MONTREAL PROTOCOL

ON SUBSTANCES THAT DEPLETE

THE OZONE LAYER

UNEP

Technology and Economic Assessment Panel

ASSESSMENT OF THE FUNDING REQUIREMENT FOR THE REPLENISHMENT OF THE MULTILATERAL FUND FOR THE PERIOD 2000-2002

April 1999 Report

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April 1999 TEAP Replenishment Task Force Report

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Montreal Protocol
On Substances that Deplete the Ozone Layer

UNEP Technology and Economic Assessment Panel

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Table of Contents Page

Executive Summary

E1. TEAP Mandate

E1.1 Decision X/13

The Tenth Meeting of the Parties made a detailed request to TEAP to prepare a replenishment report and present it to the Nineteenth Open-Ended Working Group to enable the Parties to decide at their Eleventh Meeting on the appropriate level of the 2000-2002 replenishment of the Multilateral Fund (Decision X/13).

E2. TEAP Response

E2.1 Replenishment Task Force

The TEAP constituted a Task Force of six of its members from Australia, China, Mauritius, The Netherlands, United Kingdom and Venezuela to prepare the report.

E2.2 Consultations

The Task Force carried out consultations with a wide range of financial and technical experts and stakeholders. Personal interviews were conducted during the 10th Meeting of the Parties held in Cairo and also in other Montreal Protocol working meetings. In addition, consultations were held with the members of the Executive Committee of the Multilateral Fund, the Secretariat of the Multilateral Fund, the Ozone Secretariat and the Implementing Agencies. A questionnaire was dispatched to all Parties, to members of the Ad-hoc Working Group on the 2000-2002 Replenishment (as appointed by the 10th Meeting of the Parties) and to the 1998 and 1999 Executive Committee members. Twenty-one country responses to the questionnaire were received.

The Task Force, in consultation with TEAP, designated a small panel of reviewers comprising two past Chairmen of the Executive Committee from Costa Rica and United Kingdom, respectively, and the Multilateral Fund and Ozone Secretariats. The draft report was reviewed for consistency and for accuracy of data and information jointly by the members of the Task Force and the reviewers during a meeting in Maastricht, Netherlands, 6-7 April. The final review and completion of the document was subsequently carried out by the TEAP during its meeting on 7-11 April 1999.

E2.3 Experience from the 1997-1999 Replenishment

Data

The replenishment study conducted in 1996 used CFC consumption data submitted by Article 5(1) Parties to the Ozone Secretariat for the years 1992-1995. In cases where data for 1995 were not available, they were extrapolated. The data were applied in a model with certain growth assumptions for the period 1995-1999. The replenishment calculation in 1996 had a significant degree of uncertainty as a result of the extrapolations of unreported data, errors in reported data and growth assumptions based on these data.

Allocation

The 1996 estimate of the funding requirement for the replenishment for CFC investment projects in the consumption sector amounted to about US$ 250 million; this included an amount of US$ 40-60 million for "maintaining momentum". Inevitably, part of the replenishment has been allocated differently than was projected in the 1996 replenishment study. This is due (i) to approvals for methyl bromide projects, which were not anticipated; and (ii) the funding requirement for production closure projects in 1997-1999 has been lower than expected. However, the monetary value of approvals for CFC investment projects in the consumption sector were almost the same as was estimated in the 1996 study.

The 1996 study estimated 140,000 ODP tonnes for CFC consumption in 1997. Data submitted to the Ozone Secretariat subsequently showed that the reported CFC consumption level in 1997 was lower than expected at 126,000 ODP tonnes. This difference was not due to the implementation of a higher level of project approvals than was recommended in 1996; rather, it was the result of lower than expected growth rates. As a result, the Multilateral Fund approved projects will phase out several thousand ODP tonnes more than the minimum required for compliance with the Annex A, Group I freeze and subsequent reduction steps. This implies that many Article 5(1) Parties can be expected to meet the freeze and also make substantial progress towards compliance with the 50% reduction in CFC consumption required for the year 2005 by implementing the projects approved during 1997-1999.

E3. Methodology

E3.1 Cost Elements

This report provides estimates of the funding requirements for the major cost components of the 2000-2002 replenishment of the Multilateral Fund as follows:

- Investment projects to reduce consumption of CFCs, halons, carbon tetrachloride (CTC), 1,1,1 trichloroethane (TCA), and methyl bromide;
- Investment projects to reduce production of the substances discussed above, particularly CFCs and halons;
- Supporting activities such as an information clearing-house and information exchange, institutional strengthening, training, refrigerant management plans (RMPs), halon management plans (HMPs), technical assistance, and country programme preparation;
- Administrative costs of the Implementing Agencies; and
- Operating costs of the Secretariat and Executive Committee of the Multilateral Fund.

These five cost components were assessed individually as follows:

Investment Projects for the Consumption Sector: An improved version of the spreadsheet model that was used in the 1996 replenishment study was applied to each of the controlled substances analysed in this report, with the exception of MDI phaseout costs as they cannot be estimated with sufficient accuracy at this time;

Investment Projects in the Production Sector: Estimates were based on the costs for projects already agreed with China for Halons and CFCs, including a modest additional allowance for further such agreements during the 2000-2005 replenishment period;

Supporting Activities: Submissions for these activities which support investment projects in phasing out ODS production and consumption were received by the Replenishment Task Force; they are based on the three-year business plans of the Implementing Agencies;

Administrative Costs of the Implementing Agencies: An average charge of 12 % on all project approvals was used to estimate this cost component; and

Operating Costs of the Secretariat and Executive Committee of the Multilateral Fund: These costs were estimated on the basis of planned expenditure on current operations, including the recent initiative on monitoring and evaluation.

E3.2 Base Case

To determine the funding requirement for the 2000-2002 period, the Replenishment Task Force used best estimates for the model parameters (e.g., implementation lags, cost-effectiveness factors, etc.) and estimated allowances for those cost elements that are not directly related to investment projects in the consumption sector. This set of assumptions has been designated as the "*Base Case for the 2000-2002 Replenishment*".

In estimating project approvals for Investment Projects in the Consumption Sector, the Base Case was constructed as follows:

- Investment projects approvals are those compiled by the Multilateral Fund Secretariat for the period 1991-1998 plus those listed in the Consolidated 1999 Business Plans of the Implementing Agencies;
- Implementation lags were determined by the time required for ODS reductions to be realised, i.e., a 1 to 5 year time lag. The time pattern for these implementation lags were obtained from data held by the Multilateral Fund Secretariat;
- Cost-effectiveness figures are derived from the Multilateral Fund Secretariat's database; they also take into consideration the higher costs associated with projects that address SMEs and Low Volume Consuming Countries (LVCs);
- Net growth percentages are limited to a maximum of 8-10 % per year for those years prior to the 1 July 1999 freeze;
- Compliance with reductions in consumption for CFCs after the year 1999;
- Extrapolation of consumption trends in the 1992-1997 period for CTC, TCA and methyl bromide until a freeze or a phase-down is mandated by the Protocol;
- Effective implementation of the Chinese halon sector phaseout strategy; and
- No reductions in ODS consumption due to domestic policies.

Regarding the relative prices of CFCs and alternative substances, there is no evidence of supply prices rising sufficiently, either in the short or longer run, to induce a market-driven switch to alternatives. These market conditions are likely to continue in the absence of policy intervention to create an excess demand for CFCs relative to those of alternatives. In the absence of a sufficient change in relative prices, policy intervention to increase the supply and effectiveness of "supporting activities", i.e., non-investment projects, could be used to secure reductions in CFC consumption and production through regulatory controls and market forces.

For Investment Projects in the Production Sector, the existing agreements with China provided the basis for the estimates. For Supporting Activities, Administrative Costs and Operating Costs of the Secretariat and the Executive Committee of the Multilateral Fund, the current guidelines issued by the Executive Committee and information provided by the Implementing Agencies facilitate the use of direct estimating procedures.

E3.3 Sensitivity Analysis

The impacts on the Base Case for changes in the values of key parameters for (i) cost-effectiveness factors, (ii) implementation lags and (iii) reductions in

consumption due to effective domestic policies are reported in the sensitivity analysis section of this report.

E4. Key Findings

E4.1 The Base Case: Funding Requirement for the 2000 – 2002 Replenishment

The funding requirement for the Base Case, i.e., providing the minimum funding requirement for the 2000-2002 replenishment to enable the Article 5(1) Parties to comply with the Montreal Protocol, is ***US$ 306.3 million***.

E4.2 Advancing Funding to the 2000 – 2002 Replenishment Period

Looking ahead to the next three replenishment periods, it is estimated that the funding requirements for the Article 5(1) Parties to maintain compliance with the Protocol are as follows (in rounded figures):

2000 – 2002	US$ 300 million
2003 – 2005	US$ 870 million
2006 – 2008	US$ 330 million
	US$ 1,500 million

These estimates of funding requirements are based on the current cost-effectiveness thresholds, the results of calculations regarding investment projects in the production and consumption sectors, the estimated costs of implementing supporting activities through non-investment projects and the operating costs of the Implementing Agencies and the Secretariat and Executive Committee of the Multilateral Fund, as applied in the Base Case study described above for the replenishment period 2000-2002.

The estimates reveal a sharp increase in the funding requirements for the 2003-2005 replenishment period following the comparatively low estimate for 2000-2002 replenishment period which could give rise to inefficiencies both in implementation and in funding. These prospective inefficiencies could be avoided by reducing the disparity in these replenishment estimates with a view to fully utilising existing implementation capacity that is needed to maintain the momentum of the phaseout in the Article 5(1) countries. This approach would help to level the financial contributions required from the donor countries and help to sustain cost effective programming and implementation on the part of the Implementing Agencies, including their commitment to enhance the effectiveness of domestic policies in progressing ODS phaseouts in Article 5(1) countries. If the Parties decided to bring forward an additional US$ 200 million to the 2000-2002 replenishment, they could advance the reduction of 16,500 ODP tonnes (assuming an average cost-effectiveness of US$ 11/kg) to the

benefit of the ozone layer. The Parties may wish to consider the allocation of resources to the triennia 2000-2002, 2003-2005, and 2005-2008 having regard to these potential benefits.

In conclusion, the TEAP proposes that US$ 200 million (including administrative costs) could be advanced to the 2000 – 2002 replenishment period. The proposed advance of US$ 200 million, from the US$ 870 million estimated for the 2003-2005 replenishment, would result in a funding requirement of approximately US$ 500 million for the 2000-2002 replenishment of the Multilateral Fund. The estimated allocations to the major cost components for this "*Advanced Funding Case for the 2000-2002 Replenishment"* are presented in the table below.

Replenishment Cost Components:	**US$ million**
CFC Consumption Sector Projects	39.5
CTC, TCA, Halons Consumption Sector Projects	37.3
MB Consumption Sector Projects	69.1
Investments: Production Sector	80.0
Maintaining Momentum (CFC, CTC, and Halon Consumption Sectors)	178.6
Supporting Activities	41.1
Administrative costs of Implementing Agencies	51.2
MLF Secretariat/ Executive Committee Operational Costs	9.5
Total (rounded to US$ 500 million)	**506.3**

E4.3 Results of the Sensitivity Analyses

The estimates of the funding requirements for triennial replenishments are sensitive to changes in assumptions regarding (i) the effectiveness of domestic policies; (ii) implementation lags; (iii) cost-effectiveness; and (iv) data inaccuracies. E.g., each per cent reduction in CFC consumption per year would result in an approximate 8% reduction in the funding requirement for CFC based projects in the consumption sector over a 6 year period (2000-2005). Further results of a selection of sensitivity analyses are presented in Annex 7.

1. Introduction

1.1 Terms of Reference

Decision X/13 of the Tenth Meeting of the Parties requested the Technology and Economic Assessment Panel (TEAP) to submit a report to the Eleventh Meeting of the Parties (Beijing, December 1999) through the Nineteenth Meeting of the Open-Ended Working Group (Geneva, June 1999), to the Parties in reaching a decision on the level of the 2000-2002 Replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.

1.2 Scope and Coverage

Decision X/13 directs the TEAP to take into account the following factors:

(a) All control measures, and relevant decisions, agreed to by the Parties to the Montreal Protocol, including decisions by the Tenth Meeting of the Parties, in so far as these will necessitate expenditure by the Multilateral Fund during the period 2000-2002;

(b) The need to allocate resources to enable all Article 5 Parties to maintain compliance with the Montreal Protocol;

(c) Agreed rules and guidelines for determining eligibility for funding of investment projects (including the production sector) and non-investment projects;

(d) Approved country programmes;

(e) Financial commitments in 2000-2002 relating to sectoral phaseout projects agreed by the Executive Committee;

(f) Experience to date, including limitations and successes of the phaseout of ozone depleting substances achieved with resources already allocated, as well as the performance of the Multilateral Fund and its Implementing Agencies;

(g) The impact that the controls and country activities are likely to have on the supply and demand for ozone depleting substances, and the effect that this will have on the cost of ozone depleting substances and the resulting incremental cost of investment projects during the period under examination;

(h) Administrative costs of the Implementing Agencies, taking into account paragraph 6 of decision VIII/4, and the cost of financing the secretariat services of the Multilateral Fund, including holding meetings.

In undertaking this task, Decision X/13 directs the Technology and Economic Assessment Panel to consult widely with relevant persons and institutions and other relevant sources of information deemed useful. The Decision also asks the Panel to strive to complete its work in time to enable its report to be distributed to all Parties two months before the nineteenth meeting of the Open-ended Working Group (15-18 June 1999).

The Tenth Meeting of the Parties (Cairo, November 1998), established an ad-hoc Working Group consisting of Article 5(1) countries (China, Cuba, India, Iran (Islamic Rep of), Nigeria, Venezuela and Zimbabwe) and non-Article 5(1) countries (Canada, Germany, Japan, Poland, Switzerland, United Kingdom and the USA) within the framework of a procedure to advance related negotiations. The ad-hoc Working Group will agree a limited set of sensitivity analyses to be submitted to the Technology and Economic Assessment Panel requesting the Panel to carry them out and submit a report to the Secretariat. The Technology and Economic Assessment Panel is requested to provide its response to those requests to the Secretariat for distribution to all Parties as early as possible prior to the nineteenth meeting of the Open-ended Working Group. As requested by the Parties, the Secretariat will convene a meeting of the ad hoc Working Group and the Replenishment Task Force for consultation on the 2000-2002 replenishment immediately prior to the nineteenth meeting of the Open-ended Working Group (13-14 June 1999). Further consultations will be scheduled prior to the Eleventh Meeting of the Parties (30 November-3 December 1999).

1.3 Analytical Methods and Consultative Processes

The TEAP established a Task Force to prepare the report on the 2000-2002 replenishment of the Multilateral Fund, in consultation with the full TEAP membership. The members of the Task Force were **Dr Tom Batchelor** (Australia, co-chair MBTOC), **Dr Lambert Kuijpers** (The Netherlands, co-chair TEAP, co-chair RTOC), **Mr Jose Pons Pons** (Venezuela, co-chair ATOC), **Mr Sateeaved Seebaluck** (Mauritius, Senior Expert), **Dr Robert Van Slooten** (United Kingdom, co-chair EOC) and **Dr Shiqiu Zhang** (China, co-chair EOC).

A review group constituted by **Mr Marco A. Gonzalez-Salazar** (Costa Rica, former chair of the Executive Committee), **Mr David Turner** (United Kingdom, Department for International Development and former chair of the Executive Committee), **Dr Omar El-Arini** (Chief Officer of the Multilateral Fund Secretariat) and **Mr K. M. Sarma** (Executive Secretary of the Ozone

Secretariat UNEP). This group reviewed the drafts for consistency and accuracy of data.

The consultation process included the members of the 1998 and 1999 Executive Committees, the Multilateral Fund Secretariat, the Ozone Secretariat, the Implementing Agencies, members of the ad-hoc Working Group and other national experts from both Article 5(1) and non-Article 5(1) countries. The Task Force sent a questionnaire to the individual members of the 1998 and 1999 Executive Committees and to the Article 5(1) members of the ad-hoc Working Group. The questionnaire requested information on ODS consumption and also on the role and effectiveness of domestic policies. A summary of the responses received are presented in Annex 8 to this document.

Following consultations with the TEAP regarding the analytical approach to be used in preparing the 2000-2002 replenishment report, the Task Force decided to use the same analytical approach that was used for the 1997-1999 replenishment report. This approach uses a spreadsheet model to estimate funding requirements for investment projects in the consumption sector with a high level of transparency. Furthermore, the use of a spreadsheet model facilitates the use of sensitivity analyses to assess the implications for the 2000-2002 funding requirement of specific changes in key assumptions. In contrast, less formal techniques were used for investment projects in the production sector and also for non-investment projects; these included consultations with the National experts, the Implementing Agencies and the Multilateral Fund Secretariat.

1.4 The Structure of the Report on the 2000-2002 Replenishment

The structure of the TEAP report is as follows:

Introduction. *Chapter 1* presents the terms of reference, the setting up of the Task Force and the consultative processes followed in preparing this report.

The Multilateral Fund. *Chapter 2* presents information regarding the establishment of the Multilateral Fund, the previous replenishments of the Multilateral Fund, and a brief account of the contribution of the Multilateral Fund to the efforts of the Article 5(1) countries to comply with the control schedules of the Montreal Protocol. Further information is presented in Annexes 1 and 2 to this report.

Conceptual Framework and Methodology. *Chapter 3* identifies the commitments that the Article 5(1) countries will have to meet if they are to achieve full compliance with the control schedules of the Montreal Protocol during the 2000-2002 replenishment period and beyond. The methodology used to estimate the funding requirement for the 2000-2002 replenishment is

explained; and the use of the model to estimate the funding requirement for investment projects in the consumption sector is explained in Annex 5. For methyl bromide, the methodology used to estimate the funding requirement for methyl bromide and the results obtained are presented in Annex 6.

The Base Case for the 2000-2002 Replenishment. *Chapter 4* presents quantitative estimates of the funding requirement for the implementation of the *Base Case for the 2000-2002 Replenishment* of the Multilateral Fund as defined in Chapter 3 above. It also presents the *Advanced Funding Case for the 2000-2002 Replenishment* which is characterised by a certain amount of advanced funding from the 2003-2005 replenishment period.

Conclusions. *Chapter 5* presents conclusions on the funding requirement for the 2000-2002 replenishment of the Multilateral Fund.

Annex 7 to this report presents sensitivity analyses of the funding requirement for the *Base Case for the 2000-2002 Replenishment*.

1.5 Concluding Remarks

The purpose of this report is to assist the Parties in reaching a decision on the appropriate funding requirement for the 2000-2002 replenishment of the Multilateral Fund. The TEAP prepared this report at the request of the Parties, in accordance with the terms of reference as set out in Decision X/13. The TEAP endeavoured to ensure transparency in consultations, methodology, including estimating procedures, and in reaching conclusions. As required by the Parties to the Montreal Protocol, this report was reviewed and subsequently adopted by consensus of the UNEP Technology and Economic Assessment Panel (TEAP) as established under the Montreal Protocol.

2. The Multilateral Fund

2.1 Key Factors in the Establishment of the Financial Mechanism

The original 1987 Protocol addressed these issues in Article 5, paragraphs 2 and 3, and in Article 10, paragraphs 1 and 2.

Following the adoption of the Montreal Protocol in 1987, science demonstrated that the original control measures would not be sufficient to enable the ozone layer to recover. Having accepted the scientific assessment, the Parties agreed to accelerate the phaseout schedules for chemicals that were already controlled and to extend control measures to newly identified ozone-depleting substances. In these circumstances, the Parties recognised that a formal financial mechanism was required to meet the needs of Parties operating under paragraph 1 of Article 5.

Accordingly, at their First Meeting, (Helsinki, May 1989), the Parties established an Open-Ended Working Group to develop modalities, including an international funding mechanism,.

At their Second Meeting (London, June 1990), the Parties agreed that the needs of the Parties operating under paragraph 1 of Article 5 required co-ordinated and specific actions beyond those already in place.

Therefore, the Parties decided (Decision II/8) to establish an Interim Financial Mechanism to provide financial and technical co-operation, including technology transfer for Parties operating under paragraph 1 of Article 5 of the Montreal Protocol, to enable their compliance with the control measures set out in Article 2. For procedural reasons, the Mechanism was established initially on an interim basis for 1991-1993. The Mechanism provided for a Multilateral Fund that would operate under the authority of the Parties to the Montreal Protocol.

For the 1991-1993 period, the Parties decided to provide US$ 160 million to the Multilateral Fund with the proviso that it would be increased by an additional US$ 80 million once more countries had ratified the Montreal Protocol.

In 1993 and 1996, the Parties decided to replenishment the Multilateral Fund with of US$ 510 and 540 million, respectively (see Annex 1).

Currently, the Fund is in the final year of its third triennium replenishment period. During the 1991-1998 period, the donor countries, i.e., the non-Article 5(1) Parties, paid about 80% of their combined assessed contributions.

2.2 Performance of the Multilateral Fund

Historical data on funds collected, project approvals, money disbursed and implemented projects are presented in Annex 2.

Data

The study conducted in 1996 for the 1997-1999 replenishment used CFC consumption data submitted by the Article 5(1) Parties to the Ozone Secretariat for the years 1992-1995. Where data for 1995 were not available, they were extrapolated by the Task Force. The data were used in a spreadsheet model together with certain assumptions regarding the growth in consumption for the period 1995-1999. Consequently, the 1996 estimates for the 1997-1999 replenishment were subject to a significant degree of uncertainty given the need to use extrapolated data where data had not been unreported, the errors in reported data and the need to estimate CFC consumption growth based on these data.

Allocation

The 1996 estimate of the funding requirement for CFC investment projects in the consumption sector was about US$ 250 million. This estimate included US$ 40-60 million for “maintaining momentum” in the phaseout process. Inevitably, part of the 1997-99 replenishment has not been allocated as was projected in the 1996 replenishment study. This is due to (i) unanticipated approvals of methyl bromide projects; and (ii) the lower than expected funding required for investment projects to close ODS production facilities during 1997-1999. However, the funding required for approvals of CFC investment projects in the consumption sector was very much as was estimated in the 1996 study.

The 1996 study estimated CFC consumption of 140,000 ODP tonnes for 1997. Data subsequently submitted to the Ozone Secretariat showed that reported CFC consumption for 1997 was only 126,000 ODP tonnes. This decline in CFC consumption was not due to the implementation of a higher level of project approvals than expected. In fact, it was due to lower than expected growth rates in CFC consumption. As a result, the Multilateral Fund approved the phase out of several thousand ODP tonnes in excess of the minimum required for compliance after 1999. This implies that many Article 5(1) Parties should be able to meet the freeze and also to make substantial progress towards compliance with the 50% reduction step in CFC consumption required for the year 2005 by implementing the projects approved during 1997-1999.

2.3 ODS Consumption Levels

The ODS consumption levels for the years 1994, 1995, 1996 and 1997 are given for all Article 5(1) countries that have requested support from the Multilateral Fund for the reduction and subsequent phaseout of all controlled substances.

The 1994 and 1995 data presented are as reported to the Ozone Secretariat /UNEP98, UNEP99/. The Task Force has not attempted to adjust for unreported data regarding these years. Unreported data for 1996 and 1997 /UNEP99/ have been estimated by applying extrapolation techniques to the consumption patterns of earlier years, particularly for Annex B, and C substances. Consumption of Annex E substances is as reported to the Ozone Secretariat /UNEP99/.

Results are given in Table 2.1. It shows that the consumption of ODS (Annex A and Annex B substances) in all Article 5(1) countries increased, overall, from 110,895 ODP tonnes in 1986, to 212,298 ODP tonnes in 1995, after which total Article 5(1) consumption began to decline. Between 1995 and 1996, the consumption level decreased by approximately 31,000 ODP tonnes, largely due to different consumption growth patterns and also due to the implementation of Multilateral Fund projects. In the changing growth patterns, economic circumstances may have played a significant role.

Table 2.1 *ODS consumption levels (ODP tonnes) for all Article 5(1) countries for the years 1986, 1994, 1995, 1996 and 1997 for CFCs, halons, Annex B, C and E substances /UNEP98, UNEP99/. Virtually all data for 1996 were available. A few countries had not reported 1997 data by end March 1999; in these case, data were extrapolated from the 1995-1996 consumption pattern.*

Year	**1986**	**1994**	**1995**	**1996**	**1997**
CFCs	112,329	163,828	159,254	128,540	126,287
Halons	38,329	29,148	40,667	38,972	39,250
Annex B, TCA	4	2,710	2,167	1,481	1,150
Annex B, other	45	15,673	10,210	12,191	11,250
Sub-total	150,707	211,359	212,298	181,184	177,937
Annex C		3,016	3,906	3,741	3,650
Annex E		7,062	7,563	7,651	8,164
Total		221,297	223,767	192,576	189,751

Note: Consumption data reported by the Republic of Korea and by Singapore have not been taken into account.

For the Article 5(1) countries, the total consumption of all controlled substances also peaked in 1994 and 1995 (223,767 ODP tonnes in 1995) after which it began to decline. Reported consumption in 1996 was approximately 30,000 ODP tonnes lower than in 1994 and 1995. The total consumption of all controlled substances in 1997 was only slightly lower than in 1996. As some extrapolated data were used, the 1997 data is subject to uncertainty of about 2% for CFCs and about 5% for other substances.

Compared with 1996, the 1997 consumption data show small decreases in the consumption of CFCs (-2%); a substantial reduction in methyl chloroform (-22%); an 8% reduction in CTC consumption; and a small reduction in Annex C substances (-2%), which might be due to unreported data. On the other hand, halon consumption increased moderately (+4%); the largest increase can be noted for methyl bromide (+7%).

Following a sharp decrease in the CFC consumption between 1995 and 1996, largely due to decreases in two to three large consuming countries, the data show only a small decrease for the year 1997 even though project implementation continued in the large CFC consuming Article 5(1) countries. This unexpected result may have been due to CFC stockpiling by companies in Article 5(1) countries; either to increase their respective freeze value (the average of 1995, 1996 and 1997 CFC consumption), and/or as a precaution against supply disruption following the CFC phaseout in non-Article 5(1) countries.

Methyl bromide consumption shows different patterns. Methyl bromide (MB) is used by Article 5(1) Parties mainly as a pre-plant soil fumigant for the production of certain high value crops, such as tobacco, cut flowers, strawberries, bananas, melons, tomatoes and peppers. Its use has been mainly for export crops /MBC94, MBC98/, but recently the use of methyl bromide has increased significantly for the production of a number of domestic crops. The other major controlled use of methyl bromide by Article 5(1) countries is for fumigating stored durable commodities to prevent pest-infestation.

The official 1997 data for methyl bromide consumption by Article 5(1) Parties, as reported by the Article 5(1) Parties to UNEP, is approximately 8,100 ODP tonnes. However, the Methyl Bromide Technical Options Committee (MBTOC) has estimated /MBC98/ that Article 5(1) Parties consumed between 9,210-10,500 ODP tonnes of methyl bromide in 1997 /MBC98/. Therefore, MBTOC estimates that Article 5(1) consumption is 23%-26% of global methyl bromide consumption /MBC98/. MBTOC's best point estimate is 10,394 ODP-tonnes for methyl bromide consumption by the Article 5(1) countries in 1997. It should be noted that this estimate may include some unidentified Quarantine and Pre-shipment (QPS) uses. For this study, the official 1997 reported data have been used.

2.4 Concluding Remarks

In 1995, the Executive Committee has established that projects can be submitted for approval even if, at any one meeting, the call on funds may be greater than the funds available. This procedure recognises the need to ensure that the highest environmental benefits, as well as equity, are achieved in allocating the resources of the Multilateral Fund. In addition, the Executive Committee has made special provision for Article 5(1) Parties that consume low volumes of ozone depleting substances (LVCs).

As of November 1998, the Executive Committee had approved US$ 654.9 million for a large number of projects leaving US$ 194 million as yet unallocated. These projects will eventually eliminate 91,805 ODP tonnes of CFCs as well as 22,520 ODP tonnes of other controlled substances, in 82 Article 5(1) countries. According to data submitted by the Implementing Agencies /ExC99/, 60% of all approved projects through 1998, had been fully implemented by the end of 1998. Further information is presented in Annex 2 of this report.

3. Conceptual Framework and Methodology

3.1 Introduction

The objectives of the Montreal Protocol are being realised through the progressive phaseout of ozone-depleting substances (ODS) as specified in the control schedules approved by the Meetings of the Parties.

This chapter presents a consolidated list of all those control schedules as they apply to the Article 5(1) countries. It then goes on to address compliance with these control schedules.

Subsequently, the objectives and methodology used to estimate the funding requirement for the 2000-2002 replenishment of the Multilateral Fund are presented. The estimating procedures build on and extend those used in the preparation of previous replenishment reports. The factors that most significantly affect the empirical results are identified and discussed, including the underlying assumptions, analytical methods, and consultative procedures that were used to prepare the *Base Case for the 2000-2002 Replenishment.* Sensitivity analyses, based on the imposed changes in the starting assumptions, were used to assess changes in the estimated funding requirement due to of specific quantitative changes in key variables and/or parameters of the spreadsheet model (see Annex 6).

3.2 Control Schedules for Article 5(1) Countries

A consolidated list of the Montreal Protocol control schedules, as they apply to the Article 5(1) countries for all controlled substances, is provided in Table A3.1 (Annex 3). The list includes production and consumption of the following controlled substances: Annex A, Groups I (CFCs) and II (halons); Annex B, Groups I (other fully halogenated CFCs), II (Carbon Tetrachloride) and III (1,1,1 TCA, or methyl chloroform); Annex C, Groups I (HCFCs) and II (HBFCs); and Annex E (Methyl Bromide).

Further information on compliance with control schedules can be found in Annex 3.

3.3 The Base Case for the 2000-2002 Replenishment

The Base Case for the 2000-2002 Replenishment is the base run of the estimating procedures adopted by the Task Force. It is based on the best available estimates for the key parameters of the consumption sector model and the best endeavours of the Task Force to quantify other key factors that could not be estimated by formal statistical techniques. All sensitivity analyses

are based on specific variations in key parameters of the consumption sector spreadsheet model and/or specific changes in the assumed values of key variables that were obtained through consultations with appropriate experts.

As in the 1997-99 replenishment report, the Task Force assessed two different time horizons in estimating the funding requirement for the 2000-2002 replenishment. The first time horizon addresses only those projects for which project approvals would be necessary during 2000-2002. Implementation of these projects would allow compliance with the freeze and reduction steps for all Annex A, Annex B and Annex E substances during the period 2002-2005. The second time horizon addresses project approvals that would be required during the 2003-2005 replenishment period to assist compliance with the subsequent control measures on all Annex A, B and E substances. This approach was taken to make it possible to capture the implications of effects of time lags between project approvals and implementation.

If the 2000-2002 replenishment were to be restricted to project approvals that are required to achieve strict compliance with the freeze and the first reduction steps of all controlled substances (the first time horizon), then the funding requirement for the 2000-2002 replenishment period would be quite low. Similarly, any financial carry-over to assist compliance with the future reduction steps, e.g., during the 2005-2007 replenishment period, would be even more limited. Nevertheless, it is important to note that the terms of reference, as specified by the Parties, does not commission the TEAP to address the funding requirement for these reduction steps at present. However, it is already clear that compliance with the future reduction steps for CFCs, assuming current cost-effectiveness values for CFCs (see Annex 5), could lead to a very sharp rise in the funding requirement for the 2003-2005 replenishment.

These circumstances would challenge the capacity of the Article 5(1) countries, the Multilateral Fund and its Implementing Agencies to generate sufficient project approvals to meet the next reduction steps of the Montreal Protocol; and implementation time lags could be expected to lengthen. If such a sharp fluctuation in the funding requirement for the 2003-2005 replenishment were to be realised, then it could be expected that either the cost-effectiveness of the implementation process would deteriorate significantly, or non-compliance with the control schedules would increase significantly..

Having recognised these potential difficulties, the Task Force designed the Advanced Funding Case to extend its coverage to the implementation of projects beyond 2005. This was done to address the implications of the 2000-2002 replenishment for compliance with the reduction steps in CFC consumption that will be required during the period 2005-2007. If the inefficiencies identified above can be controlled by appropriately smoothing of

the funding profile over the phaseout process as a whole, i.e., over the next three triennia of the replenishment process, then the Parties will be in a much better position to minimise the future total economic cost of compliance with the control schedules of the Montreal Protocol.

Therefore, in specifying the *Advanced Funding Case for the 2000-2002 Replenishment*, the Task Force made the explicit assumption that projects would be approved during 2000-2002 to yield a linear reduction from freeze levels to the next reduction steps, respectively. This was also done for those reduction steps that are required for compliance by 2005 and beyond.

Under the *Advanced Funding Case*, more investment projects would be approved during 2000-2002 than would be the case if the sole objectives were to be the freeze and reduction steps during 2002-2005. However, lower levels of project approvals would be required for the replenishment period 2003-2005 and thereafter. The quantitative estimates of the funding required to implement the *Advanced Funding Case for the 2000-2002 Replenishment*, as specified above, are presented in Chapter 4 of this report.

3.4 Key Factors in the Methodology Applied

The capacity of an Article 5(1) country to comply with the control schedules of the Montreal Protocol is influenced by the following key factors:

- the implementation of projects during 2000-2002 that were approved prior to 2000;
- the estimated ODS consumption during the period 1997/1998-1999/2000;
- the distribution of ODS by application sector, and
- the effectiveness of domestic policies in reducing ODS consumption and production.

3.5 Country Categories

For this replenishment study, the Article 5(1) countries have been allocated to five Categories, according to their average CFC consumption level for the years 1995, 1996 and 1997 (in fact, their "freeze" levels of consumption) :

Category 1:	*> 5,200*	*ODP tonnes;*
Category 2:	*1,000 – 5,200*	*ODP tonnes;*
Category 3:	*360 – 1,000*	*ODP tonnes;*
Category 4:	*100 - 360*	*ODP tonnes;*
Category 5:	*< 100*	*ODP tonnes.*

For halons, different ranges were used, i.e. > 1000, 400-1000, 50-400 and < 50 ODP tonnes, which leads to a subdivision in 4 Categories:

Category A:	*> 1000*	*ODP tonnes;*
Category B:	*400-1000*	*ODP tonnes;*
Category C:	*50-400*	*ODP tonnes;*
Category D:	*< 50*	*ODP tonnes.*

Countries in the Categories A, B and C can (with one or two exceptions) be found in Category 1 and Category 2 given above for CFCs. The Categories 3, 4 and 5 (CFCs) are essentially countries with a halon consumption < 50 ODP tonnes. Therefore, for the purpose of calculating halon consumption levels, countries belonging to Categories 3, 4 and 5 can be grouped together to form Category D. This allows the same mathematical approach to be used for CFCs and halons.

The situation is different for methyl bromide where there is no direct relationship between countries that are large CFC consumers and those that are large MeBr consumers. Countries were subdivided in two Country Categories with the following consumption levels:

Category M1:	*> 100*	*ODP tonnes;*
Category M2:	*< 100*	*ODP tonnes.*

3.6 Modelling the Funding Requirement

These key factors are embedded in the estimation procedure that was developed and programmed as a spreadsheet model by the Task Force. In the model, each country in Categories 1 and 2 is modelled as a separate spreadsheet programme to reflect the individual circumstances of each country; whereas, the individual countries in Categories 3, 4 and 5, respectively, are consolidated into a single spreadsheet for each Category. The same approach was used for CFCs, halons, CTC and TCA (methyl chloroform) in so far that separate spreadsheet programmes, however similar in type, could be used. In the case of halons, four Categories (A, B, C and D) were defined where Category D actually contains the countries in Categories 3, 4 and 5 in the case of CFCs; the same approach as for CFCs can be used for these four Categories.

In the case of CTC and TCA, for which spreadsheet programmes have also been used, there is significant uncertainty in the development of the consumption patterns, given the data known for the years 1994-1997. Furthermore, not many projects have been approved which would make a spreadsheet analysis nugatory. In summary, for these substances, approximate estimates will yield comparable results.

In the case of methyl bromide, a spreadsheet analysis can be easily made given that the analysis does not have to take into account possible reductions due to project implementation. The important parameter in this case is the consumption growth rate expected up to the freeze year.

In summary, spreadsheet models have been used for all substances, taking into account their different control schedules. They have proven to be most valuable for the Annex A, Group I and II substances and for Annex E (methyl bromide).

Each country has a specific sector distribution of ODS (CFC) use. These country specific data are available for all countries in Categories 1 and 2 from the Country Programmes. However, these data are not available for all countries in Categories 3, 4 and 5 (although significant progress has been made in the drafting of country programmes since the year 1996 when the last replenishment study was carried out). To overcome this data problem, the Task Force grouped the available data and calculated their weighted average values for use in the spreadsheet models for the Categories 3, 4 and 5, respectively.

The implementation of projects in specific sectors can change a country's ODS sector distribution. The model takes these dynamic changes into account by recalculating this parameter as it identifies the appropriate mix of future projects.

An explanation for how the programme deals with CFCs is given in Annex 5. The same type of procedure applies to other controlled substances, although with different freeze years, and different reduction schedules.

In the case of methyl bromide the situation is completely different from that of CFC, particularly given the progress made with respect to compliance with control schedules for CFCs compared with methyl bromide. The freeze year will be 2002. However, consumption for the year 2002 will not be known until after the completion of the replenishment study for the period 2003-2005). An explanation of the modelling approach used and the results for methyl bromide are presented in Annex 6.

A spreadsheet model was developed to provide estimates of the impact of certain separate and joint factors on methyl bromide consumption and MF funding levels. Annex 6 provides the details of this analysis.

The spreadsheet model addressed factors, relative to the Base Case, which affect methyl bromide consumption and the costs of eliminating sufficient methyl bromide to meet the freeze, such as:

- Recent trends in consumption for each Party that has reported data to the Ozone Secretariat;
- The methyl bromide control schedule of the Montreal Protocol;
- The number of Parties that have ratified the Copenhagen Amendment and potential number that are likely to sign in the next few years;
- The influence of MF projects commissioned prior to the next replenishment period;
- The time-scale for implementing MF projects;
- The cost-effectiveness of investment and other types of projects; and
- The potential reduction of MB through domestic policies.

4. The Base Case for the 2000-2002 Replenishment

4.1 The Base Case for the 2000-2002 Replenishment

The *Base Case for the 2000-2002 Replenishment* represents the Task Force's central estimate of the funding requirement for the 2000-2002 replenishment. The Base Case goes beyond enabling compliance with the freeze requirements in 2000, 2002 and 2003, as well as the reduction steps during 2002-2004, to contribute towards compliance with the subsequent control measures for all Annex A, B and E substances. It is based on the best estimates of the model parameters and consultations with the Implementing Agencies, the Multilateral Fund Secretariat, members of the Executive Committee and national experts.

4.2 Investment Projects in the Consumption Sector

Table 4.1 *ODS consumption as reported for all Article 5(1) countries (ODP tonnes x 1000) for the years 1994-1997 and as calculated for later years for the Base Case for the 2000-2002 Replenishment; it concerns the controlled substances CFCs, halons, CTC, TCA and Methyl Bromide (values in italic are values already reported by Article 5(1) countries, compare Table 2.1, where the Annex C substance consumption is also given)*

Year	CFCs	Halons	CTC	TCA	MeBr	Total
1994	***163.83***	***29.15***	***15.67***	***2.71***	***7.06***	***218.42***
1995	***159.25***	***40.67***	***10.21***	***2.17***	***7.56***	***219.86***
1996	***128.54***	***38.97***	***12.19***	***1.48***	***7.65***	***188.83***
1997	***126.27***	***39.25***	***11.25***	***1.15***	***8.16***	***186.08***
1998	111.85	27.1	11.2	1.10	7.95	159.20
1999	95.14	21.7	10.7	1.05	7.99	136.58
2000	80.69	16.2	10.1	1.00	8.01	116.00
2001	68.79	14.8	9.9	0.95	8.02	102.46
2002	64.05	11.8	7.7	0.90	8.02	92.47
2003	62.03	9.2	5.6	0.85	7.49	85.17
2004	60.51	9.1	3.6	0.80	6.95	80.96
2005	58.59	8.8	1.6	0.75	6.42	76.16
2006	41.36	2.2	1.3	0.67	5.78	51.31
2007	20.57	1.5	1.0	0.60	5.14	28.81

Note: The CFC consumption calculated in the 1996 Replenishment study for the years 1997, 1998, 1999 and 2000 amounted to 143.1, 140.0, 140.8 and 129.7 ODP tonnes, values significantly higher than the values presented here. This implies that consumption growth in the countries during 1995-1997 was much lower than expected in the 1996 study, which means that the determination of the replenishment for the period 1997-1999 resulted in a value higher than strictly necessary. However, this means that the funding that will be strictly required for addressing CFC consumption in the replenishment period 2000-2002 will be relatively low.

Note: The values presented for the halon consumption take into account the values presented in the halon sector phaseout strategy for China (as given in Executive Committee Decision 23/11); values presented for the years 1994-1997 are the halon consumption values reported to UNEP, of which the Chinese consumption forms the major percentage (almost 90% of the total consumption in the years 1996/1997).

The estimated funding requirement for consumption sector investment projects was calculated using the spreadsheet model described in Annex 5. These estimates are based on:

- the control schedules presented in section 3.2 and in Annex 3;
- the consumption data submitted to UNEP (particularly for 1994-1997) /UNEP98, UNEP99/;
- the investment project approvals presented in Table A2.1;
- the investment project approvals for 1999 presented in Table A2.2;
- the implementation lags presented in Table A5.1;
- the "net growth percentages" presented in Table A5.2.
- the average cost-effectiveness figures presented Table A5.3.

This has been done separately for each of the countries in Categories 1 and 2. Countries in Categories 3, 4 and 5 were grouped together. The Base Case global Article 5(1) consumption calculated for Annex A and B substances is presented in Table 4.1.

The estimated funding requirement for the approval of projects is based on the need to meet:

(i) the reduction steps Annex A, Group I during 2002-2004;
(ii) the phasedown for Annex A, Group I after 2004 (50/85% reduction in 2005/2007)
(iii) the freeze for Annex A, Group II by 2002;
(iv) subsequent reduction steps for Annex A, Group II after 2002;
(iv) the freeze for Annex B, Group III by 2003, and subsequent reduction steps;
(v) the phasedown for Annex B, Group II substances (CTC 85% by 2005);
(vi) the freeze for Annex E substances (methyl bromide) by 2002 and subsequent reductions.

Table 4.2 *Approvals required for the Base Case (in US$ million) in order to meet the different control schedules by the separate Categories of countries (see Table A3.1); first estimates for the approvals during the replenishment period 2003-2005 are presented as well*

Countries	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Total
CFCs						
2000-2002	**0.0**	**35.1**	**0**	**0**	**4.4**	**39.5**
2003-2005	316.0	178.4	62.5	21.8	13.1	591.8
Halons						
2000-2002	**1.3**	**0.4**				**1.7**
2003-2005	1.5	1.5				3.0
CTC						
2000-2002	**21.0**	**0**				**21.0**
2003-2005	12.7	0				12.7
TCA						
2000-2002	**0.5**	**0**				**0.5**
2003-2005	8.9	0				8.9
MeBr						
2000-2002	**69.1**					**69.1**
			2000-2002 Grand Total			**131.8**

Note: In the case of halons calculations have been made for four Categories which can be summarised and split into two numbers, one for the Category 1, the others for Categories 2, 3, 4 and 5. The number in Category 1 does not include the funding for the halon sector phaseout program in China

Note: In the case of CTC and TCA, calculations have been made for two Categories only, i.e., Category 1 and the total of Categories 2, 3, 4 and 5

Note: The cost-effectiveness factor for CTC projects is estimated at a level of US$ 3.5/kg.

These estimates have been calculated for the periods 2000-2002 and, assuming similar cost-effectiveness factors (see Annex 5), also for the period 2003-2005. The figures are shown in Table 4.2. Where it concerns the period 2003-2005, more elaborated considerations are presented in sections 4.5.1 and 4.5.2 below.

The total estimated funding requirement for the CFC consumption sector investment projects for the period 2000-2002 is **US$ 39.5 million**. This estimate is obtained from the spreadsheet model calculations which indicate that these investment projects will phase out approximately 4,750 ODP tonnes of CFCs over the period 2002- 2004/2005.

The estimated total funding requirement for investment projects in the consumption sector to phaseout CFCs, halons, CTC, TCA and methyl bromide during the period 2000-2002 is **US$ 131.8 million.** The largest amount of the funding required is for methyl bromide investment projects (US$ 69.1 million

or 52% of the total). Funding is also required to reduce CTC consumption for which firm guidelines will be required; a cost-effectiveness factor of US$ 3.5/kg has been used in the present study.

***Base Case**: Estimated investment project approvals for the consumption sector*

Countries	**Category 1**	**Categories 2-5**		**Total**
2000-2002 Annex A/B	**22.8**	**39.9**		**62.7**
Countries	**Freeze**		**Reduction**	
2000-2002 Annex E	**57.1**		**12.0**	**69.1**
Grand Total				**131.8**

4.3 Investment Projects in the Halon Production Sector

As presented in Annex 4, ExCom Decision 23/11 on the halon sector phaseout strategy in China provides funding for the strategy on an annual basis, dependent on final approval by the Executive Committee during the three year periods through 2009. For the period 2000-2002, **US$ 14.1 million** is required with a further US$ 14.4 million for the period 2003-2005 (see the table in Annex 4). These agreed costs have not been included in the data presented in Table 4.2 above.

4.4 Investment Projects in the CFC Production Sector

Decision 19/36 of the Executive Committee states that, pending the completion of production sector plans, the focus should be on closure projects. Decision 19/36 also requires, in general, that the scrap value of decommissioned ODS plant should be used to offset the cost of dismantling the plant.

The Government of China has agreed (March 1999) to a sector plan for the phaseout of CFC production at a total cost of US$ 150 million with phased payments of US$ 20 million in 1999 followed by 10 annual payments of US$ 13 million in current prices. On this basis, the funding required for the 2000-2002 replenishment is US$ 39 million.

Negotiations are continuing between the Executive Committee of the Multilateral Fund and the Government of India with a view to agreeing the funding required to phase out CFC production in India. The TEAP Replenishment Task Force has consulted with members of the Executive Committee and with selected officials of the Government of India regarding the nature and cost of the projects that are currently under negotiation.

As stated above, consultations with the Implementing Agencies and the Multilateral Fund Secretariat indicated that several investment projects are under discussion with national authorities. It is not possible, at this time, to identify specific projects or the funding requirement. Table 4.3 summarises the position as of March 1999.

Table 4.3 *2000-20002 Replenishment: Funding Requirement for CFC Production Phaseouts in Article 5(1) Countries (as of March 1999)*

Article 5(1) Country	***1997 Annex A-Group I CFC Production (ODP tonnes)*** *(Ozone Secretariat Data)*	***Funding Required (period 2000-2002)***
China	50,324	US$ 39.0
Argentina	3,200	
Brazil	9,362	
India	23,658	
Korea, D.P.R.	242 (1996 data)	
Mexico	8,431	
Romania	0.0 (1996 data)	
Venezuela	5,663	
Total	109,877	US$ 39.0

In these circumstances, the Task Force decided that a provisional funding requirement should be put forward given that further investment project approvals in the production sector are possible during the 2000-2002 replenishment period. On this basis, the provisional funding requirement for the 2000-2002 replenishment period is **US$ 80 million**. Once further information becomes available, the TEAP Task Force will review the provisional funding requirement and revise it accordingly.

4.5 Maintaining Momentum

The Base Case funding requirement is determined by the funding needed to meet the freeze of several substances (halons, TCA, methyl bromide) and to contribute to the subsequent phasedown schedules, particularly for CFCs.

The main funding estimates presented thus far are for the replenishment period 2000-2002; they make no provision for the period 2003-2005. In principle, this approach provides what might be considered to be the strict, or narrow, assessment of the 2000-2002 Replenishment of the Multilateral Fund.

Article 5(1) countries have shown less growth than was assumed in the 1996 TEAP Replenishment study (see note under Table 4.1). The total CFC consumption level for all Article 5(1) countries for the year 2000 is estimated to be about 45,000 ODP tonnes lower than was calculated in the 1996

replenishment study. This new estimate uses 1995-97 reported consumption data that were not available at the time of the 1996 replenishment study which used extrapolated data for 1995-97. Given that several countries showed relatively high growth rates for consumption during 1993-95, the extrapolation procedures used in the 1996 study produced substantially higher growth rates than is revealed by the reported data for 1995-97. In consequence, the 1997-1999 replenishment turned out to be more than sufficient and, thereby, enabled Article 5(1) countries to phase out more ODS than was strictly necessary to comply with the control schedules of the Montreal Protocol.

Therefore, the minimum level of funding required for project approvals during the 2000-2002 replenishment period is calculated to be "relatively" small, i.e., US$ 131.8 million, in comparison with previous replenishments. However, if funding were to be restricted to this minimum level, no "carry-over" to the 2003-2005 replenishment could be expected, whereas a very steep rise would be necessary in the funding requirement for project approvals during the 2003-2005 replenishment period which, inter alia, addresses the 85% reduction step for CFC consumption and production by the year 2007. This is the characteristic of the Base Case.

4.5.1 Replenishment Period 2003-2005

A sharp rise in the funding requirement is projected for the 2003-05 relative to the estimated funding requirement for the 2000-2002 replenishment period due to the following factors:

- further reduction steps, including the 85% reduction step for CFCs in 2007;
- no significant "carry-over" of from project approvals from the 2000-2002 replenishment period;
- halons, CTC and TCA will require additional funding for further CTC reductions after the 85% reduction step in 2005 and for TCA after the 30% reduction step in 2005; and
- methyl bromide will require additional funding for investment projects to meet the 20% reduction by the year 2005 and further reductions beyond 2005.

The funding requirements for halons, CTC, TCA and methyl bromide can be estimated at present only with a relatively large uncertainty, given that it is too early to determine their respective freeze values.

However, initial estimates can be made for the CFC sector. As outlined in the section on cost-effectiveness in Annex 5, an initial estimate for the 2003-2005 funding requirement can be established using the same cost-effectiveness values as were used to estimate the 2000-2002 funding requirement. However,

a very large part of the consumption to be addressed is related to servicing (and possible retrofits). Taking into account that:

- old equipment will be gradually replaced;
- consumption during servicing will be reduced through training; and
- relevant domestic policies are assumed to be in place;

the estimation of the funding requirement can be based on the assumption that the annual rate of negative "net growth" will most likely be within the 0% to 5% range. The results of these calculations for the CFC consumption sector are presented below for both 0% and 5% annual "negative net growth". On this basis, the central estimate for 2003-2005 funding requirement for the CFC consumption sector is US$ 475 million. Further estimates can be found in Annex 7 ("Sensitivity Analyses").

Countries	**Category 1**	**Category 2**	**Category 3**	**Category 4**	**Category 5**	**Total**
"net growth" 0%						
2003-05	316.0	178.4	62.5	21.8	13.1	**591.8**
"net growth" –5%						
2003-05	178.6	128.4	33.2	10.1	10.1	**360.5**

4.5.2 Further Considerations on Maintaining Momentum

For the 2003-2005 replenishment period, the central estimate is US$ 475 million solely for investment project approvals in the CFC consumption sector; whereas, the equivalent estimate for the 2000-2002 replenishment period is US$ 39.5 million following approximately US$ 250 million for project approvals during the 1997-1999 replenishment period. Furthermore, these large discrepancies can be assumed to carry over to the overall funding requirements for these two replenishment periods.

The Task Force submits that these estimates indicate that the implications of such large swings in the demand for project approvals and the uncertain effects on the supply of project approvals could (i) destabilise the ODS phaseout process; (ii) reduce its cost-effectiveness; and (iii) raise uncertainties regarding approval and payment of assessed contributions to the Multilateral Fund.

If Parties would wish to bring forward the required funding for additional projects –and their supporting activities-, which would otherwise be implemented during the peaks of the implementation process, then the costs of large swings in project approvals and implementation could be avoided and benefits gained through additional momentum of the phaseout process both through project implementation and accelerated phaseouts by firms as they move into the non-ODS technological mainstream.

Given the issues mentioned above, Parties may wish to consider advancing US$ 200 million from the replenishment period 2003-2005 to the period 2000-2002; this amount would include administrative costs of the Implementing Agencies (US$ 21.4 million). This amount is about one third of the central estimate of US$ 475 million for investment projects in the consumption sector (which may include supporting activities). In this way the *Advanced Funding Case for the 2000-2002 Replenishment* is defined.

For this case, the Task Force calculates a total amount of *US$ 218.1 million* (the amount as calculated for 2000-2002 plus US$ 178.6 million from the period 2003-2005) for the replenishment period 2000-2002 for investment projects in the consumption sector to phase out Annex A Group I substances. Subsequently, the Task Force calculates a total of *US$ 310.4 million* for the 2000-2002 replenishment period for investment projects in the consumption sector. The estimated allocation is as follows: US$ 218.1 million for CFCs; US$ 23.2 million for other Annex A and B substances; and US$ 69.1 million for Annex E substances.

4.6 Supporting Activities - Non-Investment Projects

4.6.1 Introduction

This section presents the funding requirements for all projects other than investment projects in the ODS consumption and production sectors, i.e., non-investment projects. For the purposes of this report, these projects are classified as follows: (1) clearing-house and information-exchange activities (2) preparation work on country programmes and institutional strengthening projects; (3) demonstration projects; and (4) training projects; refrigerant management plans (RMPs) and halon management plans (HMPs).

Actual reductions in ODS consumption through the use of non-investment activities have been documented. In particular, as of November 1998, over 1,100 ODP tonnes have been eliminated by non-investment projects in 18 large, medium and low-volume ODS consuming countries, according to data reported in the Multilateral Fund's *Inventory of Approved Projects*. This contribution to ODS reduction is likely rise as an increasing number of non-investment projects are completed.

4.6.2 Work Programmes of the Implementing Agencies

The work programmes of the Implementing Agencies include the full range of the non-investment projects, otherwise known as supporting activities. These activities have a role in phasing out ODS through the implementation of domestic policies as well as being necessary complements to investment

projects in so far as they help to create the conditions required for their effective implementation.

The Three-Year Business Plan (1997-99) allocated US$ 42 million, or 8.2% of the total funding allocation, to non-investment projects. These projects included UNEP's clearing-house and information exchange activities, country programme preparation and institutional strengthening and training projects undertaken by all Implementing Agencies. The US$ 42 million allocation did not include activities in the methyl bromide sector nor bilateral agency initiatives. In 1998, the Executive Committee decided that investment project preparation undertaken by the Implementing Agencies would be regarded as part of the funding allocation for investment projects. Taking this into account, the revised funding allocation for non-investment projects was somewhat less than US$ 42 million.

The Task Force consulted the Implementing Agencies and the Multilateral Fund Secretariat regarding their business plans for non-investment projects during the 2000-2002 replenishment period. This information is required to determine the total funding requirement for non-investment projects as part of the 2000-2002 replenishment of the Multilateral Fund.

4.6.3 Clearing-house and Information Exchange Activities (UNEP)

As an Implementing Agency of the Multilateral Fund, UNEP implements clearing-house and information exchange activities such as global information exchange, and the regional networking of National Ozone Officers. At its 21th Meeting, the Executive Committee decided that the on-going information exchange and networking activities are to be classified as "recurring" activities; all other activities are considered to be "non-recurring", i.e., they are to be treated, each year, as new project proposals to the Executive Committee of the Multilateral Fund. Since February 1997, UNEP's recurring clearing-house activities have been "capped" by the Executive Committee, at US$ 2.25 million with an allowance for up to 5% per annum for inflation. For 1999, the recurring clearing-house activities are "capped" at the level of US$ 2.35 million. The Executive Committee guidelines restrict funding for recurring activities to a maximum of US$ 10.13 million for the 2000-2002 replenishment period. The cost of non-recurring clearing-house activities has been much lower, e.g., US$ 0.56 million in 1997; US$ 0.80 million in 1998 and US$ 0.60 million in 1999. Allowing for a rise in the cost of non-recurring activities from US$ 1.96 million to an estimated US$ 2.37 million during 2000-2002 (compared with the 1997-99 triennium), the Task Force estimates that **US$ 12.5 million** is the funding requirement for the 2000-2002 replenishment period.

4.6.4 Preparation of Country Programmes and Institutional Strengthening Projects (UNEP)

Country programmes. There are 21 low volume ODS-consuming Article 5(1) countries that have yet to prepare their country programmes. The average cost of preparing these country programmes, including the preparation of refrigerant management plans (RMPs), is approximately US$ 0.06 million. On this basis, the total funding requirement for the preparation of the 21 Country Programmes currently outstanding is estimated to be **US$ 1.26 million**.

Institutional strengthening. Consultations with the Implementing Agencies indicated that 21 Article 5(1) countries have yet to receive funding for institutional strengthening and that several other countries will seek renewals of their institutional strengthening projects in accordance with Decision 19/29 of the Executive Committee. Consultations with the Implementing Agencies indicate that the estimated funding requirement for institutional strengthening projects, including a substantial number of renewals, for the 2000-2002 replenishment period is **US$ 7.0 million**.

4.6.5 National Training Projects, Refrigerant Management Plans (RMPs) and Halon Management Plans (UNEP)

UNEP delivers national training projects in the low-volume consuming countries (LVCs) where, in most cases, the only significant ODS use is in the refrigeration and air conditioning sector. Therefore, nearly all of these national training projects are concerned with the implementation of Refrigerant Management Plans (RMPs). Related training for customs officials and refrigerant technicians is carried out in the context of the RMPs. The funding approved by the Executive Committee for these training activities has been as follows: US$ 0.45 million in 1997; US$ 0.44 million in 1998; and a proposed US$ 0.39 million in 1999. These figures provide total funding of US$ 1.28 million for the 1997-99 triennium. The Task Force estimated that UNEP funding for national training projects would increase by 10 to 15 per year during the 2000-2002 triennium. On this basis, the funding requirement for national training projects during the 2000-2002 replenishment period is **US$ 1.50 million**.

UNEP estimates that the cost of implementing Halon Management Plans (HMPs) during the 2000-2002 triennium will be about US$ 3.0 million. The Task Force understands that Management Plans are not required by the Montreal Protocol, nor by the decisions of the Parties; and that most countries have either already phased out halon consumption or are addressing their phaseout through regional halon management plans. However, the Task Force understands that the Executive Committee has already approved two regional

HMPs and expects to approve three more over the next 5 to 10 years. The Task Force estimates that the total cost for the five regional HMPs to be US$ 3.0 million, including a cost of **US$ 1.8 million** during the 2000-2002 replenishment period.

4.6.6 Methyl Bromide: Non-Investment Projects

UNEP submitted a proposal to the Task Force for supporting activities or non-investment projects in the methyl bromide sector. The Task Force carefully studied this proposal and concludes the following.

It is clear that more work on the methyl bromide sector needs to be done in the next triennium. The Task Force has considered the information that has been submitted to the Task Force by UNEP and other sources. Having regard to the information that has been made available to the Task Force, the funding requirement assessed for non-investment projects in the methyl bromide sector is **US$ 5.00 million**.

4.6.7 Other Implementing Agencies

The World Bank, UNIDO and UNDP, as Implementing Agencies of the Multilateral Fund, submitted their, respective**,** estimates for non-investment project spending, i.e., supporting activities during the 2000-2002 triennium. These submissions provide very limited detail on the allocation of their, respective, estimates of their funding requirements; they are mainly for training and institutional strengthening projects. The World Bank requests **US$ 1.0 million,** UNIDO requests **US$ 6.04 million** and UNDP requests **US$ 5.0 million**.

4.6.8 Total Funding Required for Supporting Activities

The Task Force estimates that the total funding requirement for non-investment projects is **US$ 41.1 million.** The estimates for the four Implementing Agencies are as follows:

Implementing Agencies	**US$ (million)**
UNEP	29.06
UNIDO	6.04
UNDP	5.00
World Bank	1.00

4.7 Other Funding Requirements

4.7.1 Administrative Costs of the Implementing Agencies

Until recently, the World Bank, UNDP, UNIDO and UNEP have invoiced the Multilateral Fund for their respective administrative costs attributed to project work as Implementing Agencies of the Multilateral Fund. These costs have, until recently, been determined by a flat rate of 13 per cent of their respective project approvals as decided by the Executive Committee.

The 26th Meeting of the Executive Committee, following extended discussion on the acceptability of this charge in recent years, reached a new agreement with the Implementing Agencies on a revised scale of charges. It is recognised that in general large-scale projects involve a lower level of administrative costs due to economies of scale; whereas, certain projects such as non-investment projects and small-scale projects in LVCs had higher administrative costs than other projects.

The Executive Committee decided:

(a) To apply an agency fee of 13% on projects up to a value of US$ 0.5 million;

(b) That for projects with a value exceeding US$ 0.5 million but up to and including US$ 5.0 million, an agency fee of 13 % should be applied on the first US$ 0.5 million and 11% on the balance;

(c) To assess projects with a value exceeding US$ 5.0 million on a case-by-case basis;

(d) That the agency fee for projects submitted under the SME window (Decision 25/56) should be 13%;

(e) That agencies implementing projects under the SME window should report back to the Executive Committee on the actual administrative costs of such projects;

(f) To request the Secretariat and the Implementing Agencies to develop standardised cost items for future reporting on administrative costs;

(g) To review the results of implementation of this decision at the second meeting of the Executive Committee in 1999 and to report to the Eleventh Meeting of the Parties in 1999, in line with Decision VIII/4 of the Meeting of the Parties;

(h) To apply this Decision to projects approved beginning with the current meeting.

The Executive Committee further decided with regard to projects with a value exceeding US$ 5.0 million approved at the current meeting:

(a) For the China halon project, the administrative costs applicable to the second annual programme should be 10%;

(b) For the China MAC ODS phaseout sector plan, the administrative costs applicable to the first US$ 5.0 million should be 11% and thereafter 10%.

In this 2000-2002 replenishment report, the administrative costs of the Implementing Agencies are determined for the larger part as a 12 per cent mark-up on the US dollar cost of the total funding required for project implementation under the Multilateral Fund. Although 13% applies to non-investment projects and 10% to closure projects, the total is more or less 12%, i.e., **US$ 51.2 million** for the *Advanced Funding Case for the 2000-2002 Replenishment.*

4.7.2 Operating Costs of the Executive Committee and the Multilateral Fund Secretariat

This funding required for the operating costs of the Secretariat and Executive Committee of the Multilateral Fund was determined through consultations with the Multilateral Fund Secretariat regarding past operating budgets and the anticipated future workload. In principle, no major change is expected to the level of the operating budget except inflation. However, consultations revealed that the 2000-2002 budget has to include provision for the annual task of monitoring and evaluation of the implementation of Multilateral Fund approved projects. In total, a funding requirement for the operating costs of the Executive Committee and the Multilateral Fund Secretariat for the 2000-2002 replenishment period is estimated to be **US$ 9.5 million**.

4.8 Total Funding Requirements

For the *Base Case for the 2000-2002 Replenishment*, the estimates for the individual expenditure categories of the Multilateral Fund are combined into the total estimated funding requirement for the 2000-2002 replenishment. These estimates are based on the assumptions of a zero time discount rate and a zero inflation rate, therefore all monetary estimates can be regarded as being presented in US dollars at 1999 prices. For the *Base Case for the 2000-2002 Replenishment* the total funding requirement has been estimated at US$ 306.3 million (see total as given in the table below, minus US$ 200 million). The total funding requirements for the *Advanced Funding Case for the 2000-2002 Replenishment* are presented in the table below.

Type of projects	(US$ million)	Subtotal (US$ million)
a. Investment projects consumption sector		
• Contributing to CFC phaseout (2000-2002)	39.5	
• As above, Advanced Funding (from 2003-2005)	178.6	
• Contributing to ODS phaseout, halons	1.7	
• Contributing to ODS phaseout, Annex B	21.5	
• Contributing to ODS phaseout, methyl bromide	69.1	**310.4**
b. Investment projects production sector		
• Closure CFC production plants	80.0	
• Closure Halon production plants (China)	14.1	**94.1**
c. Non-investment projects, supporting activities		
• Clearinghouse and Information Exchange	12.50	
• Country Programme preparation	1.26	
• Halon Management Plans	1.80	
• Institutional Strengthening	7.00	
• Supporting activities, WB, UNDP, UNIDO	12.04	
• Technical assistance, supporting activities MeBr	5.00	
• Training projects	1.50	**41.1**
d. Other funding requirements		
• Multilateral Fund Executive Committee		
• Multilateral Fund Secretariat	9.5	**9.5**
e. Agencies' project administrative costs		
• Applicable to a1), a2), a4), a5), 12%	37.03	
• Applicable to a3), 13%	0.22	
• Applicable to b1), 9%	7.20	
• Applicable to b2), 10%	1.41	
• Applicable to c), 13%	5.34	**51.2**
Total Funding Requirement, Advanced Funding Case for the 2000-2002 Replenishment		**506.3**

Note: assuming 85% of the assessment will be paid, the total is: US$ 430 million
assuming 80% of the assessment will be paid, the total is: US$ 405 million

5. Conclusions

5.1 Introduction

The TEAP Replenishment Task Force prepared this report on the funding requirement for the 2000-2002 replenishment in accordance with Decision X/13 of the Tenth Meeting of the Parties. The total funding requirement was determined by the sum of the estimates for the following five cost categories: (1) investment project approvals in the consumption sector; (2) investment project approvals in the production sector; (3) supporting activities in the phaseout process, i.e., non-investment projects; (4) the administrative costs of the Implementing Agencies; and (5) the operating costs of the Secretariat and Executive Committee of the Multilateral Fund. The analytical methods used to estimate the respective cost components were the same as those used in the 1996 replenishment study.

5.2 Progress Achieved

As of November 1998, the Executive Committee of the Multilateral Fund had approved US$ 654.9 million for a large number of projects. These projects will eventually eliminate 91,805 ODP tonnes of CFCs and approximately 22,500 ODP tonnes of other ODS in 82 Article 5(1) countries. According to the Implementing Agencies, 60% of all approved projects through 1998 had been fully implemented by the end of 1998.

The achievements of the Multilateral Fund in approving ODS consumption sector projects during the 1997-1999 replenishment period have turned out to be more than sufficient to enable the Article 5(1) countries to maintain compliance with the control schedules of the Montreal Protocol. This was due to the actual growth rates for consumption during this period being substantially lower than have been revealed, subsequently, by the reported data (particularly for 1997).

For Article 5(1) countries, total consumption of all controlled substances peaked in 1994/1995 at 223,767 ODP tonnes after which it began to decline. Reported consumption in 1996 was approximately 30,000 ODP tonnes lower than in 1995. In 1997, the estimated total consumption was slightly lower. However, the inclusion of some extrapolated data makes this estimate more uncertain than otherwise.

The studies carried out to determine the triennial replenishments for the Multilateral Fund for the periods 1994-1996 and 1997-1999 focused mainly on investment projects in the CFCs consumption sector. Assumptions had to be made about the CFC consumption pattern in the Article 5(1) countries through

to the 1999-2000 freeze level. At that time, there was a risk of substantial residual growth in CFC consumption at the same time that the Parties were implementing Multilateral Fund investment projects to phase out existing CFC consumption.

By the time of the 2000-2002 replenishment study, this risk had been largely overcome. It is now possible to calculate accurately the required reductions of ODP tonnes to achieve compliance with the control schedules of the Montreal Protocol. However, the distribution of CFC consumption over the different application sectors has become more uncertain while the importance of large investment projects is decreasing. Furthermore, the focus of attention is shifting to the small and medium enterprises (SME) sector. As the CFC phaseout progresses, the significance of the SME sector, as a residual CFC consumption sector, is becoming the focus of attention. CFC consumption in the SME sector is considerable, especially in case the refrigeration servicing needs would be included (if this can be considered a SME operation).

5.3 The Base Case for the 2000-2002 Replenishment

The Base Case for the 2000-2002 Replenishment represents the Task Force's central estimate of the funding requirement for the 2000-2002 replenishment of the Multilateral Fund. It provides for the minimum funding required to enable the Article 5(1) Parties to comply with the freeze requirements in 2002 and 2003, 2004 and contributes towards subsequent control measures for all Annex A, B and E substances. It is based on the best estimates of the model parameters and consultations with the Implementing Agencies, the Multilateral Fund Secretariat, members of the Executive Committee and national experts.

The estimated funding requirement for the Base Case is **US$ 306.3 million**.

Replenishment studies place heavy and stringent demands on the databases maintained by the Multilateral Fund Secretariat and the Ozone Secretariat. The importance of high quality and readily accessible data cannot be overly stressed. The Task Force had access to the latest versions of the databases. The TEAP is grateful for the assistance provided by both Secretariats and their insights into the strengths and weaknesses of the data.

5.4 Looking Forward

Looking forward to the 2003-2005 replenishment of the Multilateral Fund, these uncertainties will only become larger. Project approvals during this period will have to address the need to reduce CFC consumption during the period 2005-2008 when both production and consumption must be reduced to 15% of their respective baseline levels. Inter alia, this will involve the servicing

of refrigeration equipment, possibly consumer-end-product retrofits and other difficult issues. These issues remain to be resolved; they have yet to be addressed by the Executive Committee. It is likely that the study will have to be undertaken on a country-by-country basis. If this is necessary, then it may be advisable to spread the preparation of the replenishment study over the 2000-2001 period to ensure the submission of a comprehensive and authoritative study for the Parties early in the year 2002.

In contrast to the substantial degree of certainty regarding CFC consumption (and production) as controlled by the Montreal Protocol, there is much less certainty in the case of methyl bromide. The assessment of the funding requirement for methyl bromide is at an early stage. The existing consumption data and projections of consumption growth from 1998 and to the freeze in 2002 are subject to question. Furthermore, it may not be possible to make accurate calculations for the 2003-2005 replenishment, since data for 2002 will not be available in time to determine the freeze level for methyl bromide at the time of the completion of the 2003-2005 replenishment study in early 2002.

5.5 Advancing Funding to the 2000-2002 Replenishment Period

Looking ahead to the next three replenishment periods, the Task Force estimates that the funding required for the Article 5(1) Parties to maintain compliance with the Protocol are as follows (in rounded figures):

2000-2002	US$ 300 million	**Total**
2003-2005	US$ 870 million	
2006-2008	US$ 330 million	**US$ 1,500 million**

These estimates of funding requirements are based on the current cost-effectiveness thresholds, the results of calculations regarding investment projects in the consumption and production sectors, the estimated costs of implementing supporting activities through non-investment projects and the operating costs of the Implementing Agencies and the Secretariat and Executive Committee of the Multilateral Fund as applied in the Base Case.

These estimates reveal a sharp increase in the funding requirements for the 2003-2005 replenishment period following the relatively low estimate for the 2000-2002 replenishment period which could give rise to inefficiencies in both implementation and funding. These prospective inefficiencies could be avoided by reducing the disparity in the prospective replenishment funding requirements estimates with a view to fully utilising existing implementation capacity that is required to maintain the momentum of the phaseout in the Article 5(1) countries. This approach would also level out the burden of financial contributions on the donor countries and impact positively on the programming of the implementing agencies, thereby sustaining cost-effective implementation.

Furthermore, it could be used reinforce existing efforts to strengthen the effectiveness of domestic policies in Article 5(1) countries. Finally, it might make it possible to further assist those Parties committed to accelerating their phaseout. In conclusion, these factors would bring forward a reduction of 16,500 ODP tonnes to the benefit of the ozone layer. The Parties may wish to consider the allocation of resources to the triennia 2000-2002, 2003-2005, and 2005-2008 having regard to these potential benefits.

In conclusion, the TEAP proposes that US$ 200 million (including administrative costs) could be advanced to the 2000-2002 replenishment period. The proposed advance of US$ 200 million, from the US$ 870 million estimated for the 2003-2005 replenishment, would result in a funding requirement of approximately US$ 500 million for the 2000-2002 replenishment of the Multilateral Fund. The estimated allocations to the major cost components for this "*Advanced Funding Case for the 2000-2002 Replenishment*" are presented in the table below.

Replenishment Cost Components:	**US $ Million**
CFC Consumption Sector Projects	39.5
CTC, TCA, Halons Consumption Sector Projects	37.3
MB Consumption Sector Projects	69.1
Investments: Production Sector	80.0
Maintaining Momentum, i.e., Advanced Funding (CFC, CTC, and Halon Consumption Sectors)	178.6
Supporting Activities	41.1
Administrative costs of Implementing Agencies	51.2
MLF Secretariat/ Executive Committee Operational Costs	9.5
Total (rounded to US$500 million)	**506.3**

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Annex 1 Principles of the Multilateral Fund

A1.1 Key Elements

In creating the Multilateral Fund, the Parties established a new and distinctive approach to solving global environmental problems. They recognised:

- Common but differentiated responsibilities for developed and developing countries;
- A partnership between developed and developing countries based on equality rather than dependence; and

- A fund with a specific mandate and time frame dedicated to the environment rather than to development.

There were several key elements to the Mechanism:

- It was to enable Parties operating under paragraph 1 of Article 5 to comply with the control measures set out in Article 2 of the Protocol;
- It would provide financial and technical assistance to the Parties operating under paragraph 1 of Article 5;
- Contributions by developed countries to the Mechanism would be in addition to other financial transfers;
- The Mechanism would meet all agreed incremental costs of Article 5(1) countries to enable their compliance;
- While the Multilateral Fund would be the dominant feature, the Mechanism would also include other means of multilateral, bilateral and regional co-operation;
- The Fund would meet the agreed incremental costs, and also finance a clearinghouse and the Secretariat;
- In meeting the agreed incremental costs, cash grants or a concessional loans-based approach could be used;
- Funds would be disbursed with the concurrence of the beneficiary Party;
- The Fund would be financed by contributions from Parties not operating under paragraph 1 of Article 5 on the basis of the United Nations scale of assessment - contribution in kind would be permitted;
- Bilateral activity in accordance with provisions of the Fund and the Protocol could be off-set against up to 20% of a Party's annual contribution;
- There would be an Executive Committee to manage the Fund in accordance with the objectives of the Fund and the Protocol;
- The Executive Committee would comprise 14 Parties with equal representation from developed and developing countries: the Chair and Vice-Chair would rotate annually between the two groups;

- The Executive Committee would be responsible for developing and monitoring operational policies, guidelines and administrative arrangements, budgets, the allocation and disbursement of resources, criteria for project eligibility and review of performance.

By the 26th meeting of the Executive Committee in November 1998, a large number of policy and project decisions had been taken and recognition of a need to streamline operations lead to the formation of the following:

- A Subcommittee on Monitoring, Evaluation and Finance was established;
- A Subcommittee on Project Review was established;
- A Subgroup on the Production Sector was established.

It was decided that membership should be balanced between Parties representing Article 5(1) countries and parties representing non-Article 5(1) countries (Decision 23/6; the Subcommittees consist of 3 Article 5(1) and 3 Non-Article 5(1) members). The members of the Subgroup on the Production Sector can be reconstituted from amongst the members of the Executive Committee (Decision 23/50).

All policy issues on which decisions were taken, the Terms of Reference of Subcommittees, Subgroups and Contact Groups, financial matters, can be found in the "Policies, Procedures, Guidelines and Criteria" published by the Multilateral Fund Secretariat, July 1998.

A1.2 Replenishments

For the 1991-1993 period, the level of the Fund was set at US$ 160 million with the proviso that the level would be increased by US$ 80 million when more countries had ratified the Montreal Protocol.

In 1992, at their Fourth Meeting, and reflecting the coming into effect of the 1990 London Amendment to the Protocol, the Parties moved the Fund from its interim status. The contributions made to the Interim Multilateral Fund were carried over to the newly established Multilateral Fund, and the level of financial contributions was increased to reflect the recent ratification of China at that time.

In 1993, a replenishment of US$ 510 million was agreed by the Parties at their Fifth Meeting in Bangkok for the period 1994 - 1996, which included a carry over of US$ 55 million from the previous three-year period (the 1991-1993 replenishment).

The replenishment of US$ 510 million was based on an assessment by the Executive Committee of the needs of Parties operating under paragraph 1 of

Article 5, the capacity and performance of the Implementing Agencies, and the strategies and projects to be implemented by Parties operating under paragraph 1 of Article 5. This assessment was supported by two other independent studies and was reviewed by the Open-Ended Working Group of the Parties.

In 1996, a replenishment level of US$ 540 million was agreed at the Eighth Meeting of the Parties in Costa Rica for the period 1997 - 1999, which included a carry over of US$ 74 million (reduced to US$ 73 million due to subsequent adjustments) from the previous three-year period (the 1994-1996 replenishment). The replenishment of US$ 540 million was based on an assessment by the Replenishment Task Force of the Technology and Economic Assessment Panel.

The 1997-1999 replenishment level as decided, was based on the US$ 436.5 million estimate prepared by the TEAP Replenishment Task Force. This estimate, accompanied by a recommendation for an additional US$ 40-60 million to maintain the phaseout momentum in certain Article 5(1) countries was referred to as the “Reference Case”. Taking into account the fact that certain contributions to the Multilateral Fund are postponed or not made in time, the replenishment level of US$ 540 million (including the carry over) will have made available at least US$ 430-450 million by the end of the year 1999 for the 1997-1999 replenishment period. In retrospect, the 1997–1999 assessment over-estimated the funding needed to meet the 1999 freeze of Annex A substances; this is discussed later on in this report.

The Fund is now in the final year of its third triennium. About 80% of the assessed contributions to the Multilateral Fund over the 1991-98 period have been received from the donor countries, i.e. Parties not operating under paragraph 1 of Article 5.

Annex 2 Specific Achievements of the Multilateral Fund

A2.1 Investment Project Approvals (1991-98)

During 1991-1998, inclusive of the 26th Executive Committee meeting held in Cairo, November 1998, a number of projects were approved covering a certain ODP tonnage. A summary compiled by the Multilateral Fund Secretariat /MFS99/ is given in Table A2.2 for each of the Country Categories. The ODP tonnes to be phased out by approved projects are used in the model for the consumption sector (see the body of the report).

Information can also be taken from the 1999 Business Plans of the Implementing Agencies, which were approved during the 27th Executive Meeting /ExC99/. The Inventory of Approved Projects as compiled at the Multilateral fund Secretariat mentions that through 1998, 134,288 ODP tonnes of controlled substances were addressed in approved projects (which includes 18,765 ODP tonnes of halons addressed via the sector phaseout plan in China). This document also mentions that a total amount of US$ 588 million had been used for investment projects (if projects for compressors etc. are included the amount increases to a total of US$ 654.9 million). According to information from the implementing agencies, 60% of the ODP tonnes addressed in the projects through 1998 had been phased out by the end of 1998 (74,700 ODP tonnes, which includes all controlled substances).

Table A2.1 *ODP tonnes to be phased out by projects for Article 5(1) Countries approved as of December 1998, for the different sectors (CFCs and halons)*

	Aerosols	Foams	Halons	Refrigeration	Solvents
Category 1	19,042	17,032	19,759.7	17,598	720
Category 2	2,603	15,235	2,218	9,062	246
Category 3	2,326	3,141	-	2,008	55
Category 4	563	594	4.7	1,081	-
Category 5	25	147	-	327	-
Sector-totals	24,559	36,149	21,982	30,076	1,021
Total CFCs	**91,805**				
Total Halons	**21,982**				
GRAND TOTAL	**113,787**				

Note: The total amount of 113,787 ODP tonnes in the table needs to be compared to the 134,288 ODP tonnes (mentioned as addressed in all projects) if the amounts involved in the halon sector phaseout plan and the total amounts of Annex B substances addressed in projects are added (538 ODP tonnes of TCA).

A2.2 Project Approvals 1999

In 1995, the Executive Committee, while recognising that the Multilateral Fund would be needed through 2010 and beyond, considered that it was timely to put the Multilateral Fund's management onto a more stable and transparent basis. The Executive Committee introduced, with the support of the Parties, the concept of a three-year rolling business plan for the Multilateral Fund, along with the introduction of business plans for the Implementing Agencies. Also, as the volume of projects increased, the Executive Committee decided that it was necessary to improve the internal management procedures of the Multilateral Fund so as to enhance its own performance and those of the Implementing Agencies and the Secretariat. In so far, it is relatively easy to derive numbers for 1999 and compare them with the figures for earlier years.

Although the definite project approvals for the year 1999 were not known at the time of the completion of this report, information can be taken from the Consolidated 1999 Business Plans of the Implementing Agencies, which were published in the report of the 27th Executive Committee Meeting /ExC99/. These business plans provide insight in the Implementing Agencies' plans to submit projects in 1999 for the different controlled substances.

The Consolidated Business Plans give total values for the amounts expected to be approved in 1999. The funding requested is stated to address 14,164 ODP tonnes of CFCs (including 5000 ODP tonnes in the production sector) and 13,747 ODP tonnes of non CFCs (see also Table A2.2).

Table A2.2 *ODP tonnes to be phased out by projects expected to be approved for Article 5(1) Countries in 1999 according to the consolidated business plans of the Implementing Agencies /ExC99/*

Country Category	Total ODP tonnes 1999 (CFCs)
Category 1	5471.6
Category 2	2302.7
Category 3	1179
Category 4	100
Category 5	111
Total	**9,164.3**

Note: The total amounts to 9,164.3 ODP tonnes of CFCs; halons are not taken into account here. If 5,000 ODP tonnes in the production sector are added the total amount equals 14,164.3 as given in the business plans of the Implementing Agencies /ExC99/.

In this report the model that has been used is based on the assumption that the amount of CFCs are phased out in those sectors where there is still substantial

consumption (which may imply the application of CFC phaseout projects in more than one sector for each country).

A2.3 Comparison of CFC Consumption Addressed in Project Approvals

It is useful to study how the different Categories of countries (Categories 1-5) have been supported by investment project approvals during 1991-1998 and by expected project approvals during 1999.

In a first instance one can compare the cumulative approvals with the freeze consumption values calculated for each of the Country Categories. Such a comparison has merit for analysis only as it does not mean that the resulting percentage of the freeze consumption addressed by projects is ready for phaseout. Instead, the actual values are lower because such a comparison of cumulative figures against current ones, overestimates the part addressed by projects.

The overall figure is that, of the averaged reported 1995-1997 CFC consumption, 73.2% of the ODP tonnes (CFCs) is addressed by project approvals up to and including 1999. For the second and third Category of Article 5(1) countries, the percentages of averaged 1995-1997 ODP tonnes addressed in project approvals are not so much different (80-82%). The lowest percentages are determined for countries in Categories 4 and 5, i.e. for the countries with a CFC consumption (averaged over the years 1995-1997) lower than 360 ODP tonnes, and in particular the countries with a consumption lower than 100 ODP tonnes. Here values between 50 and 62% can be determined. The value for Category 1 lies in between, i.e., 70%.

Table A2.3 *Total amount of CFCs (ODP tonnes) to be phased out by projects approved as of December 1998 and by those expected to be approved in 1999 /ExC98/, as well as the percentage of the total of approvals of the "freeze" consumption*

Country	Approvals as at December 1998	Approvals for 1999 (expected)	Total ODP tonnes involved in projects 1991-1998 and expected in 1999	Total 1995-7 consumption average data estimated from reported data /UNEP98/	Total ODP tonnes as a percentage of the total 1995-7 categories consumption data
Category 1	54,392	5471.6	59,864	85,973	69.6%
Category 2	27,146	2,302.7	29,449	36,508	80.7%
Category 3	7,530	1179	8,709	10,581	82.3%
Category 4	2,238	100	2,338	3,766	62.1%
Category 5	499	111	610	1,198	50.9%
Total	**91,805**	**9,164.3**	**100,970**	**138,027**	**73.2%**

Note: Values given in the Table relate to CFCs only (compare also the CFC approvals given in Tables 2.2 and 2.3); the percentages involved in approved projects are percentages of the ODP-tonnes estimated as the total consumption for all Article 5(1) countries (from the data reported as average consumption over 1995-1996-1997 to UNEP /UNEP98/)**.**

These values should only be considered in a relative sense because:

- some of the approvals have already (in the years before 1995) phased out a certain part of the consumption which is not part of the average 1995-1997 consumption;
- certain countries have had higher growth than others have in their CFC consumption during the period 1994-1997.

This is shown in Table A2.4, which gives the percentages of the ODP tonnes approved –or expected to be approved- as a function of the 1994, the 1996 and the average 1995-1997 consumption.

A very large part of the 1994 consumption of the countries in Category 3 (consumption level 360-1,000 ODP tonnes) has been addressed in projects. However, this percentage is substantially lower for the year 1996 which implies that these countries have shown a large growth which has offset much of the reduction due to the implementation of projects.

For the 1996 percentages, the countries in both Category 1 and 2 have substantially reduced consumption levels, i.e. there has not been a large growth in the sectors that have not been converted. The reduction in consumption due to the implementation of projects seems to have been quite successful. However, this may not be the case for some countries in Category 1 for the

period 1996-97, where the approvals as a percentage of the freeze value have decreased again (largely due to an increase of the 1997 consumption level).

In all cases the percentage of approvals for the countries in Categories 4 and 5 (with a consumption lower than 360 ODP tonnes) are low compared to the other Categories. In these countries approvals expressed as a percentage of consumption have remained relatively constant over the 1994-1997 period. This means that implemented projects have cancelled the growth of other sectors.

Table A2.4 *Total amount of ODP tonnes involved in projects versus the total 1994, 1996 and average 1995-97 consumption data for the five Country Categories; the approvals are given as a percentage of the three different consumption levels*

Country Category	Total ODP tonnes involved in projects 1991-1998/99	Total 1994, 1996 and average 1995-7 Category consumption data estimated from reported Data /UNE98/			ODP tonnes approved (or expected) as a percentage of the 1994, the 1996 and the average 1995-7 Category Consumption data		
Year		**1994**	**1996**	**1995-97**	**1994**	**1996**	**1995-97**
Cat. 1	59,864	106,593	75,928	85,973	56.2%	78.8%	69.6%
Cat. 2	29,449	43,036	36,813	36,508	68.4%	80.0%	80.6%
Cat. 3	8,709	9,062	10,631	10,581	96.1%	81.9%	82.3%
Cat. 4	2,338	3,869	3,970	3,766	60.4%	58.9%	62.1%
Cat. 5	610	1,268	1,198	1,198	48.1%	50.9%	50.9%
Total	**100,970**	163,828	128,540	138,027	**61.6%**	**78.6%**	**73.2%**

From Table A2.5, the following can be summarised:

- Countries in Category 1 have reduced their part in the total consumption from approximately 65 to 60% between 1994 and 1996; after 1996 the percentage slightly increased;
- Countries in Category 2 have more or less maintained their percentage of the total consumption from 1994 through 1996 and reduced their percentage substantially after 1996;
- Countries in Category 3 have increased their percentage of the total consumption in the total from about 5% to roughly 8% between 1994 and 1997 (compare statements made above);
- Countries in Category 4 have maintained their percentage of the total consumption in the total from 1994 through 1997, while for countries in

Category 5 their, relatively small, percentage has increased from 0.78% to somewhat less than 1%.

Table A2.5 *Total amount of ODP tonnes reported by the different Categories of countries for the years 1994, 1995, 1996 and 1997 and the proportion of the total consumption of the different Categories for these years. For the average 1995-97 consumption calculated (figures given in Table A2.4) the percentages in the total have been given.*

Country Category					
Year	**1994**		**1995**		
Category. 1	106,593	65.1%	105,927	66.4%	
Category 2	43,036	26.3%	37,304	23.5%	
Category 3	9,062	5.4%	10,873	6.8%	
Category 4	3,869	2.4%	3,958	2.5%	
Category 5	1,268	0.8%	1,192	0.8%	
Total	**163,828**	100%	**159,254**	100%	

Country Category					**1995-97 average**
Year	**1996**		**1997**		
Category. 1	75,928	59.1%	76,065	60.2%	62.3%
Category 2	36,813	28.6%	35,407	28.0%	26.4%
Category 3	10,631	8.3%	10,240	8.1%	7.7%
Category 4	3,970	3.1%	3,370	2.7%	2.7%
Category 5	1,198	0.9%	1,205	1.0%	0.9%
Total	**128,540**	100%	**126,287**	100%	100%

A2.4 Cost-Effectiveness

During the period 1992 - 1994, no cost-effectiveness guidelines were established for the operations of the Multilateral Fund. The level of funding for projects was very much dependent on the specific project and particular Executive Committee decisions regarding the funding level for a project. Therefore, a wide range of cost-effectiveness figures exists for the projects approved during the period 1992-1994.

At the 16th Meeting of the Executive Committee cost-effectiveness threshold values for the different sectors were decided (UNEP/OzL.Pro/ExCom/16/20).

Annex 3 Control Schedules

A3.1 Compliance with the Control Schedules

The individual Parties, respectively, are responsible for their own compliance with the control schedules. To assist this effort, it is important to take full note of the opportunities to promote ODS phaseouts through the design and implementation of domestic policies that are effective in creating the market incentives and support activities required to make the implementation of ODS phaseout as cost-efficient as possible.

Nevertheless, domestic policies are not sufficient on their own. External financial assistance and technology transfer are essential to the phaseout process. Recognition of these needs led to the establishment of the Multilateral Fund. The Multilateral Fund is mandated to assist the Article 5(1) countries to comply with the control schedules of the Montreal Protocol.

The resources to be made available through the 2000-2002 replenishment of the Multilateral Fund will be instrumental in making it possible for the Article 5(1) countries to meet their, respective, incremental costs in securing progressive compliance with the following control measures:

- 50% reduction step by 1 January 2005 for Annex A-Group I substances (CFCs);
- 1 January 2002 freeze and 50% reduction step for Annex A–Group II substances by 1 January 2005 (Halons);
- 20% reduction step by 1 January 2003 for Annex B–Group I substances (other halogenated CFCs);
- 85% reduction step by 1 January 2005 Annex B–Group II substances (carbon tetrachloride);
- 1 January 2003 freeze and 30% reduction step by 1 January 2005 for Annex B–Group III (methyl chloroform); and
- 1 January 2002 freeze and subsequent reduction step of 20% by 2005 for Annex E (methyl bromide).

A summary is given in Table A3.1.

Where it concerns the reduction in consumption for methyl bromide beyond 2005, Decision IX/5 should be referred to: “Conditions for the Control Measures on Annex E Substances in Article 5(1) Parties”, which mentions in 1(e) “…. The Meeting of the Parties shall decide in 2003 on further specific reductions on methyl bromide for the period beyond 2005 applicable to Parties operating under paragraph 1 of Article 5”.

Table A3.1 *Control Schedules for Article 5(1) Countries*

Annex A – Group I (Production and Consumption)	
Chlorofluorocarbons: CFC-11, CFC-12, CFC-113, CFC-114 and CFC-115	Base level: average of 1995-97 Freeze: July 1, 1999* 50 percent reduction by January 1, 2005 * 85 percent reduction by January 1, 2007 * 100 percent reduction by January 1, 2010 (with possible exemptions for essential uses) **

Annex A - Group II (Production and Consumption)	
Halons: halon 1211, halon 1301 and halon 2402	Base level: average of 1995-97 Freeze: January 1, 2002* 50 percent reduction by January 1, 2005 * 100 percent reduction by January 1, 2010 (with possible exemptions for essential uses) **

Annex B - Group I (Production and Consumption)	
Other fully halogenated CFCs CFC-13, CFC-111, CFC-112, CFC-211, CFC-212, CFC-213, CFC-214, CFC-215, CFC-216, and CFC-217	Base level: average of 1998-2000 20 percent reduction by January 1, 2003 * 85 percent reduction by January 1, 2007 * 100 percent reduction by January 1, 2010 (with possible exemptions for essential uses) **

Annex B - Group II (Production and Consumption)	
Carbon Tetrachloride	Base level: average of 1998-2000 85 percent reduction by January 1, 2005 100 percent reduction by January 1, 2010 (with possible exemptions for essential uses)

Annex B - Group III (Production and Consumption)	
1,1,1-trichloroethane (methyl chloroform)	Base level: average of 1998-2000 Freeze: January 1, 2003* 30 percent reduction by January 1, 2005 * 70 percent reduction by January 1, 2010 * 100 percent reduction by January 1, 2015 (with possible exemptions for essential uses) **

Annex C - Group I (Consumption)	
HCFCs	Base level: 2015 Freeze: January 1, 2016 100 percent reduction by January 1, 2040

Annex C, Group II (Production and Consumption)	
HBFCs	100 percent reduction by January 1, 1996 (with possible exemptions for essential uses)

Annex E (Production and Consumption) (exemption for quarantine and pre-shipment applications)	
Methyl Bromide	Base level: Average of 1995-1998 Freeze: January 1, 2002 * 20 percent reduction by January 1, 2005 100 percent reduction by January 1, 2015

* 10% of base level of production allowed to be produced additionally to meet the basic domestic needs of Parties operating under Article 5(1).

** 15% of base level production allowed to be produced additionally to meet the basic domestic needs of Parties operating under Article 5(1).

Annex 4 Production and Consumption Aspects; CFCs, Halons, CTC and TCA

A4.1 CFC Production and Consumption

In Table A4.1 the production in Article 5(1) and non-Article 5(1) Parties is presented for the years 1995, 1996 and 1997 derived from the data that have been officially submitted to the UNEP Ozone Secretariat. Table A4.1 also presents the 1995-1997 consumption data for all Article 5(1) Parties, with the exception of the consumption and production in the Republic of Korea. The produced amounts in the Republic of Korea are assumed to cover the domestic needs of the Republic of Korea only and they are therefore not considered in this table. Furthermore, the production in the Russian Federation has not been taken into account; small amounts may have been exported. Since production in the Russian Federation will be halted shortly, this aspect has not been taken into further account in this report.

Table A4.1 *ODS (CFC) production and consumption for all Article 5(1) Parties as reported to UNEP(ODP tonnes * 1000) for the years 1995, 1996 and 1997. The Table also contains the results of calculations for the CFC consumption from the study on the replenishment of the Multilateral Fund during 2000-2002. The production levels given for the period 2000-2010 have been derived from material published for China and India (as agreed for China at the 27th ExCom Meeting) and from the 1995-97 base level.*

Year	Article 5(1) CFC Consumption	Article 5(1) CFC Production	Difference (Production minus Consumption)	Non-Article 5(1) CFC Production
1994	***163.83***			
1995	***159.25***	***99.76***	***-59.49***	***100.56***
1996	***128.54***	***92.02***	***-36.52***	***33.93***
1997	***126.27***	***100.64***	***-25.63***	***32.52***
1998	111.85	102 (est)	-9.85	
1999	95.14	96 (est)	1.86	
2000	80.69	88.19	7.50	
2001	68.79	79.76	10.97	
2002	64.05	71.83	7.78	
2003	62.03	64.30	2.27	
2004	60.51	54.97	-5.54	
2005	58.59	43.79	-14.80	
2006	41.36	29.78	-11.58	
2007	20.57	17.11	-3.46	
2008	13.68	12.41	-1.27	
2009	6.84	5.71	-1.13	
2010	0	0	0	

In the years 1996 and 1997, annual production in the Article 5(1) countries was about 100,000 ODP tonnes, of which approximately 75% was produced in Asia and 25% in Central and South America. This was about 27,000 ODP tonnes less than the reported consumption. This residual amount is assumed to have been produced in the non-Article 5(1) countries under the basic domestic needs clause of the Montreal Protocol.

Table A4.1 shows a production level of approximately 33,000 ODP tonnes for 1997 in Non-Article 5(1) countries, which would leave 6,000 ODP tonnes for "essential uses" in the non-Article 5(1) countries. The difference of 27,000 ODP tonnes is exported to cover Article 5(1) "basic domestic needs", which could create some imbalance between supply and demand in the Article 5(1) countries. Overall, the more or less stable CFC prices during 1995 – 1997, suggest that there has not been a shortage in the supply of CFCs to the Article 5(1) countries during this period.

Table A4.1 also presents the consumption estimates beyond 1997. The estimates are derived from calculations involving the implementation of projects under the Multilateral Fund as presented in the relevant chapter in the body of the report. If the Article 5(1) countries maintain recent production levels during 1998 and 1999, it is expected that production will exceed demand in 1999, even without production from the non-Article 5(1) countries for "basic domestic needs".

Production estimates are also given in Table A4.1, which are taken from the TEAP report that addresses Decision X/15 on "basic domestic needs". Here assumptions on closure of production facilities are assumed in line with the Chinese CFC phaseout strategy.

Table A4.1 shows that production in the Article 5(1) countries could cover the amounts required for the consumption sector through 2003. If only Article 5(1) production would be possible, shortages are predicted to occur particularly during 2004-2007. This shortage might possibly be avoided by increasing the production in the Article 5(1) countries by 10% of the base level for satisfying "basic domestic needs".

The following scenario is the closest approximation to the current thinking about a progressive phaseout of CFC production in both the Article 5(1) and the non-Article 5(1) countries: "a phased closure of production in China and India for Article 5(1) countries in Asia, together with the progressive closure of manufacturing facilities in other countries, with access to non-Article 5(1) production as necessary".

A different aspect needs to be mentioned here. An early ban on CFC sales from non-Article 5(1) to Article 5(1) countries may make plants in the Non-Article

5(1) countries financially non-viable. As a result, companies would need to either manufacture and stockpile quantities of medical grade CFC necessary to complete the transition to CFC-free MDIs, develop Article 5(1) suppliers that are approved by national regulatory bodies (a lengthy process), or would need to pay higher prices to maintain CFC production.

If a sufficiently progressive closure of Article 5(1) CFC production facilities takes place, CFC prices will gradually increase, thereby creating an incentive to convert to substitutes and/or to initiate recovery and recycle programmes. However, at this stage there are no clear indications on the near future strategy, there seem to be no shortages in supplies in the near future if some non-Article 5(1) production is maintained. No increase in price has therefore been assumed in the study for the 2000-2002 replenishment of the Multilateral Fund.

A4.2 Halon Production and Consumption

Halon production and consumption levels can be addressed here, having regard to the halon production phaseout strategy in China (according to ExCom Decision 23/11).

Table A4.2 shows that, in 1994, the production was roughly 7,000 ODP tonnes lower than halon consumption for Article 5(1) countries as a whole. Production in China was somewhat larger than consumption. The difference between consumption and production in 1994 may have been covered by exports from the Non-Article 5(1) countries. 1994 exports of roughly 7,000 ODP tonnes not consumed in the Non-Article 5(1) countries in 1993 (derived from UNEP reported data) would for the larger part have resolved a possible shortage on the Article 5(1) countries' markets in 1994. This situation changed drastically after 1994 as China substantially increased halon production (note: the Republic of Korea has not been considered within this framework given that the 1993-1996 halon consumption reported to UNEP was offset by reported production).

Excess production of about 2,300 ODP tonnes in 1996 rose to almost 6,000 ODP tonnes in 1997. In the years 1996 and 1997, all Article 5(1) countries, excluding China, consumed about 5,800 and 3,500 ODP tonnes, respectively. The 1995-1997 baseline for all Article 5(1) countries, except China, is about 5,300 ODP tonnes. These 1996-1997 consumption levels are included in the total figure given in Table A4.2.

Table A4.2 *Halon production and consumption levels for all Article 5(1) Parties for the period 1994-1997 as reported to UNEP /UNEP98, UNEP99/ in ODP tonnes. Consumption and production levels for China are given as reported to UNEP for 1994-1997, and as prescribed for all years after 1997 in Decision 23/11 as taken by the 23rd Executive Committee meeting.*

Year	Cons. all A 5(1) Parties	Cons. all A5 (1) without China	Cons. China	Production All A 5(1) Parties	Production China	Difference prod./ cons. in China
1994	**29,148**	**8,998**	**20,150**	**21,946**	**(21,550)**	**(1,400)**
1995	**40,667**	**6,953**	**33,714**	**37,591**	**(37,350)**	**(8,700)**
1996	**38,972**	**5,857**	**33,115**	**40,574**	**(40,269)**	**(7,154)**
1997	**39,250**	**3,519**	**35,731**	**45,517**	**(45,196)**	**(9,465)**
1998	27,100	2,620	24,480*		(30,060)*	(5,580)*
1999	21,700	2,590	19,110*		(24,090)*	(4,980)*
2000	16,200	2,460	13,740*		(18,120)*	(4,380)*
2001	14,800	2,450	12,351*		(16,131)*	(3,780)*
2002	11,800	2,330	9,462*		(13,962)*	(4,500)*
2003	9,200	2,030	7,170*		(11,970)*	(4,800)*
2004	9,100	1,930	7,170*		(11,970)*	(4,800)*
2005	8,800	1,630	7,170*		(11,970)*	(4,800)*
2006	2,200	1,200	1,000*		(3,000)**	(2,000)**

*** Note:** These figures are given in the Executive Committee Decision on the Chinese halon sector phaseout strategy, and consist of both halon-1211 and -1301 data multiplied with the respective ODPs (3.0 and 10.0).
****Note:** As of 2006, the production of halon-1211 in China will be halted, according to the strategy.

With the manufacture of halon-1211 fire extinguisher equipment being phased out in India (Decision 24/52 of the Executive Committee), China is the only important halon producer. In Table A4.2 the data present China's halon production and consumption figures for the period 1998-2005, as a total for both halon-1211 and halon-1301. Although consumption and production levels significantly decrease, particularly for halon-1211 in this timeframe, an excess production of about 4,000-5,000 ODP tonnes might occur. Given that approximately 3,500 ODP tonnes are consumed by other Article 5(1) countries in 1997 (which amount tends to decline at short notice), the availability of Chinese halons for export is not expected to increase price levels nor to stimulate the domestic policies of other Article 5(1) countries during the coming years, particularly in relation to halon banking schemes.

Where it concerns the funding of the Chinese halon phaseout strategy, the following can be mentioned. For the years through 2008 (belonging to three three-year replenishment periods), the following amounts have been agreed

upon and will be transferred to China, after definite approval by the Executive Committee (Decision 23/11):

Year	Amount (US$ million)	Triennium	Amount (US$ million)
2000	4.5	2000-2002	14.1
2001	3.7		
2002	5.9		
2003	1.2	2003-2005	14.4
2004	1.8		
2005	11.4		
2006	0.4	2006-2008	0.8
2007	0.3		
2008	0.1		

A4.3 CTC Production and Consumption

CTC consumption will have to be reduced by 85% by the year 2005. Therefore if one assumes a linear reduction towards this goal, some phaseout projects need to be considered in this replenishment. CTC is rather unique because its main use is by large as a feedstock for the manufacture of CFCs (95% of all CTC uses). As such, it is not directly regulated by the Montreal Protocol, but its production follows that of its derivatives, CFC-11 and CFC-12.

CTC is currently manufactured in the following Article 5(1) countries : Brazil, China, India, Korea, Mexico, Romania and South Africa. These countries manufactured in 1996 a total of 90,491 ODP tonnes, according to UNEP figures. Despite this local manufacturing capacity, Article 5(1) countries are net importers of CTC. The 1998 Aerosols Technical Options Committee (ATOC) report estimated that in 1996 Article 5(1) countries needed some 152,600 ODP tonnes for CFC manufacture, thus a shortfall of more than 62,000 ODP tonnes results when this number is compared to the production reported to UNEP.

This shortfall should balance as Article 5(1) countries reduce CFC consumption to meet the 50 % reduction scheduled for 2005, and it should disappear by 2002 according to the figures shown in Table A4.1, (ATOC estimated a consumption of 1.35 ODP tonnes of CTC to produce 1 ODP ton of CFC).

The consumption of CTC which is directly regulated by the Montreal Protocol, was estimated by ATOC in its 1998 report to be around 11,500 ODP tonnes in 1995 and 1996. Review of data reported to UNEP by Parties for this report yielded consistent consumption levels of 10,210 and 11,250 ODP tonnes for

1995 and 1997, respectively. The main use still is as 'process agent' which use was studied in 1997 by the Process Agent Task Force and estimated at 7000 ODP tonnes for Article 5(1) countries. Process agent uses in Article 5(1) countries are eligible for funding by the Multilateral Fund.
There are several possible CTC scenarios which are contingent on the phaseout of CFCs. When CFC plants close in North and South America, it is likely that their CTC feedstock facilities will follow suit. However, the situation in India and China is different. These two countries have the larger process agents uses in Article 5(1) countries. Continued availability of CTC as a feedstock for CFC will contribute to maintain these uses until the control measures become effective in 2005. However, the unique nature of process agent uses makes it possible to circumvent phaseout if adequate emission controls are installed.

With the shortfall in CTC disappearing in the year 2002, and lacking further accurate data on the development of consumption patterns, the Replenishment Task Force considered it as premature to consider changes in CTC prices for this study on the 2000-2002 replenishment of the Multilateral Fund.

A4.4 TCA Production and Consumption

The TEAP report that addresses the Decision X/15 on "basic domestic needs" gives some values for the TCA consumption and production in Article 5(1) countries. It turns out that during the years 1995 and 1996 consumption in the Article 5(1) countries has been much larger than the global production. It must therefore have been supplied from stockpiled material after the phaseout in the non-Article 5(1) countries after the phaseout by January 1996.

There is not enough material available to derive a scenario for the development of the TCA price in the Article 5(1) countries, neither is it possible to derive a reasonable forecast for the development of the consumption pattern at short notice. It may be that the TCA price will substantially rise, which will influence the operational costs of conversion projects. Given the fact that the reduction in TCA consumption is scheduled to be 30% by the year 2005, it implies that the number of projects will be low (see the funding assumed for these projects in the body of the report). Once more information becomes available during 2000-2002, a more precise forecast can be given. No changes in cost price have been assumed in this report.

Annex 5 Specific Aspects of the Methodology Applied for Estimating the Funding Required

A5.1 First Principles of the Methodology Applied

As a first step, the model calculates the reduction in consumption resulting from the ODP tonnes phased out by investment projects. The distribution of the CFCs phased out year-by-year due to project implementation (i.e., the implementation lag) is an informed assumption made by the Task Force in consultation with the Multilateral Fund Secretariat and the Implementing Agencies. In the model, the cumulative amount of CFCs that is phased out by the implementation of an individual project is independent of the assumed implementation lag.

In the next step, the model makes a best fit to the country consumption data reported to UNEP for the years 1992-1997. This is done by calculating the consumption pattern from year to year, applying a growth percentage and subtracting the ODP tonnes reduced due to project implementation in that same year. For the next year the growth percentage is applied to the remaining CFC consumption and the reduction in ODP tonnes due to project implementation is again subtracted; this is considered to be the most realistic procedure (in almost all country cases the growth percentages considered were different for the period 1992-1994, 1994-1995, and for 1995-1997). The different growth percentages are adjusted manually in the spreadsheet programme until a best fit has been found to the data reported to UNEP /UNEP98, UNEP99/ for up to and including the year 1997.

For the next step, the model estimates the CFC consumption over the period 1998-2000, taking into account the tendency that was present during 1995-1997 (by simply extrapolating the same growth –or reduction- percentage). This implies that certain specific country circumstances, including the influence of domestic policies on the CFC consumption (see further details in section A5.5) are taken into account. However, if regulatory regimes were not in place during 1995-1997 and they are or will be put in place in 1998 or 1999, their effect has not been taken into account.

In the model, the level at which a country must freeze its consumption of CFCs over the period 1 July 1999 to 1 July 2000 can be calculated by averaging the data for 1995, 1996 and 1997 as reported to UNEP /UNEP98, UNEP99/. If the freeze is not met by implementing the projects approved during the years 1993-1997, the model will consider this again during the period 2000-2002.

A country is considered to be in compliance with the Protocol if its ODS consumption is equal to or lower than the consumption levels that are predetermined once the control schedules and the baseline or the freeze level of

consumption level are known. The values for the control schedule for CFCs, as applied in the model, are determined as follows:

- the maximum level of consumption that complies with the 1999/2000 freeze is calculated as the average level of consumption over the three year period 1995-97;
- the scheduled 50% reduction in the maximum consumption that is allowed for the reporting period 1 January 2005 to 1 January 2006, is calculated on the assumption that the annual reductions from the freeze level will follow a step-wise linear function in terms of percentages of the freeze level.

This calculation yields the following annual reduction schedule for consumption in terms of percentages of the freeze level:

2000	95.45%	2005	50.00%
2001	86.36%	2006	32.50%
2002	77.27%	2007	15.00%
2003	68.18%		
2004	59.09%		

Note: The requirement that the freeze in consumption must be achieved during the period 1 July 1999 to 1 July 2000 means that, in practice, the annual reduction starts from July 2000 and therefore the reduction in that year is one half of the reduction of the years thereafter (4.54% versus 9.09%). The fact that the reduction for 2000 is only one half also creates some reporting difficulties in practice. If a country submits data for the year 1999, it could remain in compliance with the Protocol even if its annual reported consumption is substantially higher than the freeze level, provided that the excess consumption took place in the first half of 1999 when no control schedule applies. In practice, this means that the year 2000 is the first year in which compliance or non-compliance can be established which can then be confirmed in the first reporting year after the year 2000. In principle, compliance means that a Party's annual consumption must not exceed the 1999/2000 freeze level during the period leading up to the 50% reduction as of 1 January 2005 (compliance does not imply linear reductions in consumption during the years 2000-2005). Note that the model calculates the assumed step-wise linear schedule of intermediate annual reductions in consumption; it does not follow the formal control schedule of the Montreal Protocol.

Following the freeze in 1999/2000, the model calculates the project approvals required to meet the step-wise linear reductions of consumption that enable compliance with the 50% reduction goal over the period 2000-05. By applying the assumed implementation lag, the model calculates the project approvals required year-by-year to ensure that the "target" amount of ODS is phased out by the reporting period of 1 January 2005 to 1 January 2006. This is done by calculating whether or not in a certain year the consumption will be higher than following the linear reduction schedule; if this is the case the difference is determined and a project approval is assumed at the appropriate time in advance. The size of this anticipation period is determined by the implementation lag function (see below). This is applied in a stepwise way,

year by year, where, for all years, the effects of project approvals from earlier years are taken into account.

Automatically, the computer programme determines how many ODP tonnes need to be approved in the year 2000 to impact on the consumption pattern of all Article 5(1) countries, beginning in the year 2002. The same is done for the years 2001 and 2002. Approvals during the year 2002 will have a certain effect on the consumption during 2004 and 2005, but will also have a certain, albeit small effect on the consumption in the years 2006 and 2007 which depends on the implementation lag function.

If, during the period 1997-1999, more projects have been approved than are strictly necessary to comply with the control schedule (freeze and subsequent reduction steps), the ODP tonnes to be approved in projects during 2000-2002 will be that much less. If more projects than necessary have been approved this could have been caused by (i) a lower growth percentage than assumed in the 1997-1999 Replenishment study, and (ii) different domestic policies than expected in 1996 when the 1997-1999 study was undertaken.

However, subsequent reductions in ODS consumption by approvals of projects during the 2003-2005 (replenishment) period would then be significantly higher, and the funding required in the approvals would also be substantially higher, especially because during the 2003-2005 (replenishment) period projects would have to be approved which are aimed at achieving a 35% CFC consumption reduction in two years (from 50 to 15% between 2005 and 2007), which is a higher rate of reduction than is applicable in the years 2000-2005. Furthermore, during the period 2003-2005 the last 20-40% of the baseline (freeze) CFC consumption has to be addressed. This implies that all kinds of activities will need to be phased out, which will require a substantial commitment to project preparation. Of course, where it concerns the informal sector, it is difficult to make assumptions at present how this will be dealt with.

It is very probable that the ODP tonnes that must be addressed in project approvals during the replenishment period 2000-2002 will be substantially fewer in number than the ODP tonnes expected to be addressed in project approvals during 2003-2005. This could present serious practical difficulties. In particular, the institutional capacities of the Implementing Agencies could not cope efficiently with such large fluctuations in project caseloads nor would the “absorption capacities” of Article 5(1) countries be sufficient to cope with such large changes in flow of project approvals. The net result would be a loss in the efficiency of the implementation process. Furthermore, the supply of projects that might be approved during the 2000-2002 replenishment period might be too limited in number and type to meet the phaseout strategies presented in the Country Programmes of the Article 5(1) countries.

A5.2 ODS Consumption 1992-1997

The historic consumption data used by the Task Force for this study were the Article 5(1) country data reports submitted to UNEP for the years 1992-1997 /UNEP98, UNEP99/. The data were submitted for each of the substances listed in Annex A, Groups I and II, Annex B, Groups I, II and III, and for Annex E. The data reported for 1992, 1993 and 1994 formed the starting point for the calculations for most of the substances mentioned above. In the case of methyl bromide, data reported for later years formed the starting point for the calculations.

Not all Parties have reported their consumption of controlled substances as is required by the Protocol. In the absence of official data, the Task Force estimated the missing ODS consumption data by extrapolation. Most of the missing data for 1996 were for countries in Categories 4 and 5. In the case of 1997, missing data could be deduced in all Categories excluding Category 1. Most of the missing data were again for countries in Categories 4 and 5 (see also Tables 2.1 and A2.4).

The percentage compositions by ODS of the consumption of Annex A and B substances, respectively, as derived from the country data reported to UNEP, were checked against the percentages given in the Country Programmes. If major differences were observed, the percentages based on the country data for the year 1994 (or, if necessary, 1993) were used. In the case of minor differences, the data reported in the Country Programmes were used in this study. On the whole, these data were reasonably consistent.

Data regarding distributions across sectors using Annex A, Group I substances (CFCs) were obtained from the Country Programmes. This procedure allowed the Task Force to attribute specific numbers of ODP tonnes of consumption to specific sectors in a given country. This was necessary given that the number of ODP tonnes to be phased out by investment projects and the phaseout costs are both sector specific.

Where anomalies in the reporting of CTC consumption data were encountered, the data were revised by the Task Force either by (i) requesting clarification from the national authorities or (ii) by making use of the reported data for emissive CTC uses presented in the Country Programmes, and (iii) sometimes by simple extrapolation.

In some cases, the consumption reported by a country for 1994, 1995 and/or 1996 was substantially lower than the ODS (CFC) consumption to be phased out by projects already approved. In these cases, the reported consumption was increased to maintain consistency with the ODS (CFC) to be phased out by the reported approvals which were then included in the model. Further, it

was assumed that these projects would, for all practical purposes, phase out virtually the entire consumption of that ODS (CFC) substance in that country. In other cases, project approvals focussed on certain sectors which were described as substantially smaller in the Country Programme (sector percentages). In that case, modest changes to the sector percentages had to be made to avoid the calculation of negative consumption values. The above underscores the fact that a country's consumption data will often not incorporate all ODS consumers; this may be different from year to year, i.e. with growing knowledge at the country level the reported consumption may increase although actual consumption has not increased. There is no method to take this into proper account.

A5.3 ODS Consumption Projections

If, in the model, consumption growth or reduction was evident during the period 1995-1997, that rate of increase or decrease was extrapolated through to 1999. In the model, growth or reduction can only apply to that part of the industry that has not converted.

Since the growth factor considered in the model is not the growth or decrease of the absolute consumption level (data as reported) growth (or negative growth, i.e. decrease) can be regarded as a "net growth percentage". This requires that the reported "net growth rate" was applied only to those parts of the sectors that remained fully dependent on ODS i.e., no project implementation had taken place, as yet, in those parts of the sectors.

Growth may occur in consumption in those sectors that have not been addressed in projects because:

- the servicing sector may ask for more ODS per year as the amount of installed ODS equipment grows year by year. It is difficult to derive a percentage but it could imply a growth of several percent annually;
- capacity in manufacturing may be better utilised, or may have been improved, which could yield a growth of several percent per year in sectors that have not been addressed by projects after 1995 (in relation to Decision 17/7 taken by the Executive Committee which states that "it decided, in the light of technological advances, not to consider any projects to convert any ODS-based capacity installed after 25 July 1995." (UNEP/ OzL.Pro. ExCom /17 /60)). It is again difficult to derive a maximum percentage.

The maximum "net growth percentages" which seem reasonable are in the range of 8-10%. One should bear in mind that this implies (in virtually all countries in which projects are implemented) that the consumption level of a country will hardly increase. In the case of a large number of projects being implemented, "net growth percentages" of the range of 8-10% still yield a significant decrease in consumption in absolute terms.

In some cases, CFC consumption of a country increased steeply from 1995 to 1996, or particularly from 1996 to 1997. Such increases can only be simulated by assuming "net growth percentages" which are much larger than 10% per year. This seems to be unrealistic for the average growth of Article 5(1) economies and therefore, the assumption must be that this steep growth must involve some extra imports, i.e. stockpiling of CFC material. It is logical to assume that the consumption will then be significantly lower in the year thereafter. In all cases for which the consumption after 1995 was simulated, the "net growth percentage" was limited to 8-10% and a best curve fitting was determined. Some "net growth percentages", as applied in the model, are given in section A5.5 below.

The Task Force also sent out questionnaires to several Article 5(1) countries, to request further information on expected growth of ODS consumption. Several countries responded promptly and their information was used in the computer calculations for the consumption sector.

A5.4 Factors Applied: Implementation Lag

The period between project approval and project implementation and completion (i.e., ODP tonnes phased out), can range from about 1.5 to maximum 6 years. Given the implementation time lag for projects approved during 1993-96, much of the ODS phaseout will have taken place during 1997-99; for the projects approved during the period 1997-1999 most of the ODS phaseout will take place after 1999. Only approvals done during the year 1997 may enable several countries to comply with the 1999/ 2000 freeze.

The Task Force estimated the effect that the implementation lag will have on the timing for project approvals required to achieve the reduction steps in the consumption of the substances listed in Annex A, Group I. The historical data on implementation lags were analysed from data on approvals and implementation that are recorded in a regularly up-dated database maintained by the Multilateral Fund Secretariat /MFS99/. Using this information in the light of consultations with the Secretariat and the Implementing Agencies, an average implementation time lag was determined. The implementation lag summarises information on how much, in percentage terms, of the targeted ODP phaseout through project implementation takes place, year-by-year, until full implementation has been achieved.

The Task Force assumed that the implementation lag valid for the 1993-1995 approvals could be slightly improved (this was already mentioned in the 1997-1999 Replenishment study) for the years 1996 and thereafter. No further improvements are expected after the year 1999, i.e. for projects to be approved during the replenishment period 2000-2002.

This implies:

- after 2 years: 60% implemented (instead of 55%, as for the 1993-95 approvals); and
- after 3 years: 85% implemented (instead of 70%, as for 1993-1995 approvals); and
- after 4 years: 95% implemented (instead of 80%, as for 1993-1995 approvals).

Table A5.1 *Percentage project implementation in years after project approval (cumulative distribution for the distributed time lag)*

Project Implementation	**Schedule 1993/1996** (cumulative values)	**Schedule after 1996** (cumulative values)
Within 1 year	0%	0%
Within 2 years	55%	60%
Within 3 years	70%	85%
Within 4 years	80%	95%
Within 5 years	90%	100%
Within 6 years	100%	-

The implementation lags assumed for projects approved during 1993-96 and after 1996, respectively, are presented in Table A5.1.

Given these implementation lags, it is possible to calculate the ODP-tonnes that must be approved in the 2000-2002 period for reduction steps per year per country (or per Country Category) in the period 2002-2005, for a large part targeted at achieving the 50% reduction in CFC consumption by 1 January 2005.

A5.5 Factors Applied: Domestic Policies of Article 5(1) Countries

Domestic policies in Article 5(1) countries can have a substantial influence on the estimated funding requirement for the 2000-2002 and subsequent replenishments of the Multilateral Fund. Parties with well crafted and effectively implemented domestic policies to create, or reinforce, market incentives to encourage enterprises to phase out ODS. These Parties have the means to achieve ODS reductions with much greater cost-effectiveness than Parties with weak, non-existent, or inadequately enforced policies. In larger economies, improvements in cost-effectiveness created by strong domestic policies should be able to achieve ODS consumption reductions of some 40 to 50% more than has been achieved by Parties without such policies.

Lessons can be learned from the ways in which the developed countries have responded to the Montreal Protocol with a range of policy instruments,

including voluntary agreements, bans, marketable permit schemes, taxes and various public awareness campaigns

Motivated by changing international markets, and with the availability of substitute technology and financing from the Multilateral Fund, developing countries have begun to limit ODS growth and some countries have reduced ODS consumption ahead of Protocol requirements. For sectors most affected by market forces, the lag behind developed country conversion to non-ODS has been limited to 3-5 years. This has largely taken place with limited local government action. Government officials have played a key role in raising awareness and helping enterprises gain access to Multilateral Fund technical consultants and funding, but government policies in developing countries to limit ODS production, consumption or imports have been, and, in most cases remain, a low priority. This is reflected in the percentages given in Table A5.2.

ODS consumption growth over the period 1995/96-1999 will be reduced and will even be negative in many developing countries. However, this applies to the ODS consumption pattern in absolute sense. In relative sense, many Article 5(1) countries show growth in consumption in those areas that have not been addressed by investment projects under the Multilateral Fund. This implies that ODS and their associated technologies are available, that there are no economic reasons to phase out and that domestic policies are often not in place, or are not made effective; this also applies to the effectiveness of e.g. import bans if such exist. There is therefore still a daunting task to curb and phase out the ODS use in those areas that can and should be addressed via domestic policies.

Claims by Article 5(1) countries of achieving percentage growth reductions in the range of 5-10% per year due to domestic policies are likely to be overly optimistic. Sometimes, higher consumption is found in sectors not covered by earlier surveys but is revealed when annual data on ODS imports and exports begin to be submitted; and, on occasion, the claimed percentage reductions mistakenly take into account the influence of investment projects on ODS consumption.

The model made best fits to the ODS (CFC) data submitted by the countries via the application of a “net growth percentage”; whose principle has been explained above. In several cases negative values could be used, in other cases large positive “net growth percentages” yielded a best fit. In some cases “net growth percentages” in the order of 15-30% had to be applied to simulate sudden consumption increases. Since this cannot be realistic for the period after 1995, the Task Force has limited the “net growth percentage” to 8-10% and applied a best (‘smooth’) fit to the 1995-1997 period.

Given the fact that many countries show positive "net growth percentages" during 1995-1997, it can be assumed that domestic policies have to be made much more effective in the future. This may well be the case since the 1999 freeze of CFCs mandates that control measures are put in place to ensure compliance. However, it was impossible for the Task Force to judge whether domestic policies in the period after 1999/ 2000 would yield negative "net growth percentages". For this reason a conservative approach was followed. It was assumed for the Reference Replenishment Assessment that, for all countries, this "net growth percentage" would be equal to zero; in fact, this is the worst case scenario assuming full compliance.

The effect of different values for this parameter for the period after 1999/ 2000 is further investigated in the "sensitivity analysis" part of this report, given in Annex 7.

Values for the "net growth percentages" for the different Country Categories are given in Table A5.2

Table A5.2 *Relative consumption trends (periods 1995-99 and 1999-future years) for the different categories of countries as used in the model for the Base Case for the 2000-2002 Replenishment*

Country Category/Country type	**Relative consumption trend (% net growth) 1995-1999**	**Relative consumption trend (% net growth) 1999 – future years**
Category 1	-10% - +8%	0%
Category 2	-8% - +10%	0%
Category 3	+6%	0%
Category 4	-5%	0%
Category 5	+5%	0%

For halon consumption trends, monitoring is easier because of the relatively small market. Most countries mention a substantial reduction in consumption due to the influence of domestic policies (often a ban on imports). However, growth is still taking place in some countries. For the Base Case, a certain reduction is derived for halon consumption after 1998 for virtually all Article 5(1) countries (including all countries in Category 1), followed by a fixed reduction percentage per year following the freeze by 2002 (this reduction percentage is either based upon historic data on consumption and the tendencies derived, or on prescribed consumption levels (such as in the Chinese halon sector phaseout strategy)).

For Annex B and Annex E substances not much is known about the potential effects of domestic policies on their consumption growth rates. Although there

is no freeze for CTC, the same type of schedules apply to CTC and 1,1,1 trichloroethane (methyl chloroform). After 1999, CTC consumption is assumed to decrease by 17% per year (first reduction step: 85% by the year 2005) and after the year 2003 the consumption of 1,1,1 trichloroethane (methyl chloroform) is assumed to decrease by 15% per year (first reduction step: 30% by the year 2005).

Annex E substances will be subject to a freeze by the year 2002, followed by a 20% reduction step by the year 2005, which implies an average reduction of 8.33% per year.

A5.6 Factors Applied: Cost-effectiveness

Table A2.5 in Annex 2 presents the cost-effectiveness thresholds agreed by the Executive Committee for taking decisions on project approvals, and also notes the exemption for the low volume consuming countries (LVCs).

In the model, one could apply the same cost-effectiveness values to all countries for all years for all projects. This was not done in the 1997-1999 Replenishment study, where the data on the projects that were approved by the 17th, 18th and 19th Meetings of the Executive Committee revealed differences in average cost-effectiveness values for the different sectors and the different countries.

However, further study of all approvals through 1999 did not yield such systematic differences as observed earlier during 1996, when the 1997- 1999 Replenishment for the Multilateral Fund was determined. This is likely to be ascribed to the fact that the type of projects (and the sizes of enterprises) which has been submitted in recent years does not show the substantial differences between different sizes of countries as observed earlier.

A5.7 Cost-effectiveness and SMEs

In the cost-effectiveness factors to be applied for the replenishment period 2000-2002, the influence of SMEs should be considered. This is also based upon the consideration that SMEs were already considered in a “US$ 10 million SME window” decided by the Executive Committee in 1998.

The UNDP/UNEP document (UNEP/OzL.Pro/ExCom/19/54) /UND96/, dated 12 April 1996 mentions a number of consequences of SMEs being left behind in the ODS phaseout process which include

- the global ODS phaseout will be delayed;
- increased dependence on larger companies or on multinational subsidiaries;

- some SMEs may witness an increase in their ODS consumption if larger companies shift some CFC usage to SMEs, which could result in a more difficult ODS elimination;
- consumption of ODS in SMEs may continue to grow as long as CFC technologies remain cheaper than ODS replacement technologies.

The same document also mentions that there is no universally acceptable definition of SMEs. It continues: "At the policy level, many developing country governments define SMEs in terms of a combination of investment level, number of employees, sales revenues etc. We will thus characterise and identify SMEs on a sectoral basis. There are, however, several general characteristics that SMEs normally have:

- a small production capacity;
- a low level of investment;
- a higher number of employees per unit of production compared to larger companies;
- a generally low level of health and safety standards;
- low awareness about environmental issues; and

dependence on larger industries for the supply of products, raw materials and 'technology feedback'."

It is difficult to generalise for all sizes Article 5(1) countries (or Categories of countries) and for all application sectors. The Task Force has studied the documents available on SMEs, which include a study carried out in India and a study conducted by INE and UNDP in Mexico, which was completed January 1998.

Information was obtained from countries in Categories 1, 2 and 3 concerning the percentage consumption of SMEs in the total consumption. A wide range of values were mentioned; in some cases it was even mentioned that "99% of a country's consumption" was for servicing existing refrigeration equipment. On average, the percentage consumption in all Country Categories for SMEs and servicing enterprises (often called SMEs) can be assumed to be 40-50%, where this percentage can be substantially higher for low volume consuming countries.

The following has therefore been assumed in the model calculations, in percentage consumption of the base level (the average consumption level 1995/1996/1997):

Large (remaining) manufacturing operations	35%
SMEs involved in manufacturing	15%
Enterprises involved in servicing	30%
Informal, unorganised sector	20%

Approvals during the replenishment period 2000-2002 are related to projects to be implemented between 2002 and 2005 when 50% of the base level consumption has to be phased out. Therefore it is assumed that, during 2000-2002, projects in large manufacturing and SME manufacturing operations are addressed. The UNDP/UNEP document mentions an approximate increase of 80% of the costs for SMEs.

The following assumptions seem reasonable and have been used:

- The share of SMEs in the CFC consumption can be determined per Country Category;
- SME projects are on average 80% more expensive than non-SME projects (information obtained from the UNDP/UNEP document and from country information);
- During the period 2000-2002 the share of the SMEs (15% in the total) in the 50% of the (CFC) consumption to be addressed equals 30%;
- Cost-effectiveness for SME projects may be higher than the one for other projects, but the cost-effectiveness will never be higher than the cost-effectiveness threshold value. However, costs for SME projects will need additional MLF resources for awareness raising, training, technology co-operation, policy, etc., which is an implicit increase of the cost-effectiveness threshold.

This implies that an "average" cost-effectiveness value can be calculated from

CE new (incl. SMEs) = (0.7 + 0.3*1.8) * (CE (projects 1994-1998))

which is in fact an increase of the cost-effectiveness value in USD/kg ODP by 24%.

Table A5.3 *Cost-effectiveness threshold values and cost-effectiveness values applied in this study (US$/kg ODP) (including the influence of SMEs)*

Country	**CE** Threshold	**Large/Medium Scale** Category 1/2/3	**LVC<360 ODP** Category 4	**LVC<100 ODP** Category 5
Sector				
Aerosols	4.40	3.52 (80%)	6.16 (140%)	6.16 (140%)
Foams	9.53	6.39 (67%)	9.53 (100%)	9.53 (100%)
Halons	1.48	0.53 (36%)	1.12 (76%)	1.12 (76%)
Refrigeration	15.69	15.69 (100%)	25.10 (160%)	25.10 (160%)
Solvent 113	19.73	16.77 (85%)	33.54 (170%)	33.54 (170%)
Solvent TCA	38.50	38.50 (100%)	65.45 (170%)	65.45 (170%)

Note 1: The percentages contained within the parentheses were calculated for the actual cost-effectiveness values pertaining to each Category of countries as a percentage of the Executive Committee's established cost-effectiveness thresholds. For example, the threshold value for

refrigeration is determined from the values for domestic and commercial refrigeration with an allowance for higher values attributed to hydrocarbon-based projects (assumed to be 50% of the total number of projects). In several cases, the calculated cost-effectiveness values for the refrigeration, foams and solvents sectors were not significantly different from the cost-effectiveness threshold values. In these cases, the same values were used.
Note 2: According to a decision by the Executive Committee, no cost-effectiveness threshold value applies for countries with a consumption level lower than 360 ODP tonnes (i.e., LVCs), at the time when the country's Country Programme was approved.
Note 3: The cost-effectiveness values for the countries in the Categories 1, 2 and 3 were derived from actual data /MFS99/ and were adjusted for increases due to SME percentages. No cost-effectiveness value in the Country Categories 1, 2 and 3 is assumed to be higher than the threshold.

Given the fact that there was no significant difference between projects per Country Category, and the fact that the SME percentage is assumed to be country-type independent (lacking further detailed information), the cost-effectiveness values applied in this study have been assumed identical for all countries in Categories 1, 2 and 3 for all years considered (2000-2002). The values presented in Table A5.3 are estimates based on projects that have been approved to date, with the additional influence of the SME infrastructure on the cost-effectiveness taken into account.

The level of 360 ODP tonnes is used to classify countries as Low Volume Consuming Countries (LVCs). The model therefore assumed higher cost-effectiveness values (higher amount of USD/kg) for the countries in Categories 4 and 5 (consumption lower than 360 and 100 ODP tonnes, respectively). By the way, no threshold values have been set by the Executive Committee for the countries consuming less than 360 ODP tonnes annually. The cost-effectiveness values have been increased for the LVCs (the countries in Categories 4 and 5) by factors that have been estimated by drawing on experience with project preparation and appraisals.

The Task Force assumed that the cost-effectiveness values used are likely to decline in future with an increasing application of sector approaches to ODS phaseouts which are expected to be significantly more cost-effective than projects based on the current enterprise-by-enterprise approach. This assessment provides a credible reason for not assuming values of cost-effectiveness that are higher than the threshold. Furthermore, the Task Force expects that the cost-effectiveness value, expressed in US$/kg, will be lower in the near future due to an increase in CFC prices, which will reduce the incremental operating costs (the influence is assumed to be at least 10% averaged over all sectors, which would give extra financial room to address all types of SME projects within the existing cost-effectiveness threshold values). However, it is very much dependent on the phaseout schedule for the Article 5(1) production sector.

Outlook to the Replenishment period 2003-2005

If one would also consider the 2003-2005 period where approvals are related to completion of project implementation during the period 2005-2007/08 (when CFC consumption has to be brought back to 15% of the base level) it can be assumed that a large part of projects has to address the servicing sector or end-user retrofits. In Decision X/13, the Task Force was not explicitly requested to take this into account, since guidelines regarding cost-effectiveness are lacking where it concerns servicing and retrofits.
So far a number of servicing / retrofit projects have been formulated for CIS countries, which have been approved by the Global Environment Facility (which included recovery and recycle). Cost-effectiveness thresholds applied were the same as for refrigeration investment projects addressed so far by the Executive Committee under the Multilateral Fund. Lacking further information, it can reasonably be assumed that the same cost-effectiveness figures could be applied in order to calculate *a first approximate* value for the funding requirement for the replenishment period 2003-2005.

Significantly more time than spent for the present study would be needed for a detailed replenishment study to be carried out for the funding requirement for the period 2003-2005 with instructions from the Parties. This would particularly relate to collecting the necessary (country specific) consumption data. The Replenishment Task Force could continue to collect information during the period 2000-2001 in order to be able to carry out a replenishment study in 2001/2002, if the Parties would instruct the TEAP to do so.

Annex 6 Methyl Bromide Calculations and Results

A6.1 Introduction

Methyl bromide (MB) is used by Article 5(1) Parties mainly as a pre-plant soil fumigant for producing certain high value crops such as tobacco, cut flowers, strawberries, bananas, melons; and tomatoes, peppers and some other vegetables. Its use has been mainly for export crops /MBC94, MBC98/, but recently a significant number of domestic crops have also been produced with MB. Its other major controlled use by Article 5(1) countries is for killing pests infesting stored, durable commodities. Consumption by Article 5(1) Parties was estimated by MBTOC in 1998 to be approximately 23-26% of global MB consumption in 1996.

MB is a significant ozone depleting substance (ODS) whose elimination was identified as the single greatest remaining step that Parties could undertake to protect the ozone layer /UWMO94/.

Under the Montreal Protocol, Article 5(1) Parties are scheduled to achieve a freeze in MB consumption by 31 December 2002, based on their average consumption reported to the Ozone Secretariat over the four year period from 1995 to 1998. This average consumption is called the 'baseline'. A further 20% reduction in baseline consumption is scheduled for 2005.

This report provides an analysis to assist the Parties in determining the funds required to eliminate sufficient MB consumption to meet the freeze in consumption and production in 2002. As consideration will have to be given to funding projects in 2000-2002 aimed at eliminating MB to meet the 20% reduction in 2005, this report also considers the funds required to eliminate sufficient MB consumption and production to meet the 2005 reduction step.

The analysis was conducted in two stages:

1. Base Case

Firstly, the officially reported consumption for 121 Parties was entered into a database, and total consumption was graphed. As only one Article 5(1) Party produced MB, the production for this party was entered into a database and graphed. Secondly, recent trends in consumption for individual Parties were extrapolated to 2005. The trend in production was also extrapolated to 2005. These extrapolations were based on best-fit statistical lines for each Party's officially-reported, annual consumption and production over a number of years. The section below provides details of the methods employed.

2. *Sensitivity Analysis*

Factors were identified that might affect the consumption volumes and/or cost of projects to reduce MB. A model was developed to provide estimates of the impact of individual and combined factors on MB consumption and MLF funding levels. The model considered factors relative to the Base Case which affect MB consumption and the costs of eliminating MB to meet the freeze and reduction schedule, such as:

- Recent trends in consumption for each Party reporting to the Ozone Secretariat;
- For the freeze, the number of Parties that have ratified the Copenhagen Amendment and potential number signing in the next few years;
- For the 20% reduction step, the number of Parties that have ratified the Montreal Amendment and potential number signing in the next few years;
- The influence of MLF projects commissioned prior to the next replenishment period;
- Time-scale for implementing MLF projects;
- The cost-effectiveness of investment projects; and
- The potential reduction of MB through policy development projects.

A6.2 Methods

A6.2.1 Base Case

Data source

For the Base Case, the consumption data that had been submitted to the Ozone Secretariat from Article 5(1) Parties up to March 1999 were considered in the analyses (Ozone Secretariat database as at 25 March 1999). No other data for MB consumption were considered.

MB consumption is an annual calculation (Consumption = (Imports + Production) - Exports) performed by the Ozone Secretariat that does not always relate to MB use by a Party. The controlled consumption reported by the Ozone Secretariat excluded consumption for Quarantine and Pre-shipment (QPS).

Only production data that had been submitted to the Ozone Secretariat from the Article 5(1) Party concerned were considered in the analyses (Ozone Secretariat database as at 25 March 1999).

Statistical analysis

The consumption data for MB from 121 Article 5(1) Parties, recorded by the Ozone Secretariat for the years 1991, 1994, 1995, 1996 and 1997, were entered into a database. The Parties that had reported data for three or more years had their consumption trends analysed. Those Parties with less than three years data were excluded.

The production data for 1 Article 5(1) Party were entered into the database for the years that were reported of 1995, 1996 and 1997. Extrapolations for the years 2000-2005 did not exceed the maximum capacity of both plants that are currently operational.

For each Party in turn, recent trends - whether increasing, decreasing or stable - were extrapolated to provide the best-fit trend in annual MB consumption for the years 1998-2005 using SigmaPlot® statistical software /SPS97/.

The analysis to determine the quantity of MB that would need to be eliminated to meet the controls in 2002 and 2005 occurred in four stages:

1. *A scatter plot of the consumption or production data for each country was generated.*
2. *A library of regression equations was then tested against the scatter plot to identify a line that gave the best-fit to the consumption data for each Party.*
3. *The regression equation with the highest R-squared value for each Party's consumption was used to predict MB consumption for that Party in 1998, 2002 and 2005. The 1998 consumption was required as the last year of consumption necessary to compute the baseline consumption for each Party. The baseline consumption is the average annual consumption for the period 1995-1998.*
4. *The quantity of MB that would need to be eliminated by each Party to meet the freeze on consumption was estimated by subtracting the baseline from the estimated consumption in 2002. The quantity to be eliminated to meet the 20% reduction in consumption in 2005 was calculated by reducing the baseline by 20% and subtracting this value from the estimated MB consumption for each Party in 2005.*
5. *The quantity of MB produced that would need to be eliminated by the Party to meet the freeze was estimated by subtracting the baseline from the estimated production in 2002. The quantity to be eliminated to meet the 20% reduction in production in 2005 was calculated by reducing the baseline by 20% and subtracting this value from the estimated MB production for the Party in 2005.*
6. *The total quantity of MB that would need to be eliminated was determined by adding up the MB consumption of Parties that would need to make reductions, and excluded those Parties whose estimated consumption in 2002 and 2005 were estimated to meet the scheduled controls, based on current consumption trends.*

Low and high consuming Parties

Parties were categorised as 'low' and 'high' consumers according to how much estimated MB each would need to eliminate to meet the controls in 2002 and 2005. Note that these terms did not denote permanent and definitive categories of low and high MB consumption, but merely provided a convenient classification for the purposes of this analysis.

- 'High consumers' More than 100 ODP-tonnes of MB
- 'Low consumers' Less than 100 ODP-tonnes of MB

Copenhagen and Montreal Amendments

Where relevant, the analyses reported separately on consumption trends for Parties that have signed, and have not signed, the Copenhagen Amendment (for the freeze) and the Montreal Amendment (for the 20% reduction step) as at 15 January 1999.

According to current MLF Guidelines on MB projects, Parties that have ratified the Copenhagen Amendment are eligible for investment projects /ExC97a/. Parties that have not ratified the Amendment are not normally eligible, unless a letter has been received indicating their intent to ratify the Amendment within nine months. Current MLF Guidelines state that non-signatory Parties may be eligible for funds for information transfer and policy development.

Therefore, additional Parties ratifying the Copenhagen and Montreal Amendments in the next few years will increase the potential level of project funding required.

Dollar per kg value

By early 1999, the MLF Executive Committee had approved only two Investment Projects resulting in very limited information on the costs of eliminating MB on a per kg basis. One of the Implementing Agencies estimated informally that future costs of MB investment projects might vary from US$ 8 to US$ 15 per kg, depending on the crop.

The approach in this report was to use US$ 12 per kg as this figure was provided in the Consolidated Draft 1999 Business Plans of the Implementing Agencies. A value of US$ 12 was the highest listed in Table A6.5 of this report (MLF Secretariat 1998).

A6.2.2 Sensitivity Analyses

Key factors examined

Four sensitivity analyses were applied to determine factors that could require greater or lesser expenditure from the MLF for eliminating sufficient MB to meet the freeze and the 20% reduction step. The factors investigated were:

1. Increased ratification of the Copenhagen Amendment by Parties that are currently not signatory;

2. Higher and lower costs per kg for eliminating MB;

3 Increased MB consumption data; and

4. A reduction in MB use brought about by existing Projects.

The methodology for 1) and 2) was the same as that used in the Base Case. The methodology for 3) and 4) is described below.

Impact of MLF Projects on MB Consumption

The MLF Guidelines state that 'Demonstration Projects may, in the course of field testing, bring about a *small reduction* in MB use, but their primary purpose is to demonstrate the efficacy of alternatives to facilitate the broader scale implementation of informed Investment Projects' (UNEP/OzL.Pro/ExCom/24/47 - Annex IV; 1997; italics added by TEAP).

Although it is difficult to predict the future impact of Non-Investment Projects on MB consumption , for the purposes of this report, the Executive Committee provided estimates of possible impact. The Executive Committee suggested that the analysis should assume that approved Demonstration Projects would achieve MB reductions of about 5%; and that existing Non-Investment Projects would achieve MB reductions of about 5% (ExCom, pers.comm. March 1999).

Time-scale for projects

The analysis also examined the time that it might take to implement MB projects to meet the freeze. At present, Demonstration Projects typically precede Investment Projects, so the number and completion date of the commissioned Demonstration Projects were plotted as a histogram, see below. This provided an indication of the likely timing of the start of Investment or Non-investment Projects for the Sensitivity Analysis.

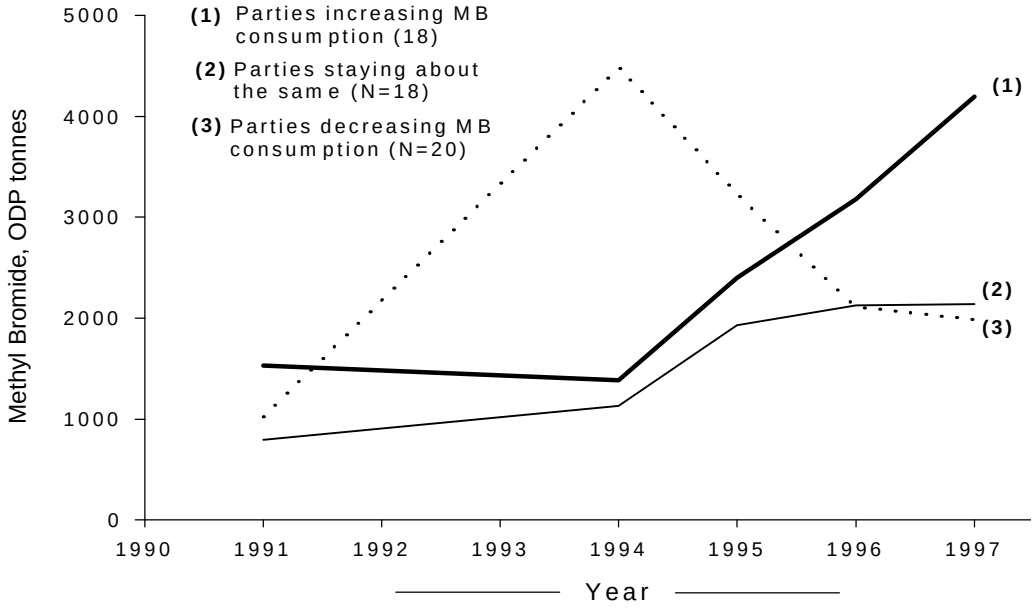
A6.3 Results and Discussion

A6.3.1 Base Case

Methyl bromide consumption

The MB consumption data for the years 1991 and 1994-1997 that had been reported to the Ozone Secretariat was graphed for 18 Parties there were increasing MB consumption, for 20 Parties that were decreasing MB consumption and for 18 Parties whose consumption was staying about the same (Figure A6.1).

Figure A6.1 *Reported consumption of methyl bromide by Article 5(1) Parties for the years 1991 and 1994-1997. Consumption was based only on data reported to the Ozone Secretariat up to 9 April 1999.*



For all Parties together, total consumption was predicted to increase only slightly in the period 1998-2005, from 7,952 ODP tonnes in 1998 to 8,029 ODP tonnes in 2005. There are a number of uncertainties that could alter this prediction and these are discussed below.

An overview analysis of the database storing the consumption data for each Party showed that, out of 121 Article 5(1) Parties, 40 Parties had never reported consumption data on MB, 23 had reported for only one year and one Party had reported for two years. It was not possible to predict consumption trends for these 64 Parties.

For the remaining 57 Parties, 9 Parties had reported MB consumption data on three occasions, 14 Parties on four occasions, and 34 Parties on five occasions. One of these Parties had reported on 4 occasions but their data were not able to be analysed. Therefore, the remainder of this report focuses on the consumption trends for 56 Article 5(1) Parties (Table A6.1) where there were sufficient data for analysis.

Table A6.1 *Suitability of MB consumption data for prediction of future consumption. The data on individual consumption by Parties were provided by the Ozone Secretariat.*

Number of years Reported for the years 1991 and 1994-97	**---------- Number of Parties ----------**	
	Analysis not possible due to insufficient data	Sufficient data for analysis
0	**40**	**---**
1	**23**	**---**
2	**1**	**---**
3	**---**	**9**
4	**1**	**13**
5	**---**	**34**
TOTAL	**65**	**56**

Statistical analysis and extrapolation to 2005 for these 56 Parties showed that MB consumption would be expected to increase in 17, decrease in 20 and remain relatively unchanged in 19. Increased consumption by 8 Parties was much greater than those Parties expected to decrease consumption, and hence the overall trend was an increase in MB consumption to a plateau of slightly more than 8,000 ODP tonnes in 2005.

Methyl bromide production

MB production was predicted to reach maximum capacity of 2,580 ODP tonnes in 1999 for the Party and remain at this level until 2005. This prediction is based on no expansion of production capacity during 1999-2005.

Elimination of MB consumption to meet the 2002 freeze

Thirty-six Parties, out of the 56 analysed, would be expected to consume MB below their individual baseline levels by 2002, and therefore they would be expected to meet the freeze. The remaining 20 Parties would be expected to increase MB consumption after the baseline period, contributing to a total of 4,054 ODP tonnes that would need to be eliminated to meet the freeze (Table A6.2).

Twelve Parties that are signatory to the Copenhagen Amendment would need to eliminate 1,195 ODP tonnes of the total MB to meet the freeze (Table A6.2). Eight Parties currently not signatory to this Amendment would need to eliminate 2,859 ODP tonnes of MB to meet the freeze.

Five Parties categorised as High-Consumers (>100 ODP tonnes MB per annum) consumed 90% (3,653 out of 4,054 ODP tonnes) of the MB that would need to be eliminated to meet the freeze (Table A6.2). One Party alone that had not ratified the Copenhagen Amendment would be expected to consume 65% of the MB that would need to be eliminated to meet the freeze.

Table A6.2 *Estimated volume of methyl bromide that would need to be eliminated to meet the 2002 freeze. High-Consumers are those Parties that consume greater than 100 ODP tonnes and Low-Consumers are those that consume less than 100 ODP tonnes.*

Ratification of Copenhagen Amendment	**High-Consumers** ODP tonnes (number of Parties)	**Low-Consumers** ODP tonnes (number of Parties)	**Estimated Total** ODP tonnes (number of Parties)
Parties signatory to the Copenhagen Amendment	1,010 (4)	185 (8)	1,195 (12)
Parties not currently signatory to the Copenhagen Amendment	2,643 (1)	216 (7)	2,859 (8)
TOTAL	3,653 (5)	401 (15)	4,054 (20)

For 24 Parties who reported consumption data on one or two occasions that was insufficient for statistical analysis (see Table A6.1, 23 + 1), their highest reported historical consumption in any one year was taken as future potential consumption. Based on this analysis, 2 Parties who have signed the Copenhagen Amendment may need to eliminate about 500 ODP tonnes to meet the freeze, and the remaining non-signatory Parties would be expected to consume about 100 ODP tonnes.

Elimination of MB consumption to meet the 20% reduction in 2005

Table A6.3 shows the estimated consumption of MB that would need to be eliminated to meet the 20% reduction in 2005.

Of the 56 Parties that could be examined in detail, consumption by 33 Parties would be expected to decline below their individual baselines sufficiently to

meet the reduction in 2005. The remaining 23 Parties would be expected to consume MB above their baselines, each contributing to a total of 6,851 ODP tonnes that would need to be eliminated to meet the 2005 reduction (Table 3).

As at 15 January 1999, only one Party has ratified the Montreal Amendment. The number of Parties ratifying this Amendment prior to 2005 is likely to increase. For this report, we have assumed that a similar ratio for Parties signing the Copenhagen Amendment would also apply to the Montreal Amendment. Table A6.3 estimated that 14 Parties would have signed the Montreal Amendment by 2005 and would need to eliminate 2,101 ODP tonnes of MB to meet the 2005 reduction. Nine Parties would probably not have signed this Amendment and would need to eliminate 4,750 ODP tonnes of the MB to meet the 2005 reduction step.

Seven Parties categorised as High-Consumers (>100 ODP tonnes MB per annum) are estimated to consume 94% (6,353 out of 6,851 ODP tonnes) of the MB that would need to be eliminated to meet the reduction step (Table A6.3).

Table A6. 3 *The volume of methyl bromide that would need to be eliminated to meet the 20% reduction in 2005. High-Consumers are those Parties that consume > 100 ODP tonnes and Low-Consumers are those that consume < 100 ODP tonnes.*

Ratification of Montreal Amendment	**High-Consumers** ODP tonnes (number of Parties)	**Low-Consumers** ODP tonnes (number of Parties)	**TOTAL** ODP tonnes (number of Parties)
Parties signatory to the Montreal Amendment	1,787 (5)	314 (9)	2,101 (14)
Parties not currently signatory to the Montreal Amendment	4,566 (2)	184 (7)	4,750 (9)
TOTAL	6,353 (7)	498 (16)	6,851 (23)

Uncertainties in consumption data

Uncertainties in predicting future consumption could arise if:

- The regression line for each Party is inaccurate;
- MB consumption and production are reported inaccurately;
- Additional Parties report MB consumption;

- Commercial decisions result in more or less MB being consumed; and
- Investment and Non-Investment projects reduce MB in various amounts and at various times.

Accuracy of regression lines

Approximately 94% of the ODP tonnes of MB that would need to be eliminated to meet the freeze were associated with regression lines that were a 'good' fit to the consumption data for each Party (Table A6.4). The 20 regression lines that were a poor fit represented only 6% of the MB consumption that would need to be eliminated to meet the freeze. On 2 occasions and for upward trends only, a 'good' fit exponential line was exchanged for a 'poor' fit linear line as the steep, upward slope of the exponential line made calculation of values in 2002 and 2005 impossible. In many cases, it was not possible to fit a 'good' line to the consumption data as they were too variable from year-to-year e.g., 200 ODP tonnes one year, zero the next.

Table A6.4 *The ODP tonnes (and number of Parties) that would need to be eliminated to meet the freeze that are associated with regression lines that are a "good" and "poor" fit to the consumption data. "Good" = R-squared values > 0.65; "Poor" = R-squared values < 0.65 (see section 2.1.2)*

Criteria	**Good fit** ODP tonnes (number of Parties)	**Poor fit** ODP tonnes (number of Parties)	**TOTAL** ODP tonnes (number of Parties)
Parties signatory to the Copenhagen Amendment	945 (21)	250 (12)	1,195 (33)
Parties not currently signatory to the Copenhagen Amendment	2,857 (15)	2 (8)	2,859 (23)
TOTAL	3,802 (36)	252 (20)	4,054 (56)

Inaccurate reporting

There could be uncertainties in the consumption data reported by Parties and the Ozone Secretariat. Some Parties, for example, might have had difficulties collecting reliable data, some might have had difficulties in distinguishing non-QPS from QPS consumption, or in some cases, mis-calculations might have arisen when handling or converting the data from tonnes to ODP tonnes.

Using several official sources of data, the Methyl Bromide Technical Options Committee (MBTOC) report estimated that Article 5(1) Parties consumed 9,210 - 10,500 ODP tonnes of MB in 1996, equivalent to 23-26% of global consumption (MBTOC 1998). MBTOC's best estimate, based on information from government departments, was 10,394 ODP-tonnes for 1996.

Examination of the MBTOC data showed that 25 Parties reported 3,100 ODP tonnes *more* MB consumption than recorded by the Ozone Secretariat. Four of these Parties reported a total consumption of 2,683 ODP tonnes *more* to MBTOC than to the Ozone Secretariat, and the remaining 21 Parties 446 ODP tonnes *more* to MBTOC than to the Ozone Secretariat. One of the four Parties was South Africa, categorised as an Article 5(1) Party in the MBTOC survey but as a non-Article 5(1) to the Ozone Secretariat. At the Ninth Meeting of the Parties in 1997, South Africa agreed to re-classification from non-Article 5(1) to Article 5(1). As this Party has undertaken not to request financial assistance from the Multilateral Fund for fulfilling commitments undertaken by developed countries prior to that Meeting, it is not included in the Ozone Secretariat Article 5(1) database.

Some of the discrepancies between the MBTOC and Ozone Secretariat data might also have been due to some Quarantine and Pre-shipment use being incorrectly included in the consumption data being reported to the Ozone Secretariat.

Additional Parties report MB consumption data

Forty Parties out of 121 Parties in the Article 5(1) database have not reported MB consumption. If some of these Parties consume MB and choose to report consumption for any of the years from 1991, the amount of MB that would be expected to be consumed by Parties would probably increase.

Similarly, if any of the 64 Parties (see Table A6.1) that have reported MB on none, one or two occasions decide to report MB consumption in the future, the amount of MB that would be expected to be consumed by Parties would probably increase.

The uncertainties could be reduced substantially if all Article 5(1) Parties were to annually report their MB consumption data to the Ozone Secretariat. They could be reduced further if Parties were able to re-check the accuracy of data. This would permit more accurate regression lines and trend predictions.

Commercial decisions purchasing MB

MB consumption can fluctuate from year to year. National MB consumption can increase unpredictably if commercial organisations decide to import MB to control pests for a crop that was not previously grown in that country. Conversely, MB consumption can decrease unpredictably if for example,

domestic policy is changed that results in a ban on MB imports, or an alternative treatment to MB is developed and farmers no longer rely on MB for pest control.

Investment and non-investment projects

MB consumption would be expected to decrease predictably as a result of Investment and Non-Investment Projects eliminating MB, but their impact would result in various amounts being reduced and at various times. As there are only two investment projects initiated to date, the impact of both of them has been factored into the reductions in MB that would need to be eliminated to meet the freeze.

Meeting the controls for MB production

The amount of MB that would need to be eliminated to meet the freeze in production was estimated to be 1,700 ODP tonnes.

The amount of MB that would need to be eliminated to meet the 20% reduction in production was estimated to be 1,900 ODP tonnes.

Cost of eliminating methyl bromide to meet the freeze

Based on the discussion above, a price of US$ 12 per kg was selected to provide the estimated costs for the Base Case.

The total cost was estimated to be US$ 14.3 million for eliminating sufficient MB (Table A6.2) to meet the 2002 freeze for those Parties that have ratified the Copenhagen Amendment (Table A6.5). The cost for Parties that have currently not ratified was estimated to be US$ 34.3 million. This produced a potential total of US$ 48.6 million under this scenario.

Table A6.5 *Estimated cost of meeting the freeze in 2002, based on methyl bromide consumption data for Parties provided in Table A6.2. For the purpose of this estimate, the cost of eliminating methyl bromide was assumed to be US$ 12 per kg.*

Ratification of Copenhagen Amendment	**High-Consumers** US$ (No of Parties)	**Low-Consumers** US$ (No of Parties)	**Estimated Total** US$ (No of Parties)
Parties signatory to the Copenhagen Amendment	12.1 million (4)	2.2 million (8)	14.3 million (12)
Parties not currently signatory to the Copenhagen Amendment	31.7 million (1)	2.6 million (7)	20.0 million (8)
TOTAL	43.8 million (5)	4.8 million (15)	34.3 million (20)

Table A6.6 *Based on methyl bromide consumption data provided in Table 1, the estimated cost of meeting the 20% reduction in 2005. For the purpose of this estimate, the cost of eliminating methyl bromide was assumed to be US$ 12 per kg.*

Ratification of Montreal Amendment	**High-Consumers** US$ (No of Parties)	**Low-Consumers** US$ (No of Parties)	**Estimated Total** US$ (No of Parties)
Parties signatory to the Montreal Amendment	21.4 million (5)	3.8 million (9)	25.2 million (14)
Parties not currently signatory to the Montreal Amendment	54.8 million (2)	2.2 million (7)	57.0 million (9)
TOTAL	76.2 million (7)	6.0 million (16)	82.2 million (23)

Cost of eliminating methyl bromide to meet the 20% reduction in 2005

Based on the discussion above, a price of US$ 12 per kg was selected to provide the estimated cost for the Base Case.

The total cost was estimated to be US$ 25.2 million for eliminating sufficient MB (Table A6.3) to meet the 2002 freeze for those Parties that have ratified the Copenhagen Amendment (Table A6.6). The cost for Parties that have currently not ratified was estimated to be US$ 57.0 million. This produced a potential total of US$ 82.2 million under this scenario.

Cost of reducing methyl bromide production to meet the controls

The costs of reducing production of MB by 1,700 ODP tonnes to meet the freeze would be US$ 6.8 million, based on $4 per kg (US$ 2 per kg cost, and US$ 2 as per kg compensation for future sales).

The costs of reducing production of MB by 1,900 ODP tonnes to meet the 20% reduction step would be US$ 7.6 million, based on the same price criteria calculated for the freeze.

These dollar values were arbitrarily based on $4 per kg. A study would be required to determine more precise values.

A6.3.2 Sensitivity Analysis

Compared to the Base Case, the Sensitivity Analysis estimated the funds required to eliminate sufficient MB to meet the freeze if:

- More Parties ratify the Copenhagen Amendment;
- The ODP-kg cost of MB was more expensive;
- Actual consumption was more than reported to the Ozone Secretariat; and
- Projects already commissioned by the MLF result in a reduction of MB consumption.

More Parties ratify the Copenhagen Amendment

Parties that have not ratified, or who have not officially provided their intention to ratify, are not eligible for MLF funding for projects to eliminate MB. If further Parties ratify the Amendment and consume MB in volumes that would be expected to not meet the freeze, the amount of MB consumption eligible for funds from the MLF will increase.

If all 8 Parties (see Table A6.2) that account for 100% of the 2,859 ODP-tonnes were to sign the Copenhagen Amendment, then a sum of approximately US$ 34.3 million (Table A6.5) would be needed to reduce the expected MB consumption to meet the freeze.

Of the 24 Parties whose consumption was not sufficient for statistical analysis, their maximum reported consumption in any one year was 600 ODP tonnes (including 2 Parties that had signed the Copenhagen Amendment and consumed about 500 ODP tonnes). Based on this analysis, 22 Parties who have not signed the Copenhagen Amendment consumed a total of about 100 ODP tonnes. Therefore, at US$ 12 per kg, a sum of approximately US$ 1.2 million for 100 ODP tonnes would be needed to reduce the expected MB consumption of these non-signatory Parties to meet the freeze.

The Party that produces MB has not ratified the Copenhagen Amendment. If this Party were to ratify the Amendment, the cost would be US$ 6.8 million to reduce production by 1,700 ODP tonnes to meet the freeze.

The estimated cost for eliminating MB sufficient to meet the freeze would therefore be US$ 14.3 million for those Parties that have signed the Amendment, US$ 34.3 million for those that have not, US$ 7.2 million for 600 ODP tonnes associated with Parties that have reported MB in the past but not frequently enough for statistical analysis, and US$ 6.8 million for production reduction for a Party that has not signed the Amendment. The total cost is therefore estimated to be approximately US$ 62 million for eliminating 6,354 ODP tonnes (i.e., 4,054 + 600 + 1,700) to meet the freeze.

Increased/decreased dollars per kg

The cost of US$ 12 per kg (the highest cost-effectiveness figure produced in the MLF report, according to the 1999 Consolidated Business Plans of the Implementing Agencies) could be too conservative for reducing MB consumption when the costs from projects already commissioned are considered. To date, the only two Investment Projects commissioned to eliminate MB indicated a phase out cost of US$ 38 and US$ 101 per kg.

Based on these costs, it may be reasonable to apply a cost of US$ 30 per kg for Investment and Non-Investment projects on the assumption that project implementation and effectiveness for eliminating MB would improve in the next 1-2 years. For Parties that have signed the Copenhagen Amendment, this would result in a cost of US$ 50.9 million for eliminating 1,695 ODP tonnes (1,195 (Table 1) + 500 (Section 3.2.1) ODP tonnes) of MB to meet the freeze and US$ 60.3 million to eliminate sufficient MB to meet the 20% reduction step.

Conversely, other types of projects, such as projects that develop policies at domestic level, may be *more* cost-effective than the Base Case at a cost of US$ 12 per kg. Effective domestic policies such as awareness campaigns, regulatory controls, taxes, import bans, consumer policies and pricing policies were estimated to be 4-7 times less costly than other methods of eliminating ODS /TEA96/. Further work to establish the cost-effectiveness of such policies in

eliminating MB is beyond the scope of this report but we recommend that it should be undertaken.

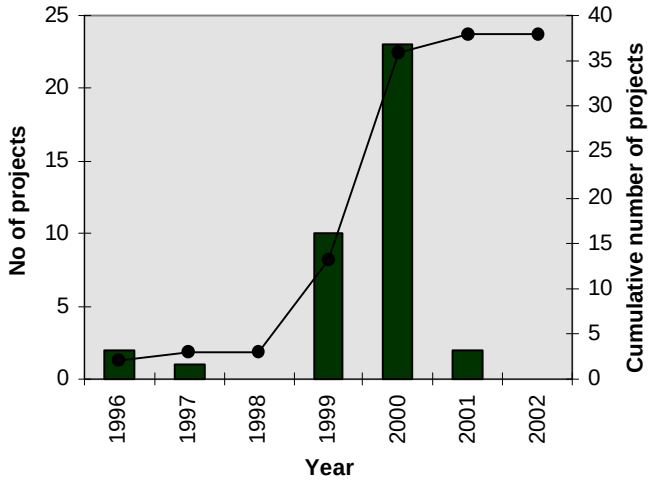
Increased Actual Consumption

Actual consumption data may be greater than reported to the Ozone Secretariat. Some Implementing Agencies provided alternative consumption data for nine Article 5(1) countries for most of the years 1995, 1996 and 1997. Analysis of the data suggested that on average, these countries consumed 36% more MB than figures reported to the Ozone Secretariat. The results of a sensitivity analysis showed that, as this increase contributed proportionately to the baseline as well as to the total consumed, the net amount of MB that would need to be eliminated to meet the freeze was very similar to the amount under the Base Case. Therefore, significant increases in MB data previously reported to the Ozone Secretariat would only have a significant impact in cases where reported MB consumption increased for years *after* 1998, the final year that contributed toward the average baseline.

Completion of Demonstration Projects

An analysis of the completion dates for the Demonstration Projects approved by January 1999 showed that more than 90% of them are due to finish by December 2000 (Figure A6.2). Assuming a 2-3 year lag time for Investment Projects and Non-Investment Projects (e.g. training, policy) to be completed to eliminate sufficient MB, consideration should be given to "early start" initiatives for projects so they overlap with the final year of the Demonstration Project in order to ensure MB reductions are achieved in time to meet the freeze.

Figure A6.2 *Scheduled Annual Completion of Approved Methyl Bromide Demonstration Projects, as at January 1999.*



Impact of Existing MB Projects

Almost 40 Demonstration Projects on MB alternatives have been approved as of January 1999 (Figure A6.2). In addition, several Non-Investment Projects have been implemented, including workshops and production of information material on topics such as MB action plans, companies supplying MB alternatives, MB legislation, case studies detailing alternatives to MB, and other technical information. A policy mentor programme is also planned to assist Parties in making legislative and other changes to control their potential increase in MB consumption.

Based on information provided by the Executive Committee, if one assumes for the four year period 1999-2002 that existing Demonstration Projects will *indirectly* eliminate 5% of the total MB, and that existing Non-Investment Projects will eliminate 5% of the total MB, then the maximum amount of MB that would remain to be eliminated to meet the freeze for all Parties that have or have not signed the Copenhagen Amendment would be 4,188 ODP tonnes (i.e., 4,054 + 600 = 4,654 ODP tonnes, less 10%). The impact on the funds that would be required is discussed in the Conclusions.

A6.4 Meeting the Methyl Bromide Freeze and Reduction Step

Most of the current Demonstration Projects will be completed by December 2000. If we assume that each Investment Project or Non-Investment Project for MB will be 2-3 years long, and that such projects will commence after reviewing the results of the Demonstration Projects, then the projects would produce results too late to meet the freeze in 2002.

It is clear that Investment projects and Non-Investment projects would need to start as soon as possible in order to maximise the opportunity for meeting the freeze. In order to avoid the potential of not meeting the freeze and the reduction step, the we suggest that:

- A review is undertaken of the ‘High’ MB-consuming Parties and those that may have difficulties meeting the freeze to determine their consumption on an individual crop/commodity basis, including identification of the most promising alternatives, their cost and implementation time, and the most effective methods for implementing changes (whether investment, training, policy development or other mechanisms). The advantages of some alternatives may already be evident from the current batch of MB Demonstration Projects.
- A study is undertaken to identify other cost-effective, environmentally-acceptable alternatives such as those, for example, that involve grafting of resistant rootstock in combination with other techniques to control soil pathogens.

- Priority is given to the development and implementation of effective domestic policies that, for example, would restrict the use of MB soil fumigation to every other year (as in Italy, for example) and introduce MB taxes or pricing policies that make alternatives more attractive.

- Guidelines are established to ensure that training programmes for alternatives are linked to existing field agencies and institutes in order to leverage effort and minimise costs; and

- Every consideration should be given to identifying "early start" projects (for Investment and Non-Investment projects) where preliminary data from Demonstration Projects (yet to be completed) or other sources indicate they will be successful.

A6.5 Conclusions

Based on the model and the previous discussions, the estimated costs to the MLF for elimination of MB can be determined by consideration of the *quantity* of MB that would need to be eliminated to meet the freeze on consumption and production in 2002, the 20% reduction step in consumption and production in 2005, and the *cost* per kg of eliminating these quantities of MB.

This country-by-country analysis of the MB consumption data reported to the Ozone Secretariat showed 36 out of the 56 Parties analysed in detail would be likely to meet the freeze on the basis of recent trends. The other 20 Parties that have and have not signed the Copenhagen Amendment were estimated to consume 4,054 ODP tonnes of the MB that would need to be eliminated to meet the freeze. There could be a case for excluding non-signatory consumption, but if the largest non-signatory were to ratify the Amendment before 2000, 92% of the estimated consumption from non-signatory Parties would be eligible for funds. A further 24 Parties who reported infrequently and were not able to be statistically analysed were estimated to consume about 600 ODP tonnes. The total amount of MB that would need to be eliminated to meet the freeze was therefore estimated to be 4,654 ODP tonnes for consumption (excluding 1,700 ODP tonnes for production at this stage).

If the effect of Demonstration, Investment and Non-Investment projects commissioned prior to 1999 is assumed to be a 10% *indirect* reduction in the amount of MB that would need to be eliminated, then this would leave **4,188 ODP tonnes** (4,654 less 10%) of MB to be eliminated to meet the freeze in 2002.

For Parties that would not likely ratify the Montreal Amendment, the total amount of MB that would need to be eliminated to meet the 20% reduction step in 2005 was estimated to be **2,101 ODP tonnes**.

Over the next 2-3 years with increased effort directed at project implementation efficiency, targeted policy and training, it is possible that the cost-effectiveness may be reduced to US$ 12 ODP-kg.

Based on this cost-effectiveness figure, the costs of eliminating MB to meet the freeze for Article 5(1) Parties that have and have not signed the Copenhagen Amendment would be US$ 50.3 million for eliminating 4,188 ODP tonnes of MB. To this cost could be added the costs of reducing production to meet the freeze of US$ 6.8 million to eliminate 1,700 ODP tonnes.

The costs of eliminating MB to meet the 20% reduction step in 2005 for Article 5(1) Parties that are likely to have signed the Montreal Amendment would be US$ 25.2 million for eliminating 2,101 ODP tonnes of MB. The amount allocated from the MLF to meet this reduction step could be less than US$ 24.2 million - say about 50% or US$ 12 million - as some MB would have been eliminated prior to 2005 and some projects could be funded later than 2002.

The total amount of funding estimated for elimination of MB to meet the freeze in 2002 for all Parties that would have significant consumption and production at this time, and to meet the 20% reduction in consumption of MB in 2005, would be **US$ 57.1 million** (signatory and non-signatory to the Copenhagen Amendment) and **US$ 12** million (signatory to the Montreal Amendment) - a total of **US$ 69.1** million.

Annex 7 Funding Estimates: Sensitivity To Key Factors

In this annex, sensitivity analysis is presented for the major part in the funding requirement for the replenishment 2000-2002, i.e. the CFC consumption sector. This annex investigates the influence of growth percentages (domestic policies) after 2000, implementation lags, cost-effectiveness factors on the funding implications for CFC projects.

A7.1 The Size of the "Net Growth Percentage" Parameter After 1999/2000

According to the Base Case, the estimated funding required for investment projects in the consumption sector to phase out Annex A, Group 1 substances (CFCs) is US$ 39.5 million for the period 2000-2002; it is estimated to be US$ 591.8 million for the period 2003-2005. These amounts are based upon the assumption of 0% growth for those sectors that still rely on CFCs after the freeze, i.e., after the year 1999 (e.g. domestic policies, price settings and other phenomena could influence this 0% and could cause a certain negative "net growth" per year). Next to the 0% growth applied in the Base Case, the following alternative "net growth" rates for the years after 1999 have also been considered:

(i) the Base Case
(ii) the Base Case plus 2% negative "net growth",
(iii) the Base Case plus 3.5% negative "net growth",
(iv) the Base Case plus 5% negative "net growth".

The resulting estimated funding requirements for the replenishment periods 2000-2002 and 2003-2005 are given in Table A7.1.

Table A7.1 *Sensitivity of funding requirements (in US$ million) to certain "net growth" percentages in all categories of countries, for CFCs only*

Countries	**Cat. 1**	**Cat. 2**	**Cat. 3**	**Cat. 4**	**Cat. 5**	**Total**
"Base Case", net growth 0%						
2000-2002	0	35.1	0	0	4.4	39.5
2003-2005	316.0	178.4	62.5	21.8	13.1	591.8
Net growth –2%						
2000-2002	0	20.8	0	0	0.2	21.0
2003-2005	256.4	158.7	51.2	17.8	13.6	497.7
Net growth –3.5%						
2000-2002	0	15.4	0	0	0	15.4
2003-2005	215.8	142.4	43.5	13.9	11.9	427.5
Net growth –5%						
2000-2002	0	10.1	0	0	0	10.1
2003-2005	178.6	128.4	33.2	10.1	10.1	360.5

Table A7.1 shows that the size of the "net growth rate percentage" is of substantial influence on the funding requirements, if the same percentage is assumed for all countries (which will never be the case in practice). A change in this percentage will change the funding requirement for 2000-2002, and it will substantially change the funding requirement (in absolute sense) for the period 2003-2005. E.g., each per cent reduction in CFC consumption per year would result in an approximate 8% reduction in the funding requirement for CFC based projects in the consumption sector over a 6 year period (2000-2005).

If the assumed "net growth rate" of 0% per year for all countries for the period after 1999 is changed to minus 2%, the estimated funding requirement for 2000-2002 decreases by US$ 18.5 million to US$ 21 million. A minus 5% "net growth rate" results in a decrease in the funding requirement of US$ 29.4 million to the "low" value of US$ 10.1 million for the period 2000-2002.

A minus 2% "net growth rate" decreases the estimated funding requirement for the 2003-2005 period by US$ 94.1 million to US$ 497.7 million, compared to US$ 591.8 million for the Base Case. A minus 3.5% results in a decrease by approximately US$ 165 million, a minus 5% in a decrease by approximately US$ 231 million, which is a huge amount compared to the amount determined in the Base Case.

One may refer here to the recommendation made by the Task Force in chapter 4 to transfer US$ 200 million from the 2003-2005 replenishment requirement to the replenishment period 2000-2002. Even if all Article 5(1) countries would show a 3.5% negative "net growth" (which results in a funding requirement for CFC project approvals of US$ 427.5 million) the transfer would still leave approximately US$ 227 million as replenishment requirement for the period 2003-2005, which is comparable to the requirement for an earlier replenishment period (e.g. 1997-1999).

This analysis demonstrates that changes in the "net growth rates" in all (CFC consuming) Article 5(1) countries can have substantial impacts on the estimated funding requirements for both the 2000-2002 and the 2003-2005 replenishment period.

A7.2 The Funding Implications of Different Implementation Lags

To investigate the funding implications for the 2000-2002 replenishment of changes in the speed of implementation, the assumed distributed time lag was varied and results were analysed. Only the implementation lag for projects approved after 1996 was varied. The following cases were studied:

Implementation Lags Function		Base Case	Fast Case	Slow Case
Implemented	within 2 years	60	100	45
	within 3 years	85	-	65
	within 4 years	95	-	80
	within 5 years	100	-	90
	within 6 years	100	-	100

It is important to note that the model used by the Task Force contains neither time discount rates nor inflation adjustment factors. Inflation rates and discount rates are both assumed to be zero. However, even in the absence of these factors, changes in the implementation lag assumption result in changes in the estimates of the funding requirement for the 2000-2002 replenishment.

Changes in the speed of project implementation, defined in terms of changes in the distributed time lag, would impact on the estimated funding requirement for each three-year replenishment period. For example, using the values in Table A7.2 above, if 100% of approved projects could be implemented within two years, rather than the 60% assumed in the Base Case, there would be a decrease of approximately US$ 10 million in the estimated funding requirement for the 2002-2002 replenishment, which does not seem to have a big impact (however, percentagewise it is a reduction of 25%). Furthermore, the estimated funding requirement for the 2003-2005 replenishment would decrease by approximately US$ 140 million. It should, however, be mentioned here that 100% implementation of projects within 2 years does not seem to be realistic.

Table A7.2 *Sensitivity of funding requirements (in US$ million) to implementation lags in projects dealing with CFCs, for the five Categories of countries*

Countries	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Total
"Base Case", 60-85-95-100%						
2000-2002	0	35.1	0	0	4.4	39.5
2003-2005	316.0	178.4	62.5	21.8	13.1	591.8
(Fast implementation: 100% within 2 years)						
2000-2002	0	26.9	0	0	2.6	29.5
2003-2005	233.2	146.0	45.2	14.8	11.6	450.8
(Slow implementation: 45-65-80-90-100%)						
2000-2002	0	44.2	0	0	6.1	50.3
2003-2005	415.1	220.4	81.2	28.8	15..3	760.8

Therefore, faster implementation of projects would reduce the combined funding requirement for the 2000-2002 and 2002-2005 replenishments by approximately US$ 151 million, which is about 25% of the combined funding

estimated for the Base Case. One should realise that this does not imply that the phaseout process as such will be less costly. Faster implementation means that the funding is used at the very moment that it is needed to satisfy the Montreal Protocol requirements, and no funding is available at a later stage. Slower implementation implies that not all the funding involved in approvals is used at the moment that it is needed; a certain amount of ODP tonnes from approvals is "available" at a later stage and will reduce the funding requirement for that later stage, a replenishment period in the future.

If the realised speed of implementation for the period after 1996 (including the replenishment period 2000-2002) were to be slower than assumed in the Base Case (i.e., 45% rather than 60% within 2 years, 90% implementation after five years rather than 95% after 4 years), then the estimated funding requirements for 2000-2002 would increase by approximately US$ 11 million and increase for 2003-2005 by approximately US$ 169 million. These estimates imply a net increase of approximately US$ 180 million over 2000-2005.

Faster implementation is important to achieve short-term targets at lower cost, however, it will not reduce much the cumulative cost of the longer term phaseout process. A certain higher amount of funding would be needed at a later stage. The potential savings of fast implementation (the extreme of 100% within 2 years) over 2000-2005 are presented in the preceding paragraph. These savings are significant, but this is only part of the reasoning if all future replenishment periods are taken into account.

Slower implementation than assumed in the Base Case does not seem likely. The example given above demonstrates a huge increase in funding required. However, also in this case it should be mentioned that the funding that is not used in the form of ODP tonnes at short notice, will be used at a later stage. The slow implementation case as demonstrated results in a total combined funding of about US$ 810 million. Due to the slow implementation of projects approved during 2003-2005 the funding may well be sufficient for the complete phaseout process (10% of the approvals of 2004 implemented after 2008).

(The complete funding for the CFC phaseout process may therefore be in the order of US$ 810 million, if all parameters would be as assumed in the Base Case: it would yield a funding requirement of roughly US$ 178 million for CFC investment projects for the last replenishment period 2006-2008. However, it should be underscored here that it is impossible to give a reliable estimate at this stage where still so many parameters can and will influence the CFC consumption pattern, and one should particularly refer to the "informal", "unorganised" sector).

Conclusions as presented above are different in the case of a negative "net growth" parameter. In that case, the statements about funding that is not used at short notice and that is therefore useful for a future part of the process are not true. The net growth plus the type of implementation are parameters that influence the model results in a complicated way. This is shown in the next three examples, given in Table A7.3, where the same implementation lag functions are applied (as for the calculations given in Table A7.2), with a "net growth" of –3.5%.

In principle, if one would not fund the phaseout process, CFCs would be phased out by the "net growth" in a country in the very long term (20-30 years). Whether this would happen in practice is questionable since the "net growth" will vary with the level of CFCs consumed (in certain sectors it will be impossible to phase out without assistance).

Table A7.3 considers a "net growth" percentage of 3.5% and determines values for different rates of implementation. It shows for the Base Case a funding requirement of US$ 443 million for two replenishment periods, where the implementation within 2 years would require a total funding of approximately US$ 310 million, a difference of US$ 133 million. In the case where the "net growth" percentage was assumed to be 0%, (see Table 7.2), the difference was US$ 151 million, substantially larger than in this case. Reducing the implementation as much as possible is of a certain importance, but practical parameters will certainly influence this. In conclusion, an implementation process where the majority (85%) of the approvals has been implemented within 3 years seems to be reasonable.

Table A7.3 *Sensitivity of funding requirements (in US$ million) to implementation lags in projects dealing with CFCs, for the five Categories of countries, assuming a negative "net growth" of 3.5%*

Countries	**Cat. 1**	**Cat. 2**	**Cat. 3**	**Cat. 4**	**Cat. 5**	**Total**
"Base Case", 60-85-95-100%						
2000-2002	0	15.4	0	0	0	15.4
2003-2005	215.8	142.4	43.5	13.9	11.9	427.5
(Fast implementation: 100% within 2 years)						
2000-2002	0	11.8	0	0	0	11.8
2003-2005	144.9	109.7	27.3	8.6	9.3	299.9
(Slow implementation: 45-65-80-90-100%)						
2000-2002	0	19.9	0	0	0	19.9
2003-2005	280.1	180.8	56.1	17.8	15.1	550.0

A7.3 Sensitivity of Replenishment to Cost-effectiveness Factors

Cost-effectiveness has a direct effect on the funding requirement. In principle it is easy to calculate. If one would decrease the cost-effectiveness by a certain factor (increase the costs involved) the funding requirement can be calculated by multiplying the Base Case values with the same factor. Doubling the costs would require a funding of approximately US$ 80 million for the period 2000-2002, but also almost US$ 1,200 million for the replenishment period 2003-2005.

Table A7.4 *Sensitivity of funding requirements (in US$ million) to differences in cost-effectiveness; next to the assumptions used in the Base Case, cost-effectiveness for all (CFC) application sectors was assumed to be equal to the cost-effectiveness threshold value, as well as to 60% of that threshold value*

Countries	**Cat. 1**	**Cat. 2**	**Cat. 3**	**Cat. 4**	**Cat. 5**	**Total**
"Base Case", cost-effectiveness values given in Table 5.2						
2000-2002	0	35.1	0	0	4.4	39.5
2003-2005	316.0	178.4	62.5	21.8	13.1	591.8
(Cost-effectiveness: equal to threshold values for all sectors)						
2000-2002	0	37.5	0	0	4.5	42.0
2003-2005	376.5	190.8	65.8	22.9	13.3	669.3
(Cost-effectiveness: equal to 60% of the threshold values for all sectors)						
2000-2002	0	22.5	0	0	2.7	25.2
2003-2005	225.9	114.5	39.5	13.7	8.0	401.6

Table A7.4 shows that, if all sectors would be funded at the threshold value as determined by the Executive Committee, the funding requirement for the period 2000-2002 would be increased by US$ 2.5 million (however, it would increase by US$ 78 million for the 2003-2005 period). If all sectors would be funded at 60% of the cost-effectiveness threshold value, the 2000-2002 funding requirement would be decreased by approximately US$ 14 million (however, the requirement for the 2003-2005 period would be decreased by approximately US$ 190 million).

The above given examples only demonstrate the importance of the cost level at which investment projects are funded. No further conclusions can be derived from the results of these calculations.

Annex 8 TEAP Questionnaire: Summary of Responses

A8.1 Introduction

Decision X/13 directs the Technology and Assessment Panel to consult widely with relevant persons and institutions and other relevant sources of information.

The TEAP Replenishment Task Force requested responses to a questionnaire that was sent to:

- members of the ad-hoc Working Group as created by the Tenth Meeting of the Parties;
- individual members of the 1998 and 1999 Executive Committees, respectively;
- the Ozone Secretariat;
- to all Article 5(1) and non-Article 5(1) Parties via the Ozone Secretariat, in languages;
- the Secretariat of the Multilateral Fund.

Inter alia, the questionnaire requested information on ODS consumption and the role and effectiveness of domestic policies.

A8.2 Summary of the Responses

The TEAP Replenishment Task Force received 21 written responses to the questionnaire. The Task Force is grateful to those who responded for their care and attention in providing their responses to the questionnaire. A short summary of key points is provided below.

- Meeting the 1999 freeze for Annex A, Group I substances is not seen as being very difficult, although the prices and/or non-availability of chosen substitutes could be an impediment;
- The commercial refrigeration, refrigeration and air conditioning servicing and process agent sectors are seen as important sectors to be addressed during 2000-2002;
- The time frame 2000-2005 is crucial due to the major reduction steps that are required by 2005;
- The phaseout of ODS use in the SME sector require separate and higher cost-effectiveness thresholds and the SME funding window should be extended to other sectors;
- National governments should play an important role in assisting in the ODS phaseout for the SME sector which may require Multilateral Fund support for government management costs;

- Effective implementation of domestic policy initiatives, based on institutional strengthening and training, are seen as being of crucial significance in the post-2000 period, but the level of assistance required is difficult to specify;
- "Maintaining momentum" should be retained and encouraged during the 2000-2002 replenishment;
- The analytical methods used by the Replenishment Task Force are widely supported as being appropriate for the 2000-2002 replenishment study;
- Incentives are required to reduce the use of methyl bromide based on the results of the demonstration projects;
- Implementing Agencies should liaise closely with country implementing institutions in project formulation and implementation;

A8.3 Conclusions

The main conclusions drawn from the responses to the TEAP questionnaire are as follows:

- The analytical procedures used in the preparation of this report have been well-received;
- There is widespread agreement that the supporting activities to the investment projects, i.e., non-investment projects, especially institutional strengthening and training, are an essential instrument to the design and implementation of effective domestic policies; and that
- There is strong support to make provisions for the funding required during the period 2003-2005 in the requirement for the 2000-2002 replenishment period, i.e., to advance (part of) the funding required during the replenishment period 2003-2005.