnes of CFCs for each year in the period 2007-2009. The allowances for this production are tradable between CFCs;[15]

(c) Through voluntary initiatives, the total annual production of CFCs by non-Article 5 Parties to meet the basic domestic needs of Article 5 Parties has been estimated at approximately 2,000 ODP tonnes in 2007 and 1,500 ODP tonnes in 2008 and in 2009;[16]

(d) There is no indication whether these CFCs could be used for production of MDIs.

[11] TEAP concluded in its May 2006 progress report that it does not appear that formulation patents will constitute a major barrier to the introduction of CFC-free MDIs.

[12] The availability of CFCs in Article 5 countries during the 2004-2010 period was considered by the Parties at their 17th Meeting, based on a report prepared by TEAP pursuant to their decision XV/2. In its report, the TEAP indicated that, on the basis of the analysis performed, it could not make definite recommendations for CFC basic domestic needs production volumes and concluded "that there seems no reason to make changes to the non-Article 5(1) basic domestic needs amounts, which are forecast to be produced. Next to precise monitoring, this will need further analysis in the near future".

[13] In 2005, 2,699 tonnes of CFCs were used by non-Article 5 countries for the manufacture of MDIs under essential use exemptions. For 2006 and 2007, 2,050 and 1,778 metric tonnes respectively of CFCs have already been requested for MDI production (Source: May 2006 TEAP Progress Report).

[14] No pharmaceutical-grade CFCs are produced in Argentina.

[15] Rule 40 CFR Part 82 issued by the Environmental Protection Agency.

[16] Notation by the contact group established at the 26th meeting of the Open-Ended Working Group to discuss a proposal for the adjustment of the Montreal Protocol to advance the phase-out of CFC production by non-Article 5 Parties to meet the basic domestic needs of Article 5 Parties (paragraphs 148 to 152 of document UNEP/OzL.Pro.18/10).

16. After 1 January 2010, production of CFCs that might be approved for any essential uses agreed by the Parties might not be economically viable. Depending upon operational parameters, the percentage of CFC production that does not meet the specifications required by MDI manufacturers is between 25 and 50 per cent of total production. Currently, CFCs that do not meet pharmaceutical specifications can be used for non-MDI applications. However, after 2009, these CFCs would need to be destroyed.

17. The use of CFC stockpiles[17] or recycled CFCs for manufacturing MDIs has some constraints. There have been previous instances of substantial quantities of CFCs in stockpiles becoming contaminated during storage and not meeting specifications for use in pharmaceutical applications. It has also been reported[18] that because of the complex nature of contaminants and concentration present in recycled CFCs, it is impractical to develop commercial facilities to purify used CFCs to pharmaceutical standards.

III. OVERVIEW OF THE MDI MANUFACTURING SUB-SECTOR IN ARTICLE 5 PARTIES

18. MDIs are manufactured in 13 Article 5 Parties,[19] with a total consumption of 2,085 metric tonnes of CFCs as shown in Table 1 below. A detailed description of the MDI sub-sector in these countries is contained in Annex III to the present document.

Table 1.

Article 5 Parties with current local production of MDIs

	Country	CFC baseline consumption	2005 CFC consumption	CFC consumption for MDI (2005)		Ratio CFC-MDI/2005 CFC	
				Total	Nationally-owned	Total ratio	Eligible ratio
	(a)	(b)	(c)	(d)	(e)	(f)=(d)/(c)	(g)=(e)/(c)
Countries with an approved project for the complete phase-out of CFCs for MDIs							
1	Cuba	625.1	208.6	109.0	109.0	52.3%	52.3%
2	Egypt	1,668.0	821.2	159.5	159.5	19.4%	19.4%
3	Uruguay	199.1	97.6	10.0	10.0	10.2%	10.2%
	Subtotal			278.5	278.5		
Countries with no approved project for the complete phase-out of CFCs for MDIs							
1	Argentina	4,697.3	1,675.5	187.7	130.9	11.2%	7.8%
2	Bangladesh	581.6	263.0	61.8	51.4	23.5%	19.5%
3	Brazil	10,525.8	967.2	156.9	10.0	16.2%	1.0%
4	China	57,818.7	13,321.7	418.5	369.0	3.1%	2.8%
5	Colombia	2,208.2	556.9	2.1	2.1	0.4%	0.4%
6	India	6,681.1	1,957.8	748.3	703.4	38.2%	35.9%
7	Indonesia	8,332.7	2,385.3	30.1	30.1	1.3%	1.3%
8	Iran	4,571.7	2,221.0	68.2	68.2	3.1%	3.1%
9	Mexico	4,624.9	1,604.0	47.5	47.5	3.0%	3.0%
10	Pakistan	1,679.4	453.0	85.8	19.6	18.9%	4.3%
	Subtotal			1,806.9	1,432.2		
	Total			2,085.4	1,710.7		

(a) Article 5 Parties with CFC-MDI manufacturing plants.

[17] Some MDI manufacturing plants in non-Article 5 Parties have established storage facilities for strategic reserves of CFCs (2002 ATOC Report).

[18] Based on a study carried out on behalf of IPAC in 1993 (2002 ATOC Report).

[19] MDIs are also manufactured in South Africa, with an estimated total CFC consumption of 71 metric tonnes (18 tonnes by nationally owned companies).

(b) CFC baseline calculated by the Ozone Secretariat on the basis of data reported under Article 7 of the Montreal Protocol.
(c) Latest (2005) CFC consumption reported under Article 7 of the Montreal Protocol.
(d) Total amount of CFC used for the manufacturing of MDIs by national and multi-national companies. For some countries, this information has been extracted from the 2002 ATOC Report.
(e) Amount of CFC used for the manufacturing of MDIs by nationally-owned companies (i.e., excluding consumption by multi-national companies).

19. The following observations are relevant:

(a) About 82 per cent of the total amount of CFCs needed for the production of MDIs in Article 5 countries is used by nationally-owned manufacturing companies;

(b) Cuba,[20] Egypt and Uruguay are implementing approved investment projects for the complete phase-out of CFCs used in the production of MDIs.[21] The expected completion dates for these projects are March 2008 for Cuba, December 2009 for Egypt and July 2007 for Uruguay;

(c) Total CFC consumption by locally-owned MDI manufacturing companies in each country is less than 10 per cent of its latest (2005) reported CFC consumption, except for Bangladesh (19.5 per cent) and India (35.9 per cent);

(d) It is assumed that any MDIs consumed in the other Article 5 Parties that receive assistance from the Multilateral Fund are imported.

20. A few HFA-MDIs are already being manufactured in locally-owned enterprises in three Article 5 countries:

(a) One locally-owned company that has been producing CFC-MDIs in Croatia since 1975, started manufacturing HFA salbutamol MDIs in 2004, and by 2005 the full production of MDIs was based on HFA propellant;

(b) The second-largest pharmaceutical company by market share in India launched CFC-free inhalers in 2000.[22] Currently, the company is selling both CFC and HFA-MDIs to several Article 5 and non-Article 5 Parties;

(c) In September 2006, the leading manufacturer of MDIs in Bangladesh (covering 75 per cent of the country's demand) announced the introduction of HFA salbutamol and beclomethasone MDIs.[23]

[20] In Cuba, CFC consumption used in the manufacturing of MDIs is above the eligible CFC consumption level for 2007. UNDP has reported that "in order to maintain compliance with the Montreal Protocol obligations on CFCs, Cuba and UNDP are working to have the MDI plant in operation before mid-2007. The engineering works are ongoing and the equipment is expected to be installed in December 2006. If the production of MDI can start in early 2007, there will be a substantial reduction in the need for CFC for 2007. Compliance in 2008 will be easier as the MDI plant will be fully operational and there will be no need for CFC (only at minimum levels, if any)".
[21] More detailed information on these projects is presented in Annex II of this document.
[22] Following the successful introduction of CFC-free salbutamol inhalers, Cipla also launched the world's first CFC-free budesonide inhaler (Source: The Director's Sixty-Fourth Annual Report of the Company and Audited Accounts for the year ended 31st March 2000).
[23] News release issued on 16 September 2006 during the International Symposium on Metered Dose Inhalers at the Bangladesh-China Friendship Conference Centre, in front of 1,000 physicians and chest specialists.

IV. ISSUES TO BE ADDRESSED IN RELATION TO THE MDI SUB-SECTOR IN ARTICLE 5 PARTIES

21. During the 2007-2009 period, CFC consumption for the production of MDIs in facilities owned by Article 5 countries will need to be phased out by 1 January 2010, unless the Parties authorize essential uses for the production of MDIs after that date.[24] However, as previously discussed, the practicality of continuing to manufacture CFC-MDIs may be quite limited in view of the likelihood of reduced availability of pharmaceutical-grade CFCs after 2009.

22. All Article 5 Parties where CFC-MDIs are currently manufactured have committed not to request any additional funding for any controlled uses of CFCs, except for Argentina, China and Indonesia, which had excluded specific amounts of CFCs used for the manufacturing of MDIs from their national phase-out plans. Therefore, under the current rules of the Fund, additional assistance could only be provided to Argentina, China and Indonesia.

23. If the option of providing financial assistance for CFC phase-out in MDIs were to be considered more broadly for the seven Article 5 Parties[25] with locally-owned manufacturing facilities (i.e., Bangladesh, Brazil, Colombia, India, Iran, Mexico, Pakistan), the following would need to be taken into account:

Date of establishment of the production line

24. Through its decision 17/7, the Executive Committee decided, in the light of technological advances, not to consider any projects to convert any ODS-based capacity installed after 25 July 1995.[26] However, it is to be noted that:

(a) Based on the limited information available to the Secretariat, it appears that the majority of CFC-MDI production facilities owned by Article 5 Parties were established after 25 July 1995;

(b) Increases in production levels of CFC-MDIs have been occurring on an annual basis (Argentina, Bangladesh, Brazil, India, Mexico and Pakistan);

(c) The first HFA-MDI was only introduced in Europe in March 1995, followed by a few other HFA-MDIs in 1997. It is, therefore, unlikely that the technology was fully developed, commercially available and transferable to companies owned by Article 5 Parties until the late 1990s; and

(d) Under paragraph 2 of decision XVIII/16, the Parties requested the Executive Committee to "consider within the context of the existing Multilateral Fund guidelines to review its decision 17/7 with regard to the existing cut-off date for consideration of metered-dose inhaler conversion projects consistent with the reality of the pace of technological advances in the MDI sector".

[24] Paragraph 7 of decision IV/25 states that "essential use controls will not be applicable to Parties operating under paragraph 1 of Article 5 of the Protocol until the phase-out dates applicable to those Parties".

[25] Excluding Cuba, Egypt and Uruguay, as funding has been approved for the phase-out of CFCs used in the production of MDIs.

[26] Since the adoption of decision 17/7, no funding from the Multilateral Fund has been provided for the conversion of any new ODS-based manufacturing facility established after 25 July 1995.

25. Under these circumstances, the Executive Committee would need to consider:

(a) Whether or not the cut-off date of 25 July 1995 would apply to CFC-MDI production lines; and

(b) The base year to be used for establishing the consumption of CFCs in the MDI sub-sector that would be eligible for funding.

Governments' agreements and other undertakings

26. In addition to the commitments by the majority of Parties where CFC-MDIs are currently manufactured not to request any further funding for any controlled uses of CFCs, other specific commitments have been made by several countries not to seek any additional funding for the MDI sub-sector as follows:

(a) The national or sectoral CFC phase-out plans approved for Brazil, Colombia and the Philippines included technical assistance activities to address the MDI sub-sector;

(b) In the case of India, both the national phase-out plan[27] and the country programme update[28] stated that the Government of India would not submit any MDI-related requests for funding to the Multilateral Fund;

(c) The Government of Mexico in its phase-out plan[29] stated that it will manage to phase-out MDI usage of CFCs without any assistance from the Fund.

27. In the case of Argentina, China and Indonesia, funding for preparation of investment projects to phase-out CFCs in MDIs have already been approved. Funding for project preparation has also been approved for Bangladesh (pursuant to decision XVIII/16) and Iran.[30] For additional assistance to be provided on an equitable basis, the Executive Committee would need to consider a possible revision of the rules related to funding eligibility, and take into account the direct assistance that has already been provided in some countries for addressing the MDI sector.

Time-scale for incremental operating costs

28. The three major incremental cost categories for the conversion of CFC-MDI production lines to HFA propellant are capital costs, operating costs and costs associated with technology transfer.[31]

29. The capital costs associated with the conversion of CFC-MDI production lines to HFA propellant would depend, *inter alia*, on the existing baseline, the method of manufacturing and the production volume. For the majority of cases, new production lines will be needed, as it will not be possible to retrofit the baseline equipment. The costs of technology transfer will vary

[27] UNEP/OzL.Pro/ExCom/42/33.
[28] UNEP/OzL.Pro/ExCom/49/37.
[29] UNEP/OzL.Pro/ExCom/42/39.
[30] All the project proposals will be submitted for consideration by the Executive Committee in 2007, except for Indonesia, which will be submitted in 2008.
[31] A detailed analysis of incremental costs for the MDI sub-sector is contained in Annex II of this document.

depending on whether or not local manufacturing is undertaken independently, or under a licensing agreement with a multi-national company that has a product already developed. The active ingredient of each type of MDI manufactured, and national requirements for product testing and validation will also need to be taken into account. Therefore, both capital and operating costs would need to be assessed on a case-by-case basis.

30. The operating costs of MDI projects are based on the difference in prices between HFA and CFC propellants, and the modification of physical components of the MDI (i.e., canisters, metering valves and actuators). Of all these items, the incremental costs of HFA-MDIs mainly relate to the incremental cost of the valves. In regard to operating costs, the following observations are relevant:

(a) From the time a project proposal has been approved, an average of two to three years would be required for the conversion of the production line to HFA propellant, and the production of the first batch of HFA-MDIs including the launching of the final reformulated MDI. By that time, limited CFC production would affect the overall supply situation for pharmaceutical-grade CFCs and have an impact on its price;

(b) As the volumes of CFC-MDIs decrease, it is likely that current costs of CFC-based valves canisters and actuators will increase;

(c) Furthermore, according to the Indicative List of Categories of Incremental Costs: "…savings or benefits that will be gained at both the strategic and project levels during the transition process should be taken into account on a case-by-case basis, according to criteria decided by the Parties and as elaborated in the guidelines of the Executive Committee. In this respect the Executive Committee shall agree which time scales for payment of costs are appropriate in each sector."[32]

31. Based on the above observations and taking into consideration that operating costs or savings would only be realized upon project completion (i.e. two to three years after the project has been approved), the Executive Committee would need to consider the appropriate time scale for payment of operating costs/savings for the MDI sub-sector.

Funding for transition strategies to non-CFC-MDI alternatives

32. Through its decision XII/2, the Parties to the Montreal Protocol requested the Executive Committee to consider providing technical, financial and other assistance to Article 5 Parties to facilitate the development of MDI transition strategies and the implementation of approved activities contained therein.

33. To address the request by the Parties, the Executive Committee has already approved transitional strategies in several Article 5 countries as a component of national phase-out plans and terminal phase-out management plans (TPMPs) for low-volume consuming (LVC) countries. Furthermore, through its decision 45/54 on preparation of TPMPs, the Executive Committee decided "to approve, on a case-by-case basis, up to US $30,000 for the preparation of

[32] Appendix I of decision II/8.

a transitional strategy for CFC-MDIs where the need for a strategy had been fully demonstrated and documented".

34. Currently, there are several non-LVC countries with an approved national CFC phase-out plan and several LVC countries with an approved TPMP prior to decision 45/54, that have not received assistance for the preparation of a transition strategy to non-CFC-MDI alternatives. Many of these countries have submitted official requests to relevant implementing agencies for the development of transition strategies, irrespective of whether the need to develop such strategy has been demonstrated.

35. The Executive Committee would need to consider whether it wishes to determine the level of funding for the development of transition strategies to non-CFC MDI alternatives in all countries that have not included such strategies in national phase-out plans or TPMPs under implementation irrespective of whether the need for such strategy has not been demonstrated.

Funding implications

36. The Secretariat has attempted to get a preliminary estimate of the possible cost to the Multilateral Fund for the conversion of CFC-MDI production facilities owned by Article 5 Parties, without prejudice to decisions that the Executive Committee might wish to take in regard to funding eligibility. This cost estimate is based on the following considerations:

(a) The levels of CFCs to be phased out are those reported by the Article 5 Parties in the questionnaire issued by the Secretariat for the preparation of this paper. These levels of consumption refer to the year 2005 and exclude consumption by multi-national companies;

(b) The costs associated with the changes to the production line (capital costs) and technology transfer are specifically related to each manufacturing facility; therefore they can only be considered on a case-by-case basis;

(c) Operating cost calculations are based on the same items in all MDI production facilities. Their value is only associated with the production volume (MDI units/year) and the specific time-scale for payment (i.e., number of months or years);

(d) Based on the limited experience available in the Fund for the phase-out of CFCs in the MDI manufacturing sector, the analysis is based on the average capital and technology transfer costs of the MDI projects so far approved applying different time scales for payment of operating costs: i.e., 0 (no operating costs), 9 months (as in the case of Egypt), 12 months and 24 months (Cuba and Uruguay);

(e) Taking into consideration the wide range in levels of CFC consumption among the ten countries, the analysis considers two sets of values:

(i) For countries with levels of consumption below 20 ODP tonnes (i.e., Brazil, Colombia and Pakistan), the average values of the project in Uruguay (with an annual CFC consumption of 10.3 ODP tonnes) were used; and

(ii) For the other seven countries, with levels of CFC consumption above 20.0 ODP tonnes, the average value of the projects in Cuba and Egypt were used.

37. The results of the analysis are presented in Table 2 below:

Table 2.

Preliminary estimate cost for conversion of MDI manufacturing plants in Article 5 Parties

Parameters/Country	CFC (ODP tonnes)	Total Cost (US $)			
		Option 1	Option 2	Option 3	Option 4
Time scale of payment of operating costs (months)		0	9	12	24
Group I					
Argentina	130.9	3,773,461	4,813,637	5,160,363	5,840,758
China	369.0	10,637,182	13,569,382	14,546,782	16,464,780
Indonesia	30.1	867,694	1,106,879	1,186,607	1,343,062
Subtotal	**530.0**	**15,278,337**	**19,489,898**	**20,893,752**	**23,648,600**
Group II					
Bangladesh	51.4	1,481,710	1,890,152	2,026,300	2,293,468
Brazil	10.0	380,022	392,983	397,304	414,585
Colombia	2.1	79,805	82,527	83,434	87,063
India	703.4	20,276,948	25,866,405	27,729,558	31,385,708
Iran	68.2	1,966,005	2,507,945	2,688,592	3,043,084
Mexico	47.5	1,369,285	1,746,736	1,872,553	2,119,450
Pakistan	19.6	744,844	770,248	778,716	812,587
Subtotal	**902.2**	**26,298,619**	**33,256,996**	**35,576,456**	**40,155,946**
Total	**1,432.2**	**41,576,956**	**52,746,894**	**56,470,208**	**63,804,546**

(*) CE refers to cost-effectiveness.

V: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

38. After 1 January 2010, production of CFCs that might be approved for any essential uses agreed by the Parties might not be economically viable, and the use of CFC stockpiles or recycled CFCs for manufacturing MDIs has some major constraints. Therefore, CFC consumption used for the production of MDIs in facilities owned by Article 5 countries will need to be phased out by 1 January 2010, even if the Parties authorize essential uses for the production of MDIs after that date.

39. Currently, 2,085 ODP tonnes of CFCs (data for 2005) are used for the production of MDIs in 13 Article 5 Parties. Of this consumption, 278.5 ODP tonnes are used in three countries with approved MDI phase-out projects, and 374.7 ODP tonnes are used by multi-national companies operating in Article 5 Parties. Therefore, 1,432.2 ODP tonnes of CFCs are used by

enterprises owned by ten other Article 5 Parties with approved national or sectoral CFC phase-out plans. Of this amount, 530.0 ODP tonnes are used by three Parties (Argentina, China and Indonesia) which explicitly excluded this consumption from their approved national phase-out plans. The remaining 902.2 ODP tonnes are used by seven Parties which have committed not to request any additional funding for any controlled uses of CFCs.

40. If additional assistance were to be provided on an equitable basis, the Executive Committee would need to consider a possible revision of the current rules of the Fund related to funding eligibility, and take into account the direct assistance that has already been provided in some countries for addressing the MDI sector.

41. Depending on the time frame for payment of operating costs, the additional cost to the Fund for addressing the 902.2 ODP tonnes of CFCs used by the seven Parties which have committed not to request any additional funding for any controlled uses of CFCs would be between US $26.3 and US $40.2 million. An additional US $15.3 million to US $23.7 million would be required should the Executive Committee decides to approve funding for the phase out the 530.0 tonnes of CFCs used in the MDI sub-sector in Argentina, China and Indonesia (i.e., eligible for funding).

Recommendations

42. The Executive Committee may wish to consider whether or not it wishes to provide financial assistance for CFC phase-out in MDIs for the seven Article 5 Parties with locally-owned manufacturing facilities which have already funding approved for the complete phase-out of CFCs through other projects, and, if so, to consider providing specific guidance on the following:

(a) Whether or not the cut-off date of 25 July 1995 would apply to CFC-MDI production lines;

(b) The base year to be used for establishing the consumption of CFCs in the MDI sub-sector that would be eligible for funding; and

(c) The appropriate time scale for payment of operating costs/savings for the MDI sub-sector.

43. The Executive Committee may also wish to consider the level of funding for the development of transition strategies to non-CFC MDI alternatives in countries that have not included such strategies in national phase-out plans or TPMPs under current implementation.

Annex I

RELEVANT DECISIONS ON THE METERED DOSE INHALERS SUB-SECTOR

This annex presents in chronological order all the decisions on the metered dose inhaler (MDI) sub-sector that have been taken by the Parties to the Montreal Protocol and the Executive Committee.

Eighth Meeting of the Parties (November 1996)

Decision VIII/10: Actions by Parties not operating under Article 5 to promote industry's participation in a smooth and efficient transition away from CFC-MDIs

1. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to demonstrate ongoing research and development of alternatives to CFC-MDIs with all due diligence and/or collaborate with other companies in such efforts and, with each future request, to report in confidence to the nominating Party whether and to what extent resources are deployed to this end and progress is being made on such research and development, and what licence applications if any have been submitted to health authorities for non-CFC alternatives;

2. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to demonstrate that they are undertaking individual or collaborative industry efforts, in consultation with the medical community, to educate health-care professionals and patients about other treatment options and the transition to non-CFC alternatives;

3. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to demonstrate that they, or companies distributing or selling their product, are differentiating the packaging of the company's non-CFC-MDIs from its CFC-MDIs and are applying other appropriate marketing strategies, in consultation with the medical community, to encourage doctor and patient acceptance of the company's non-CFC alternatives subject to health and product-safety considerations;

4. That Parties not operating under Article 5 will request companies manufacturing, distributing or selling CFC-MDIs and non-CFC alternatives not to engage in false or misleading advertising targeted at non-CFC alternatives or CFC-MDIs;

5. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to ensure that participation in regulatory proceedings is conducted with a view toward legitimate environmental, health and safety concerns;

6. That Parties not operating under Article 5 will request companies manufacturing CFC-MDIs to take all economically feasible steps to minimize CFC emissions during the manufacture of MDIs;

7. That Parties not operating under Article 5 will request companies manufacturing, distributing or selling CFC-MDIs to dispose of expired, defective, and returned MDIs containing CFCs in a manner that minimizes CFC emissions;

8. That Parties not operating under Article 5 will request companies manufacturing CFC-MDIs to review annually CFC requirements and current MDI market forecasts, and notify national regulatory authorities if such forecasts will result in surplus CFCs obtained under essential-use exemptions;

9. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to provide information on the steps that are being taken to provide a continuity of supply of asthma and chronic obstructive pulmonary disease (COPD) treatments (including CFC-MDIs) to importing countries;

10. That Parties not operating under Article 5 will request companies applying for MDI essential-use exemptions to provide information that demonstrates the steps being taken to assist the company's MDI manufacturing facilities in Parties operating under Article 5 and countries with economies in transition in upgrading the technology and capital equipment needed for manufacturing non-CFC asthma and chronic obstructive pulmonary disease (COPD) treatments;

11. To request the Technology and Economic Assessment Panel to reflect paragraphs 1 through 10 above in a revised version of the Handbook on Essential-Use Nominations.

Decision VIII/11: Measures to facilitate a transition by a Party not operating under Article 5 from CFC-MDIs

The Parties note that a transition is occurring from the use of CFC-based MDIs to non-CFC treatments for asthma and chronic obstructive pulmonary disease. In order to ensure a smooth and efficient transition, and protect the health and safety of patients, Parties not operating under Article 5 are encouraged:

1. To promote coordination between national environmental and health authorities on the environmental, health and safety implications of any proposed decisions on essential-use nominations and MDI transition policies;

2. To request their national authorities to expedite review of marketing/licensing/pricing applications of non-CFC treatments of asthma and chronic obstructive pulmonary disease, provided that such expedited review does not compromise patient health and safety;

3. To request their national authorities to review the terms for public MDI procurement and reimbursement, so that purchasing policies do not discriminate against non-CFC alternatives.

Decision VIII/12: Information gathering on a transition to non-CFC treatments for asthma and chronic obstructive pulmonary disease for Parties not operating under Article 5

1. To note with appreciation the work done by the Technology and Economic Assessment Panel and its Technical Options Committee pursuant to decision IV/25 of the Fourth Meeting of the Parties and decision VII/28 of the Seventh Meeting of the Parties;

2. To note with appreciation that one new non-CFC-MDI for one active ingredient has now entered the market in some countries, and that others are anticipated over the next one to three years. Other non-CFC treatments and devices already provide a suitable alternative for many patients in some Parties not operating under Article 5;

3. To request Parties not operating under Article 5 that have developed a national transition strategy to report to the Panel and its relevant Technical Options Committee on the details of that national transition strategy for non-CFC treatments of asthma and chronic obstructive pulmonary disease in time for meetings of the Technical Options Committee, beginning in 1997;

4. To request the Technology and Economic Assessment Panel and its relevant Technical Options Committee to provide an interim report on progress in the development and implementation of national transition strategies in Parties not operating under Article 5 for non-CFC treatments of asthma and chronic obstructive pulmonary disease (COPD) and report to the Open-Ended Working Group in preparation for the Ninth Meeting of the Parties;

5. To request the Technology and Economic Assessment Panel to further examine and provide a progress report to the Ninth Meeting of the Parties and a final report to the Tenth Meeting of the Parties on issues surrounding a transition to non-CFC treatments of asthma and chronic obstructive pulmonary disease in Parties not operating under Article 5 that is fully protective of public health. In so doing, the Technology and Economic Assessment Panel should consult with international bodies, such as the World Health Organization and other institutions representing health-care professionals, patient-advocacy groups and private industry, and with national bodies and Governments. The Technology and Economic Assessment Panel should consider:

(a) In the context of a transition phase, how decisions taken within the Montreal Protocol framework and national strategies might complement each other;

(b) The impact on the right and ability of patients in Parties operating under Article 5, in countries with economies in transition, in Parties not operating under Article 5 with large disadvantaged communities and in importing countries to receive CFC-MDIs where medically acceptable and affordable alternatives are not available due to reductions in essential-use exemptions in Parties not operating under Article 5 for CFC-based MDIs;

(c) The influence of potential transferable essential use exemptions as well as existing and potential trade restrictions by individual countries on a smooth transition and access to affordable treatment options;

(d) The international markets and fluidity of trade in CFC-MDIs as well as alternative treatments for asthma and chronic obstructive pulmonary disease;

(e) The implications for patient subgroups which may have continuing compelling medical needs after a virtual phase out;

(f) The range of regulatory and non-regulatory incentives for, and impediments to, research and development of alternative treatments for asthma and chronic obstructive pulmonary disease and market penetration of alternative treatments for asthma and chronic obstructive pulmonary disease;

(g) The degree to which dry powder inhalers (DPIs) and other treatment options may be considered medically acceptable and affordable alternatives for CFC-MDIs in

consultation with the above bodies, and as a result, the factors which may influence their ability to act as substitutes in different countries;

(h) The relative implications for the phase out of ozone-depleting substances of different policy options that facilitate the transition to non-CFC treatments;

(i) Steps that could be taken to facilitate access to affordable non-CFC treatment options and technology.

Ninth Meeting of the Parties (September 1997)

Decision XI/20: Transfer of essential-use authorizations for CFCs for MDIs

1. That all transfers of essential-use authorizations for CFCs for MDIs be reviewed on a case-by-case basis at Meetings of the Parties for approval;

2. Notwithstanding paragraph 1 of the present decision, to allow the Secretariat, in consultation with the Technology and Economic Assessment Panel, to authorize a Party, in an emergency situation, to transfer some or all of its authorized levels of CFCs for essential uses in MDIs to another Party, provided that:

(a) The transfer applies only up to the maximum level that has previously been authorized for the calendar year in which the next Meeting of the Parties is to be held;

(b) Both Parties involved agree to the transfer;

(c) The aggregate annual level of authorizations for all Parties for essential uses of MDIs does not increase as a result of the transfer;

(d) The transfer or receipt is reported by each Party involved on the essential-use quantity-accounting format approved by the Eighth Meeting of the Parties by paragraph 9 of decision VIII/9.

Twelfth Meeting of the Parties (December 2000)

Decision XII/2: Transition to chlorofluorocarbon-free MDIs

1. For the purposes of this decision, "chlorofluorocarbon metered-dose inhaler product" means a chlorofluorocarbon-containing metered-dose inhaler of a particular brand name or company, active ingredient(s) and strength;

2. That any chlorofluorocarbon metered-dose inhaler product approved after 31 December 2000 for treatment of asthma and/or chronic obstructive pulmonary disease in a non-Article 5(1) Party is not an essential use unless the product meets the criteria set out in paragraph 1(a) of decision IV/25;

3. With respect to any chlorofluorocarbon metered-dose inhaler active ingredient or category of products that a Party has determined to be non-essential and thereby not authorized for domestic use, to request:

(a) The Party that has made the determination to notify the Secretariat;

(b) The Secretariat to maintain such a list on its Web site;

(c) Each nominating Party to reduce accordingly the volume of chlorofluorocarbons it requests and licenses;

4. To encourage each Party to urge each metered-dose inhaler company within its territory to diligently seek approval for the company's chlorofluorocarbon-free alternatives in its domestic and export markets, and to require each Party to provide a general report on such efforts to the Secretariat by 31 January 2002 and each year thereafter;

5. To agree that each non-Article 5 Party should, if it has not already done so:

(a) Develop a national or regional transition strategy-based on economically and technically feasible alternatives or substitutes that it deems acceptable from the standpoint of environment and health and that includes effective criteria and measures for determining when chlorofluorocarbon metered-dose inhaler product(s) is/are no longer essential;

(b) Submit the text of any such strategy to the Secretariat by 31 January 2002;

(c) Report to the Secretariat by 31 January each year thereafter on progress made on its transition to chlorofluorocarbon-free metered-dose inhalers;

6. To encourage each Article 5(1) Party to:

(a) Develop a national or regional transition strategy-based on economically and technically feasible alternatives or substitutes that it deems acceptable from the standpoint of environment and health and that includes effective criteria and measures for determining when chlorofluorocarbon metered-dose inhaler product(s) can be replaced with chlorofluorocarbon-free alternatives;

(b) Submit the text of any such a strategy to the Secretariat by 31 January 2005;

(c) Report to the Secretariat by 31 January each year thereafter on progress made on its transition to chlorofluorocarbon-free metered-dose inhalers;

7. To request the Executive Committee of the Multilateral Fund to consider providing technical, financial and other assistance to Article 5(1) Parties to facilitate the development of metered-dose inhaler transition strategies and the implementation of approved activities contained therein, and to invite the Global Environment Facility to consider providing the same assistance to those eligible countries with economies in transition;

8. To decide that, as a means of avoiding unnecessary production of new chlorofluorocarbons, and provided that the conditions set out in paragraphs (a)-(d) of decision IX/20 are met, a Party may allow a metered-dose inhaler company to transfer:

(a) All or part of its essential use authorization to another existing metered-dose inhaler company; or

(b) Chlorofluorocarbons to another metered-dose inhaler company provided that the transfer complies with national/regional license or other authorization requirements;

9. To request the Technology and Economic Assessment Panel to summarize and review by 15 May each year the information submitted to the Secretariat;

10. To modify as necessary the Handbook for Essential Use Nominations to take account of the requirements contained in this decision as they pertain to non-Article 5(1) Parties;

11. To request the Technology and Economic Assessment Panel to consider and report to the next Meeting of the Parties on issues related to the campaign production of chlorofluorocarbons for chlorofluorocarbon metered-dose inhalers.

Thirteenth Meeting of the Parties (October 2001)

Decision XIII/9: Metered-dose inhaler (MDI) production

To request the Executive Committee to prepare guidelines for the presentation of MDI projects involving the preparation of strategies and investment projects that would enable the move to CFC-free production of MDIs in Article 5 countries, and enable them to meet their obligations under the Montreal Protocol.

Decision XIII/10: Further study of campaign production of CFCs for MDIs

1. To note with appreciation the work of the Technology and Economic Assessment Panel and its Technical Options Committees in studying the issue of campaign production of CFCs for manufacturing CFC-MDIs;

2. To request the Technology and Economic Assessment Panel and Technical Options Committees to analyze the current essential-use decisions and procedures to identify if changes are needed to facilitate expedient authorization for campaign production, including information needed for the review and authorization of nominations for campaign production quantities, the contingencies for under- and over-estimation of the quantities needed for a campaign production, the timing of the campaign production vis-à-vis export and import of those quantities, the oversight and reporting on the use of campaign production quantities, and the flexibility in ensuring that the campaign production is used only in the manufacture of MDIs for the treatment of asthma and chronic obstructive pulmonary disease or that any excess is destroyed;

3. To request the Technology and Economic Assessment Panel to present its findings to the Open-ended Working Group in 2002;

4. To request the Technology and Economic Assessment Panel to continue to monitor and report on the timing of the likely need for campaign production.

35th Meeting of the Executive Committee (December 2001)

Decision 35/4 (c): Developing projects for the CFC metered-dose inhaler

The Executive Committee decided to request the Secretariat, in co-operation with the Implementing Agencies, to prepare a paper for the Executive Committee's consideration on the issues associated with developing projects for the CFC metered-dose inhaler (MDI) sub-sector to give effect to decision XIII/9 of the 13th Meeting of the Parties.

36th Meeting of the Executive Committee (March 2002)

Decision 36/9 (e): Preparation of draft guidelines for metered dose inhaler (MDI) projects

The Executive Committee decided to request the Secretariat to prepare draft guidelines for metered dose inhaler (MDI) projects for consideration by the Executive Committee at its 37th Meeting.

37th Meeting of the Executive Committee (July 2002)

Decision 37/61: Draft guidelines for metered dose inhaler (MDI) projects

The Executive Committee decided:

(a) To take note of the draft guidelines (UNEP/OzL.Pro/ExCom/37/58);

(b) To request members of the Executive Committee to submit comments on the issue to the Secretariat in time for a further discussion at the 40th Meeting of the Executive Committee;

(c) In the meantime, to allow consideration of some projects on a case-by-case basis, taking into account the relative need of the country to have an MDI project to ensure compliance, the relative cost-effectiveness of the project and the possibility that essential use applications for MDIs might be considered by the Parties as early as 2008.

Fourteenth Meeting of the Parties (November 2002)

Decision XIV/5: Global database and assessment to determine measures to complete the transition from CFC-MDIs

1. To request each Party or regional economic integration organization to submit available information to the Ozone Secretariat by 28 February 2003 and annual updates thereafter the following information concerning inhaler treatments for asthma and COPD that contain CFCs or that do not contain CFCs:

(a) CFC and non-CFC metered-dose inhalers and dry-powder inhalers: sold or

distributed within the Party, by active ingredient, brand/manufacturer, and source (import or domestic production);

(b) CFC and non-CFC metered-dose inhalers and dry-powder inhalers: produced within the Party for export to other Parties, by active ingredient, brand/manufacturer, source and importing Party;

(c) Non-CFC metered-dose inhalers and dry-powder inhalers: date approved, authorized for marketing, and/or launched in the territory of the Party;

2. To request the Technology and Economic Assessment Panel to take into account information submitted pursuant to paragraph 1 and other available information in its annual assessment, and to request the Parties to pay due consideration to this information when reviewing their national transition strategies.

Fifteenth Meeting of the Parties (November 2003)

Decision XV/5: Promoting the closure of essential-use nominations for metered-dose inhalers

1. That the present decision shall not affect the operation of paragraph 10 of decision VIII/9 relating to the authorization of a quantity of CFCs in an emergency situation;

2. To request that Parties not operating under paragraph 1 of Article 5, when submitting their nominations for essential-use exemptions for CFCs for metered-dose inhalers, specify, for each nominated use, the active ingredients, the intended market for sale or distribution and the quantity of CFCs required;

3. To request the Technology and Economic Assessment Panel and its Technical Options Committee to make recommendations on nominations for essential-use exemptions for CFCs for metered-dose inhalers from Parties not operating under paragraph 1 of Article 5 with reference to the active ingredient of the metered-dose inhalers in which the CFCs will be used and the intended market for sale or distribution and any national transition strategy covering that intended market which has been submitted according to decision XII/2 or decision IX/19;

4. That no quantity of CFCs for essential uses shall be authorized after the commencement of the Seventeenth Meeting of the Parties if the nominating Party not operating under paragraph 1 of Article 5 has not submitted to the Ozone Secretariat, in time for consideration by the Parties at the twenty-fifth meeting of the Open-ended Working Group, a plan of action regarding the phase-out of the domestic use of CFC-containing metered-dose inhalers where the sole active ingredient is salbutamol;

5. That the plans of action referred to in paragraph 4 above must include:

(a) A specific date by which time the Party will cease making nominations for essential use exemptions for CFCs for metered-dose inhalers where the sole active ingredient is salbutamol and where the metered-dose inhalers are expected to be sold or distributed on the market of any Party not operating under paragraph 1 of Article 5;

(b) The specific measures and actions sufficient to deliver the phase-out;

(c) Where appropriate, the actions or measures needed to ensure continuing access to or supply of CFC-containing metered-dose inhalers by Parties operating under paragraph 1 of Article 5;

6. To request each Party not operating under paragraph 1 of Article 5 to submit to the Ozone Secretariat as soon as practicable for that Party specific dates by which time it will cease making nominations for essential-use exemptions for CFCs for metered-dose inhalers where the active ingredient is not solely salbutamol and where the metered-dose inhalers are expected to be sold or distributed on the market of any Party not operating under paragraph 1 of Article 5;

7. To request the Technology and Economic Assessment Panel to report, in time for the twenty-fourth meeting of the Open-ended Working Group, on the potential impacts of the phase out of CFCs in Parties not operating under paragraph 1 of Article 5 on the availability of affordable inhaled therapy in Parties operating under paragraph 1 of Article 5;

8. To request the Ozone Secretariat to post on its web site all data submitted pursuant to decision XIV/5 that are designated non-confidential by the submitting Party;

9. To request the Technology and Economic Assessment Panel to modify the Handbook on Essential Use Nominations to reflect the present decision.

Seventeenth Meeting of the Parties (December 2005)

Decision XVII/14: Difficulties faced by some Article 5 Parties with respect to CFCs used in the manufacture of MDIs

1. To consider at the Eighteenth Meeting of the Parties a possible decision which would address the difficulties that some Parties operating under paragraph 1 of Article 5 may face in relation to metered-dose inhalers;

2. To request the Executive Committee of the Multilateral Fund to examine situations such as these and consider options that might assist this potential situation of non-compliance;

3. To request the Executive Committee to consider appropriate regional workshops to create awareness and educate stakeholders, including doctors and patients, on alternative metered-dose inhalers and on the elimination of chlorofluorocarbons in metered-dose inhaler uses and technical assistance to Article 5 Parties to phase out this use;

4. To request the Open-ended Working Group at its twenty-sixth meeting to consider the issue.

48th Meeting of the Executive Committee (April 2006)

Decision 48/36 (c): Options for addressing the situation of countries referred to in decision XVII/14

The Executive Committee decided to request the Fund Secretariat in consultation with the implementing agencies, to prepare a paper for submission to the 49th Meeting, outlining options for addressing the situation of countries referred to in decision XVII/14 of the Seventeenth Meeting of the Parties.

49th Meeting of the Executive Committee (July 2006)

Decision 49/33: Options for addressing the situation of countries referred to in decision XVII/14

The Executive Committee decided:

(a) To request the Governments of Bangladesh and Egypt, assisted by the relevant implementing agencies, to include the following in the 2007 and 2008 annual implementation programmes of their national CFC phase-out plans:

(i) Specific activities that were technically viable and economically feasible that could be implemented in the shortest possible period of time to achieve the greatest reduction in consumption of CFCs, such as the introduction of non-CFC drop-in refrigerants for servicing refrigeration equipment and/or cost-effective equipment retrofits;

(ii) Assessment of the feasibility of importing recovered and recycled CFCs for servicing existing refrigeration equipment;

(iii) Within the flexibility for reallocating approved funds provided in the agreements between the Governments concerned and the Executive Committee, consider establishing stockpiles of pharmaceutical-grade CFC for use in metered-dose-inhaler (MDI) production facilities, if technically feasible and economically viable;

(b) To request the Government of Bangladesh to submit to the 50th Meeting a proposal for the development of a transition strategy for the phase-out of CFC-MDIs. In developing its strategy, Bangladesh was invited to consider, among other things:

(i) Accelerating the replacement of CFC-MDIs with hydrofluoroalkane-MDIs and/or other non-CFC alternatives (i.e. dry powder inhalers) by multi-national companies that had already introduced those products in other Article 5 Parties;

(ii) Inviting multinational companies manufacturing CFC-MDIs in Bangladesh to provide information demonstrating the steps being taken to assist the earliest possible changeover to the manufacture of non-CFC

asthma and chronic obstructive pulmonary disease treatments in Bangladesh;

(iii) To facilitate the earliest possible completion by the leading nationally-owned manufacturer of MDIs in Bangladesh of the manufacturing facilities for non-CFC-MDIs currently under implementation;

(c) To request the Government of Egypt to finalize as soon as possible the preparation of a project for the phase-out of CFCs in the manufacture of MDIs that had been approved for UNIDO at the 45th Meeting of the Executive Committee, addressing any compliance-related issues; and

(d) To request the Fund Secretariat to update document UNEP/OzL.Pro/ExCom/49/39, taking into account any new information that might come to light and the implications of decisions to be taken at the Eighteenth Meeting of the Parties, and to present the revised paper to the Executive Committee at its 51st Meeting.

Eighteen Meeting of the Parties (October-November 2006)

Decision XVIII/16: Difficulties faced by some Article 5 Parties manufacturing MDIs which use CFCs

Recognizing that Parties operating under paragraph 1 of Article 5 must reduce consumption of Annex A, Group I, controlled substances (chlorofluorocarbons) by 85 per cent of their baseline by 2007 and complete the phase-out of those substances by 1 January 2010, including chlorofluorocarbons used in metered-dose inhalers for the treatment of asthma and chronic obstructive pulmonary disease,

Bearing in mind that, according to paragraph 7 of decision IV/25, essential-use controls will not be applicable to Parties operating under paragraph 1 of Article 5 until the phase-out dates applicable to those Parties,

Recognizing the potential uncertainty of supplies of pharmaceutical grade chlorofluorocarbons in the near future and the impact on people's health and local businesses if national manufacturing plants which depend on imports of those substances cannot predict their availability,

Aware that the phase-out of chlorofluorocarbon-based metered-dose inhalers in Parties not operating under paragraph 1 of Article 5 is likely to be complete by the phase-out deadline for Parties operating under Article 5 and that most of the metered-dose inhalers used by patients in many Parties operating under paragraph 1 of Article 5 are imported from Parties not operating under paragraph 1 of Article 5,

Acknowledging that some Parties operating under paragraph 1 of Article 5 have adopted metered-dose inhaler transition strategies, as encouraged by decision XII/2, but noting that most Parties operating under paragraph 1 of Article 5 have yet to put in place national or regional transition strategies and that Parties that produce metered-dose inhalers will be unable to finalize such strategies unless technology conversion is included in their national plans,

Understanding, therefore, that there is a need for further measures to facilitate the transition to non-chlorofluorocarbon treatments for asthma and obstructive pulmonary disease in Parties operating under paragraph 1 of Article 5,

Mindful that in some cases a regional approach to transition may be the most efficient,

Noting that Parties not operating under paragraph 1 of article 5 have made substantial progress in replacing chlorofluorocarbon-based metered-dose inhalers with alternative products but that at the present time still require a limited amount of pharmaceutical grade chlorofluorocarbons to produce metered dose inhalers, as demonstrated by current essential-use exemption requests granted by the Parties,

Taking into account that decision XVII/14 calls for the Eighteenth Meeting of the Parties to consider taking a decision addressing the difficulties faced by Parties operating under paragraph 1 of Article 5 on metered-dose inhaler transition,

1. To request the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol to consider as a matter of urgency the funding of projects in relation to those Parties operating under paragraph 1 of Article 5 that experience difficulties due to high consumption of chlorofluorocarbons for manufacturing metered-dose inhalers, in order to facilitate the transition from chlorofluorocarbon-based metered-dose inhalers;

2. To request the Executive Committee to consider within the context of the existing Multilateral Fund guidelines to review its decision 17/7 with regard to the existing cut-off date for consideration of metered-dose inhaler conversion projects consistent with the reality of the pace of technological advances in the metered-dose inhaler sector;

3. To request the Implementation Committee under the Non-compliance Procedure of the Montreal Protocol to consider all possible options on how to address the potential non-compliance difficulties of some Parties operating under paragraph 1 of Article 5 resulting from their high proportion of chlorofluorocarbon consumption in the metered-dose inhaler sector;

4. To further request the Implementation Committee to give special consideration to the situation of such Parties, particularly in the context of paragraph 4 of the non-compliance procedure of the Protocol, in the light of information received from the Parties concerned and having due regard to health considerations;

5. To consider again the matter referred to in paragraphs 3 and 4 at the twentieth Meeting of the Parties in 2008;

6. To request the Executive Committee to consider including on the agenda of the United Nations Environment Programme thematic regional workshops, information to clarify the steps required to advance the transition from chlorofluorocarbon metered-dose inhalers;

7. To request each Party not operating under paragraph 1 of Article 5 receiving essential use exemptions for the production or import of chlorofluorocarbons to manufacture metered-dose inhalers for export to Parties operating under paragraph 1 of Article 5 to submit to each

importing Party a detailed export manufacturing transition plan for each manufacturer where the exports of an active ingredient to that Party exceed 10 metric tonnes, specifying the actions that each manufacturer is taking and will take to transition its exports to chlorofluorocarbon-free metered-dose inhalers as expeditiously as possible in a manner that does not put patients at risk;

8. That each manufacturer's export manufacturing transition plans should include specific details for each of the manufacturer's export markets and for each metered-dose inhaler by active ingredient concerning:

(a) Timing of submission to the health authority of marketing applications for chlorofluorocarbon-free alternatives, expected approval and launch of such alternatives and withdrawal of associated chlorofluorocarbon product or products;

(b) Indicative information on facilitative pricing, licensing and/or technology transfer arrangements under consideration;

(c) Contribution to, and participation in, programmes for educating health care professionals, government health authorities and patients about the transition to chlorofluorocarbon-free treatments for asthma and chronic obstructive pulmonary disease;

9. Consistent with decision IV/25 and paragraph 4 of decision XII/2, to request each Party referred to in paragraph 7 of the present decision, when deciding whether to nominate essential-use volumes for and/or grant essential-use licenses to a manufacturer, to take into account the manufacturer's efforts to implement its export manufacturing transition plan and its contribution to transition towards chlorofluorocarbon-free metered-dose inhalers;

10. To request each Party referred to in paragraph 7 to submit each year to the Technology and Economic Assessment Panel, as part of the Party's essential-use nomination, a report summarizing the export manufacturing transition plans submitted, taking care to protect any confidential information;

11. To request the Technology and Economic Assessment Panel to consider such reports in its assessment of each Party's essential-use nominations;

12. To request the Technology and Economic Assessment Panel to assess and report on progress at the Twenty-Seventh Meeting Open-ended Working Group and to report to the Nineteenth Meeting of the Parties on the need for, feasibility of, optimal timing of, and recommended quantities for a limited campaign production of chlorofluorocarbons exclusively for metered-dose inhalers in both Parties operating under paragraph 1 of Article 5 and Parties not operating under paragraph 1 of Article 5.

Annex II

INDUSTRIAL PROCESSES INVOLVED IN THE MANUFACTURING OF MDIs

1. The MDI is a complex system designed to provide a fine mist of medication (the active ingredient) for inhalation directly to the airways to treat respiratory diseases such as asthma or chronic obstructive pulmonary disease (COPD). The active ingredient may be either dissolved in the propellant or a co-solvent (e.g., ethanol), or suspended in the propellant. The CFC-MDI technology was first introduced in 1956 in the United States.[1] Since then, the use of MDIs in the treatment of asthma and COPD has gained acceptance.

2. Production of HFA-MDIs has been increasing worldwide since the first HFA-MDI was introduced in the United Kingdom in March 1995.[2] By the end of 1996, the salbutamol HFA-MDI was available in several Article 5 and non-Article 5 Parties; a second pharmaceutical company introduced HFA-MDIs for salbutamol in Europe in 1997; and a nationally-owned MDI manufacturing company in an Article 5 country launched HFA-MDIs[3] in 2000.

3. As of today, there is at least one HFA-MDI approved and marketed in more than 110 countries,[4] and it is anticipated that there will be little need for CFC-MDIs in non-Article 5 Parties by the end of 2008.[5]

Propellants

4. Historically, the propellants used in MDIs are CFCs (CFC-12 and CFC-11, and sometimes CFC-114), and more recently HFC-134a and HFC-227ea (in the pharmaceutical sub-sector, HFC is referred to as HFA).[6] In addition, some preliminary work has been conducted using hydrocarbons as propellants. Since the propellants in MDIs comprise the large majority of the formulation (often in excess of 98 per cent), and the patients using these drugs are particularly vulnerable to airway irritation or toxicity, extensive testing had to be conducted on these propellants.

Availability of non-CFC-MDIs

5. Prior to the introduction of non-CFC-based MDIs, it was assumed that CFCs could be replaced with new propellants without significant change to the formulation of the MDI or the mechanical inhaler. However, during the development of the HFA technology, it was found that in many cases surfactants and co-solvents that worked well with CFC propellants were incompatible with the HFA propellants. Similarly, some of the MDI components (i.e., the

[1] By Riker Laboratories.
[2] 3M introduced a salbutamol HFA-MDI.
[3] The Chemical, Industrial and Pharmaceutical Laboratories, popularly known as Cipla, established in India in 1935 (www.cipla.com).
[4] More recently available HFA-MDIs include: beclomethasone, budesonide, fluticasone, di-sodium cromoglycate and nedocromil sodium. Table 1 in Annex II shows the availability of non-CFC-based asthma and COPD medications worldwide.
[5] According to the International Pharmaceutical Aerosol Consortium (IPAC). The member companies of IPAC are: AstraZeneca, Boehringer Ingelheim, Chiesi Farmaceutici, GlaxoSmithKline, Inyx, Inc., and Sepracor.
[6] All these propellants have undergone the same toxicological testing as any new chemical drug substance and are widely approved as propellants suitable for MDI use.

canister, elastomers, valve, and actuator) were found to interact with the new propellants and thus required to be modified for the use of HFA propellants.[7]

6. There are a limited number of CFC-MDIs produced today that do not yet have suitable alternatives developed. In these cases, the volumes are usually small and the products do have medically suitable alternatives available. Some of these products cannot or will not be reformulated to an HFA-MDI; in these cases other alternatives (such as dry powder inhalers or DPIs)[8] are being developed. Table 1 below shows the current availability of non-CFC-based asthma and COPD medications worldwide.

Table 1

Worldwide availability of HFA-MDIs and DPIs[9]

Moiety	Device	All countries		Article 5 countries	
		Approved	Launched	Approved	Launched
Beclomethasone	DPI	45	39	24	20
	HFA MDI	77	61	38	29
Budesonide	DPI	83	76	43	39
	HFA MDI	17	15	0	0
Fenoterol	DPI	0	0	0	0
	HFA MDI	21	20	4	4
Fenoterol + Ipratropium	DPI	0	0	0	0
	HFA MDI	23	19	6	3
Fluticasone	DPI	94	77	55	40
	HFA MDI	145	111	88	60
Formoterol	DPI	61	52	27	21
	HFA MDI	12	11	0	0
Ipratropium	DPI	0	0	0	0
	HFA MDI	28	28	3	3
Nedocromil	DPI	0	0	0	0
	HFA MDI	9	9	0	0
Salbutamol	DPI	74	66	40	37
	HFA MDI	176	112	115	82
Salmeterol	DPI	84	65	43	37
	HFA MDI	3	1	0	0
Sodium cromoglycate	DPI	2	2	0	0
	HFA MDI	*14	*14	0	0
Terbutaline	DPI	74	51	36	23
	HFA MDI	0	0	0	0

*Includes one launch of sodium cromoglycate in combination with reproterol.

[7] Information extracted from IPAC web site.

[8] The first dry powder inhaler (DPI) became available in 1968. DPIs have been formulated successfully for most anti-asthma drugs and are now widely available. In the case of Japan, for example, a substantial proportion of the former CFC-MDI market has been changed to DPI alternatives. As reported in the May 2006 TEAP progress report, pharmaceutical companies are introducing new drugs directly in CFC-free devices (i.e., mometasone furoate in a multi-dose DPI; tiotropium bromide as a single-dose DPI; ciclesonide and levalbuterol, both as HFC MDIs). These products, introduced without a direct antecedent CFC counterpart, offer important new treatment options.

[9] May 2006 TEAP Progress Report.

Costs associated with the conversion to HFA propellant

7. The three major incremental cost categories for the conversion of CFC-MDI production lines to HFA propellant are capital costs, operating costs and costs associated with technology transfer.[10]

Capital costs

8. The incremental cost of the conversion will vary depending on the existing baseline, the method of manufacturing[11] and the production volume. For example, the cost of a new high-speed filling line (i.e., 12 million MDIs per year) varies between US $2 and US $3 million, while the cost of a lower speed line (i.e., 6 million MDIs per year) is between US $1.2 and US $1.5 million.

9. In cases where production volumes are small, (i.e., 1.0 million MDIs or less) it may be possible to retrofit the production lines to HFCs. Estimates of cost are between US $200,000 to US $400,000, depending on the line configuration and the product to be filled. In these cases, there will be a need to evaluate the baseline equipment, type of products to be filled and annual production volume, in order to establish which pieces of the line(s) can be retrofitted.

Operating costs

10. Ongoing production costs for HFA MDIs are likely to be dependent on volume. After initial familiarity with the operation of the lines (set up, trials and training), the basic principles of operation are similar between comparable CFC- and HFA-MDI technologies and thus ongoing costs will be similar. The costs of most of the MDI components are likely to be very similar irrespective of the propellant being used, except for the cost of the valve which will depend on the specifications of the MDI product and filling procedure. However, as the volumes of CFC-MDIs decrease, it is likely that CFC valve costs will increase and thus drive down differences further. Conversely, as HFA MDI volumes increase, valve costs will decrease. Canister costs may vary depending on whether or not they need to be coated.

Technology transfer

11. Locally-owned CFC-MDI manufacturing plants in Article 5 countries are likely to need support and guidance for the development of alternative formulations (including an evaluation of whether reformulation of a specific drug is technically feasible), for modification of the manufacturing plants and for the development of transition policies. The required level of technical assistance from appropriate pharmaceutical and technical experts will vary, depending on whether or not local manufacturing is undertaken independently, or under a licensing agreement with a multi-national company that has a product already developed.

12. The cost of access to the technology will depend on whether there are existing patents that cover the product being contemplated and whether these are enforceable in the particular

[10] Based on the document on the draft guidelines for MDI projects (UNEP/OzL.Pro/ExCom/37/58).
[11] There are two methods: pressure filled, where the gas or the gas plus the drug is driven in under pressure through the metering valve; and cold filled, where the formulation is chilled to a low temperature (-40 oC), filled as a liquid and then the valve is crimped on the canister.

Article 5 Party. However, a preliminary evaluation[12] based on a survey of formulation patents that have been prosecuted by multinational companies in those Article 5 countries comprising the top ten users of MDIs by volume, it does not appear that formulation patents will constitute a major barrier to the introduction of CFC-free MDIs in Article 5 countries.[13] There are, however, some local exceptions to this situation that need to be noted, namely, process patents, such as those in India, or patents from domestic researchers and producers in individual countries, such as China.

13. Therefore, the more likely impediment to successful technology transfer in Article 5 countries will be access to skilled technical consultants with the expertise to develop and manufacture HFA-MDIs. One alternative for countries that do not yet have the HFA products widely available could be a license arrangement with a pharmaceutical company that has developed those products. These countries might be able to achieve access sooner and less expensively through the provision of a royalty payment.[14] In countries where no patent coverage exists or the patents are not enforceable, access to technology could be granted in exchange for a greater market presence. The magnitude of payments for this type of "enabling" technology is usually in the order of a small percentage of sales or it could come in the form of a share of revenue from sales of the already developed product.

Funding approved for the conversion of MDI production lines in Article 5 countries

14. As of November 2006, the Executive Committee has approved the following three investment projects for the complete phase-out of CFCs in the production of MDIs:

(a) Phase-out of CFC consumption in the manufacture of aerosol MDIs in Cuba, approved at the 41st Meeting (UNEP/OzL.Pro/ExCom/41/33). This project was first considered by the Executive Committee at its 38th Meeting (UNEP/OzL.Pro/ExCom/38/29);

(b) Phase-out of CFC consumption in the manufacture of aerosol MDIs in Egypt, approved at the 50th Meeting (UNEP/OzL.Pro/ExCom/50/29); and

(c) Phase-out of CFC consumption in the manufacture of MDIs in Uruguay, approved at the 43rd Meeting (UNEP/OzL.Pro/ExCom/43/44).

15. A summary of the funding level approved for these three projects by the Executive Committee is shown in Table 2 below:

[12] May 2006 TEAP Progress Report.

[13] From a moiety perspective, formulation patents covering salbutamol, beclomethasone, fluticasone and salmeterol exist in several Article 5 Parties beyond 2010. While it may be possible to introduce different products containing the same moiety that are therefore not covered by the claims of these patents, the technical difficulty of redeveloping them should not be underestimated.

[14] Possible arrangements for access to these products could include: supply of the finished product; transfer of the technology to the Article 5 company for local production; and/or a joint venture established to produce the alternate products locally.

Table 2

Level of funding approved for MDI phase-out projects

Country	CFC (ODP tonnes)	MDIs (Units)	No. of drugs	Costs (US$)				CE (US$/kg)
				Capital	Operating	Technology	Total	
Cuba	109.1	4,800,000	2	1,830,000	2,900,000	1,040,000	5,770,000	52.88
Egypt	159.5	7,500,000	5*	1,900,000	900,000	3,000,000	5,800,000	36.36
Uruguay	10.3	450,000	5	251,423	35,600	140,000	427,023	42.70

(*) One product was manufactured by two different enterprises using different procedures.

16. The following observations are relevant:

(a) New production lines were installed in the three projects since the baseline equipment could not be retrofitted;

(b) Operating costs were calculated over a two-year period in Cuba and Uruguay and over a nine-month period in Egypt. In the case of Cuba, operating costs were approved with the proviso that it should not be construed as a precedent for a two-year duration for incremental operating costs in this sector;

(c) Technology transfer costs were approved as follows:

(i) In Cuba, at a level of US $500,000 per each type of active ingredient in the MDI;

(ii) In the case of Egypt, US $4,280,000 was requested in the original project proposal. After addressing relevant technical and cost issues related to the technology, US $3 million was approved as technology transfer on the understanding that UNIDO would negotiate with potential providers prior to the 52nd Meeting and that any savings that might be realized during the process would be returned to the Fund;

(iii) In the case of Uruguay, the replacement formulations for HFA MDIs would be developed locally by the staff of the manufacturing company. Therefore, a technology transfer or a license agreement was not required.

Annex III

SUMMARY REPORT ON THE MDI SUB-SECTOR IN ARTICLE 5 PARTIES WITH NATIONALLY OWNED MDI MANUFACTURING COMPANIES

1. This Annex presents a summary report of the MDI sector in Article 5 Parties with nationally-owned companies manufacturing MDIs. Cuba, Egypt and Uruguay are excluded from this summary, as the Executive Committee has already approved investment projects for the complete phase-out of CFCs used in the manufacturing of MDIs in these countries.

2. Information from this analysis is mainly extracted from the MDI questionnaire developed by the Secretariat and submitted by Article 5 Parties, other documents that have been submitted for consideration by the Executive Committee (national or sectoral phase-out plans, country programme updates and case studies), and information on the MDI sub-sector contained in the May 2006 TEAP Progress Report.

Argentina

3. The total CFC consumption for the production of MDIs in Argentina increased from 86 metric tonnes to 188 metric tonnes between 2003 and 2005[1], as shown in the table below. It may be of interest to note that the proportion of locally-owned manufacturers had increased in comparison to that by multi-nationals.

Company	2003		2004		2005	
	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units
Nationally-owned	49.09	1,963,760	108.28	4,331,120	130.85	5,234,160
Multi-nationals	36.97	1,478,840	32.69	1,307,720	56.84	2,273,480
Total	86.07	3,442,600	140.97	5,638,840	187.69	7,507,640

4. The Government of Argentina has indicated that the maximum allowable level of CFC for each year from 2007 to 2009 is 704.6 ODP tonnes for consumption and 686.0 ODP tonnes for production. As the total CFC production will be entirely for domestic consumption, Argentina could import a maximum of only 18.6 ODP tonnes of CFCs each year for use in the MDI sector, which is much lower than the 188 ODP tonnes used for MDI production in 2005. Given those circumstances, Argentina might face a serious risk of either being unable to meet the demand for pharmaceutical-grade CFCs, with the related impact on human health, or not complying with reduction measures under the Montreal Protocol.

5. HFA-MDIs have been produced in Argentina since 2005.

Bangladesh

6. During preparation of the national CFC phase-out plan in Bangladesh, it was found that 31.7 ODP tonnes of CFCs were used for MDI applications in 2003. However, the phase-out plan did not allocate any CFC consumption to MDI applications, since this consumption has never

[1] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Argentina.

been reported to the Multilateral Fund.[2] Subsequently, the Bangladesh country programme update[3] reported that the Government had been unaware until recently of CFC use in the local production of MDIs.

7. There are 4 companies manufacturing CFC-MDIs in Bangladesh (ACME, Beximco Pharmaceuticals Ltd., GlaxoSmithKline with 18 per cent local ownership representing less than 3.0 ODP tonnes of CFCs, and Square); all production lines were established after 25 July 1995. Total CFC consumption for the production of MDIs increased from 39 metric tonnes to 62 metric tonnes between 2003 and 2005, with an estimated consumption of 76 metric tonnes in 2006, as shown in the table below (the data has been consolidated for confidentiality purposes):[4]

Moiety	2003		2004		2005		2006 (estimated)	
	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes
Beclomethasone dipropionate	178,412	4.77	236,591	6.59	269,873	7.32	352,738	9.22
Budisonide		-	17,846	0.41		-	25,000	0.57
Ciclesonide		-		-		-	24,000	0.87
Ipratropium bromide	36,425	0.83	38,700	0.88	48,145	1.10	63,500	1.45
Levosalbutamol		-		-		-	96,000	1.37
Salbutamol	1,359,777	31.66	2,244,259	51.62	2,057,259	47.65	2,244,273	51.71
Salbutamol, Ipratropium bromide		-		-	83,224	1.79	212,800	4.67
Salmeterol xinafoate	83,545	1.89	100,323	2.17	97,233	2.19	139,334	3.08
Salmetrol xinafoate, Fluticasone propionate		-	46,614	0.65	99,505	1.48	161,926	2.38
Triotropium bromide		-		-	21,000	0.29	28,600	0.40
Total	1,658,159	39.15	2,684,333	62.31	2,676,239	61.81	3,348,171	75.71

8. On 16 September 2006, Beximco Pharmaceuticals Ltd. announced the introduction of the country's first HFA salbutamol and beclomethasone MDIs.[5] The company has reported that it will not cease its current production of CFC salbutamol and beclomethasone MDIs, and that the development of HFA-based inhalers does not apply to the portion of the consumption that is used to produce GSK brands.

Brazil

9. The national CFC phase-out plan for Brazil[6] identified two national MDI manufacturing plants with a total production of some 80,000 MDIs and a CFC consumption of about 2 ODP tonnes, as well as several multi-national companies manufacturing CFC-MDIs. The phase-out plan was approved at a total funding level of US $26.7 million to achieve the complete phase-out of all uses of CFCs in Brazil by 2010.

[2] The national ODS phase-out plan for the complete phase-out of CFCs in Bangladesh was approved by the Executive Committee at its 42nd Meeting (UNEP/OzL.Pro/ExCom/42/25) (decision 42/19).
[3] The Bangladesh country programme update was considered by the Executive Committee at its 48th Meeting (UNEP/OzL.Pro/ExCom/48/41).
[4] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Bangladesh.
[5] News release issued on 16 September 2006 during the International Symposium on Metered Dose Inhalers at the Bangladesh- China Friendship Conference Centre, in front of 1,000 physicians and chest specialists of the country.
[6] The plan was approved by the Executive Committee at its 37th Meeting (UNEP/OzL.Pro/ExCom/37/30) (decisions 37/33 and 37/54).

10. According to a recent report[7], 134.5 ODP tonnes of CFCs were used by two multi-national corporations in 2006 for the production of CFC-MDIs for local use and for export to other Parties, as shown in the table below. These companies requested licenses to import some 225.7 ODP tonnes of CFCs in 2007.

	2005		2006*	
Ingredient	**MDI units**	**CFC tonnes**	**MDI units**	**CFC tonnes**
Beclomethasone	382,736	7.7	739,000	14.8
Beclomethasone/Salbutamol	342,409	6.8	315,000	6.3
Fenoterol	2,002,422	40.0	1,904,117	38.1
Fenoterol/Ipratropium	485,235	9.7	379,619	7.6
Ipratropium	-	-	160,310	3.2
Salbutamol	165,023	3.3	259,000	5.2
Salbutamol/Ipratropium	1,005,096	20.1	2,968,144	59.4
Total	4,382,921	87.7	6,725,190	134.5

* According to information received from UNDP, the total amount of CFCs used by these enterprises was 146.9 ODP tonnes (i.e., 12.4 ODP tonnes more than the consumption in the table).

11. Through the recent survey, it was also found that there are a few locally-owned manufacturers of MDIs which are currently under examination; a preliminary estimate of the consumption by these enterprises is about 10 ODP tonnes of CFCs.

China

12. The refrigeration servicing sector CFC phase-out plan for China,[8] reported the following consumption of CFCs used for the manufacturing of pharmaceutical aerosols and MDIs:

Year	**CFC consumption (ODP tonnes)**				
	2005	**2006**	**2007**	**2008**	**2009**
Pharmaceutical (external use)	784	901	800	400	334
MDI	418	481	553	553	553
Total	1,202	1,382	1,353	953	887

13. Additional information on the MDI sector in China, as reported in the May 2006 TEAP Progress Report, is presented below:

(a) More than 40 million people in China have asthma or COPD;

(b) Approximately 15 million CFC-MDIs are locally manufactured, about 2.5 million MDIs are sold each year by multi-national companies, and a small quantity of HFA MDIs has been imported since 2004; and

(c) Some local companies have developed and patented new technology for CFC-free MDIs (clinical trials are ongoing). Adequate bulk pharmaceutical-grade HFC is

[7] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Brazil.
[8] The plan was approved by the Executive Committee at its 44th Meeting (UNEP/OzL.Pro/ExCom/44/33) (decisions 44/49).

readily available from three multi-national producers and will likely be available from one local producer.

Colombia

14. The national CFC phase-out plan for Colombia[9] reported that all CFC-MDIs were imported into the country (no CFC-MDIs were manufactured in Colombia). Although CFC consumption for MDIs was nil, the Government of Colombia and the health authorities were concerned about the MDI sub-sector and requested funding for the development of an MDI transition strategy that will establish a clear schedule for import substitution of CFC-MDIs, regulations that will promote and support the phase-out of these products, and a programme that will raise physician awareness and patient acceptance of alternatives to CFC-MDIs.

15. According to a recent report,[10] several CFC-MDIs have been locally produced in Colombia since 2003 by one enterprise, as shown in the following table (this consumption was identified after the national CFC phase-out plan was approved):

Moiety	2004		2005	
	MDI units	CFC tonnes	MDI units	CFC tonnes
Salbutamol	341,396	6.8	34,387	0.7
Salbutamol/Ipratropium			10,443	0.2
Salbutamol/Beclomethasone	80,000	1.6	35,655	0.7
Beclomethasone			15,833	0.3
Ipratropium			7,730	0.2
Total	421,396	8.4	104,048	2.1

Croatia

16. According to a recent report,[11] CFC-MDIs have been locally produced in Croatia since 1975 by one company (Pliva Hrvatska). By the end of 2004, the company had ceased production of CFC-MDIs. The 2003 and 2004 CFC-MDI production is shown in the following table.

Ingredient	2003		2004		2005	
	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes
Salbutamol	276,135	7.6	187,294	6.9	0	0.0
Beclomethasone	110,960	2.0	131,910	2.7	0	0.0
Total	387,095	9.5	319,204	9.5	0	0.0

17. In 2004, the company started manufacturing HFA salbutamol MDIs (128,190 units). By 2005, about 378,700 HFA-MDI units were produced.

[9] The plan was approved by the Executive Committee at its 41st Meeting (UNEP/OzL.Pro/ExCom/41/29) (decision 41/52).
[10] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Colombia.
[11] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Croatia.

India

18. The national CFC consumption phase-out plan focusing on the refrigeration servicing sector for India[12] reported a consumption of 120 ODP tonnes of CFC-12 in the manufacturing of MDIs. In the phase-out plan as well as in the India country programme update,[13] the Government of India indicated that India had allocated its total remaining CFC consumption eligible for funding to the refrigeration servicing sector and would not be submitting an investment project for MDI aerosols.

19. According to a recent report,[14] there are 19 different MDIs currently produced in India by 7 manufacturing enterprises (less than 2 per cent of total production is by multi-national corporations). The total CFC consumption for the production of MDIs increased from 635.5 metric tonnes to 748.3 metric tonnes between 2003 and 2005 as shown in the following table:

Ingredient	2003		2004		2005	
	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes
Beclomethasone	16,226,801	250.1	6,440,717	102.5	7,405,092	117.7
Beclomethasone/Salbutamol	2,229,718	35.3	3,405,336	51.2	5,833,333	91.0
Budesonide	918,415	17.1	928,920	18.6	873,776	12.4
Budesonide/Formoterol	724,735	8.6	581,896	7.1	823,719	10.8
Fluticasone	190,493	2.1	826,986	8.5	300,464	3.1
Fluticasone/Salmeterol	273,968	4.6	249,418	3.9	215,187	3.9
Formoterol	84,393	0.9	43,882	0.5	157,950	1.7
Formoterol/Budesonide	75,900	1.0	180,000	2.7	70,000	1.0
Ipratropium	1,325,313	21.1	4,732,574	60.3	6,059,931	75.3
Ipratropium/Salbutamol	61,200	1.3	65,000	1.6	30,000	0.7
Salbutamol	15,170,099	282.7	10,301,917	207.6	23,857,324	383.8
Salbutamol/Beclomethasone	27,400	0.6	125,000	3.0	150,500	3.2
Salbutamol/Ipratropium	342,166	4.4	785,776	9.6	368,750	5.1
Salmeterol	244,775	3.7	1,240,326	15.1	145,875	1.9
Salmeterol/Fluticasone	10,000	0.1	25,121,265	252.2	2,856,470	29.0
Sodium cromoglycate	81,774	1.1	141,028	1.9	201,894	2.7
Terbutaline	23,386	0.3	23,372	0.3	129,860	2.1
Tiotropium	48,906	0.5	190,938	2.0	133,301	1.7
Tiotropium/Formoterol	-	-	77,239	0.8	89,236	1.2
Total	**38,059,442**	**635.5**	**55,461,590**	**749.5**	**49,702,662**	**748.3**

20. About 6 per cent of the total production of CFC-MDIs was based on production lines established prior to 25 July 1995.

Indonesia

21. Pursuant to decision XV/5, the Government of Indonesia reported a CFC consumption of 8.4 metric tonnes of CFCs for the manufacture of MDIs in 2002. However, the national CFC

[12] The plan was approved by the Executive Committee at its 42nd Meeting (UNEP/OzL.Pro/ExCom/42/33) (decision 42/37).
[13] Submitted for consideration by the Executive Committee at its 49th Meeting (UNEP/OzL.Pro/ExCom/49/37).
[14] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of India.

phase-out plan for Indonesia[15] indicated that some 30 ODP tonnes were used for the production of MDIs and other aerosol pharmaceutical products by several national (Otsuka, Daya Varia and Konimex) and multi-national (Astra Zeneca, Boehringer Ingelheim, GlaxoSmithKline) companies (it would appear that a large portion of the 30 ODP tonnes of CFCs reported in the phase-out plan is used for the manufacturing of pharmaceutical aerosols).

22. The phase-out of CFCs used in the manufacturing of pharmaceuticals and MDIs was not included in the phase-out plan; therefore, the Government of Indonesia will request assistance from the Fund for phasing out CFC consumption in these sub-sectors.

Iran

23. The national CFC phase-out plan for Iran[16] reported that some 50 tonnes of CFCs were used for manufacturing MDIs. In reviewing the national plan, the Secretariat observed that the project proposal submitted to the 41st Meeting by the Government of Germany on behalf of the Government of Iran was presented as a plan for the total phase-out of CFCs in Iran. The draft agreement included the provision that "this is the total funding that would be available to the Islamic Republic of Iran from the Multilateral Fund for the total elimination of CFC use in the country". The Secretariat indicated that, on this basis, the additional project for addressing CFC consumption in the MDI sector for possible future submission would not be eligible for funding. The Government of Germany responded that the Government of Iran agreed to exclude funding requests for MDI projects from the phase-out plan. However, the Government of Germany maintained the MDI component in the phase-out plan as a basis for discussing potential funding requests in the future.

24. According to a recent report,[17] CFC-MDIs have been produced in Iran since April 1993 by one locally owned company (Sina-Darou). MDI production data for the period 2003-2005 is summarized in the table below:

Moiety	2003		2004		2005	
	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes
Beclomethasone			3,000	0.1	300,000	6.2
Sodium cromoglicate					40,000	0.8
Salbutamol	3,000,000	61.2	3,600,000	73.5	2,900,000	59.2
Salmeterol			40,000	0.8	100,000	2.0
Total	3,000,000	61.2	3,643,000	74.4	3,340,000	68.2

25. An additional 814,000 CFC-MDIs were imported in 2005 (i.e., salmeterol, beclomethasone and fluticasone).

[15] The plan was approved by the Executive Committee at its 44th Meeting (UNEP/OzL.Pro/ExCom/44/40) (decision 44/39).
[16] The plan was approved by the Executive Committee at its 41st Meeting (UNEP/OzL.Pro/ExCom/41/38) (decisions 41/20 and 41/55).
[17] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Iran.

Jordan

26. At its 38th Meeting, the Executive Committee took note of the Jordan country programme update[18] and approved a CFC phase-out plan in Jordan on the understanding that, *inter alia,* the Government of Jordan agreed that no additional funding would be requested from the Multilateral Fund or bilateral agencies for activities related to the phase-out of ODS. The Executive Committee also agreed to provide Jordan with flexibility in using the agreed funds consistent with operational procedures as agreed between Jordan and the implementing agencies in the phase-out plan (decision 38/72).

27. At its 48th Meeting, the Executive Committee considered a final report on the evaluation of RMPs in non-LVCs and of national phase-out plans,[19] which was based on several case studies. According to the information reported in the Jordan case study, there is one company manufacturing a wide range of pharmaceutical products including MDIs (Arab Centre for Pharmaceutical Products), under current conversion with assistance from the Fund. After conversion, the company will still be allowed to manufacture CFC-MDIs with an estimated consumption of 5 metric tonnes of CFCs. The manufacturing of ODS products (other than MDIs) is expected to cease by March 2006.

28. According to a recent report,[20] it was found that the pharmaceutical company was using CFCs for the production of aerosol containing lidocaine as the active ingredient (a local anaesthetic and antiseptic). The technical manager of the enterprise reported that this aerosol has been registered in the Ministry of Health of Jordan as an MDI. Upon a request by the Secretariat, the MTOC Co-Chairs indicated that an MDI is designated as such when it is used to deliver a specific dose of drug deep into the lungs. The product manufactured in Jordan may deliver a specific dose, but it is a topical spray for the oral cavity. The MTOC 2006 Assessment Report states that "the types of medical aerosols in which CFCs are still used include: nasal preparations; local anaesthetics; burn and wound sprays; antibiotics; antiseptics; vaginal and contraceptive products; and ancillary products. These products do not require the narrow particle size range considered necessary for the MDIs. Most sprays that are applied over the skin can use alternative propellants such as hydrocarbon aerosol propellants, dimethyl ether, nitrogen, and compressed air. HFC-134a or HFC-152a are more likely to be used as propellants for sprays used in the oral cavity like local anaesthetics." On this basis, the pharmaceutical aerosol manufactured in Jordan was not included in the analysis for this document, since it is not an MDI product.

Mexico

29. The national CFC phase-out plan for Mexico[21] reported a consumption of 5.0 ODP tonnes of CFCs used for the manufacturing of MDIs and stated that “the Government of Mexico will manage to phase out the MDI usage of CFCs without any assistance from the Multilateral Fund”.

[18] Submitted for consideration by the Executive Committee at its 38th Meeting (UNEP/OzL.Pro/ExCom/38/63).
[19] UNEP/OzL.Pro/ExCom/48/12.
[20] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Jordan.
[21] The plan was approved by the Executive Committee at its 42nd Meeting (UNEP/OzL.Pro/ExCom/42/39) (decision 42/32).

30. According to a recent report,[22] CFC-MDIs have been produced in Mexico since 1999 by a locally-owned company (Salus). MDI production data for the period 2003-2005 is summarized in the table below:

Moiety	2003		2004		2005	
	MDI units	CFC tonnes	MDI units	CFC tonnes	MDI units	CFC tonnes
Salbutamol	800,594	15.9	1,746,347	40.4	2,136,750	37.3
Beclomethasone	557,842	11.1	655,005	15.1	542,527	9.5
Sodium cromoglicate	55,767	1.1	73,909	1.7	38,736	0.7
Total	1,414,203	28.1	2,475,261	57.2	2,718,013	47.5

31. The report also indicated that a multi-national company (Boehringer-Promeco) is also producing CFC-MDIs and requested imports of some 20 tonnes of CFC-114 for 2007.

Pakistan

32. The Pakistan country programme update,[23] reported a CFC consumption of 69.4 ODP tonnes in 2002 used for the manufacturing of MDIs by one multi-national company. According to a recent report,[24] the number of MDIs imported into the country increased from 460,192 units in 2003 to 998,838 units in 2005. Of the total MDIs imported in 2005, about 487,000 units were imported for the first time, from one MDI manufacturing company in China (Shandong Jewim Pharmaceutical Co. Ltd.).

33. There are also two MDI manufacturing companies in Pakistan. One is a joint venture between a multi-national company (GlaxoSmithKline) and a local company (with 21 per cent ownership), which started production of MDIs in 1983; the other company (Zafa Pharmaceutical), established since 1973, started production of CFC-MDIs in 2005. Production figures are presented in the table below:

Ownership	2003		2004		2005	
	MDIs	CFC tonnes	MDIs	CFC tonnes	MDIs	CFC tonnes
Joint venture	2,957,682	59.92	2,922,143	59.13	4,139,209	83.81
Nationally owned					95,197	1.97
Total	2,957,682	59.92	2,922,143	59.13	4,234,406	85.77

Turkey

34. Preliminary information available at the Secretariat indicates that CFC-based MDIs have been produced in Turkey. However, in a recent report,[25] the Government of Turkey indicated that there have been no requests submitted by companies for production of MDIs since 2005.

[22] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Mexico.
[23] Submitted for consideration by the Executive Committee at its 41st Meeting (UNEP/OzL.Pro/ExCom/41/75).
[24] Based on the information contained in the questionnaire on the MDI sector submitted by the Government of Pakistan.
[25]-based on the information contained in the questionnaire on the MDI sector submitted by the Government of Turkey.